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INFORMĀCIJAS TEHNOLOĢIJU IZMANTOŠANA IZGLĪTĪBĀ
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COMPARATIVE STUDIES OF COVID-19 IMPACT ON STUDENTS' VIEWS ON DIGITAL HIGHER EDUCATION

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Abstract. *Higher education sector has been significantly adapting to the new situation created by the COVID-19 pandemic. Despite students are often referred to, students are rarely at the centre of the concerns being raised. The research aim is to compare students' views on digital higher education in light of COVID-19 underpinning the identification of issues in digital higher education in light of COVID-19. The research implies theoretical and empirical methods. The exploratory empirical study was carried out. Semi-structured interviews serves as the data collection method. Content analysis was applied to the obtained data for data processing. The theoretical analysis allows finding that digital environment in higher education is not limited by only a technical aspect of its organisation. Digital environment also implies students' health, financial and economic situation, etc. The empirical findings contribute to the conclusion that digital higher education in light of COVID-19 is negatively evaluated by students. The most common issues faced by students are identified. The research question is newly formulated. Directions of further research are proposed. The novelty of the paper is presented by the identified issues in digital higher education in light of COVID-19.*
Keywords: Comparative studies, COVID-19 impact, digital higher education, issues, sampling, students' view.

Introduction

The pandemic Covid-19 has spread over the whole world. It was the first identified in Wuhan, China, on December 31, 2019. The first death by COVID19 was the 61-year old man in Wuhan, China, 2020. World Health Organisation

(WHO) declared COVID-19 to be a pandemic in 2020. February 11, 2020, the World Health Organisation (WHO) proposed the official name of the virus as COVID-19.

The global outbreak of the COVID-19 pandemic has led to the unprecedented changes in people's lives. Many people have experienced rapid transformations from conventional prototype to digital prototype (Ramar & Zaščerinska, 2015) of many aspects of their lives: working, education, shopping, travelling, etc. The pandemic COVID-19 has compelled the human society to maintain social distancing. The spread of the pandemic COVID-19 has significantly disrupted the higher education sector which is a critical determinant of a country's economic future. Also, education is considered as an essential human virtue to humanize a human being (Ramar & Zaščerinska, 2015). Occurrence of COVID-19 has impacted more than 120 crores of students across the planet.

Higher education sector has also been significantly adapted to the new situation created by the COVID-19 pandemic (Ahrens & Zascerinska, 2021). Higher education is conventionally delivered by higher education institutions. The terms "higher education institutions", "universities", "academies" and other names are used synonymously in this work. Also, by the term "higher education", higher education's educational environment is meant. Pressed by the COVID-19 pandemic, higher education institutions were able to rapidly change (Ellis-Haque, 2020). Almost overnight, university staff were able to start online working and teaching from home (Ellis-Haque, 2020). Online working and teaching from home have been identified as the new normal (Ellis-Haque, 2020). However, the work put into achieving this should not be under-estimated (Ellis-Haque, 2020). These intensive and immersive digital educational opportunities make the student learning more productive, informative and creative (Hariharan, Zascerinska, & Swamydhas, 2013). Hence, students are revealed to be the key participants (Ahrens, Purvinis, Zaščerinska, & Andreeva, 2015). For example, higher education institutions are closed if they do not enroll enough students. If students are not satisfied with the higher education delivery at one higher education institution, than they can change to another one, even if it is located in another country (Ahrens, Grünwald, Bassus, Andreeva, Zaščerinska, & Melnikova, 2018). Consequently, the students' primary role in higher education cannot be diminished. Against students are referred to, students are rarely at the centre of the concerns being raised (Timmis, 2020). Huge differences in experience persist both within and between different country contexts, largely driven by existing inequalities (Timmis, 2020).

The research aim is to compare students' views on digital higher education in light of COVID-19 underpinning the identification of issues in digital higher education in light of COVID-19. Both theoretical and empirical methods are used

in the present research. Theoretical sources were anaylszed, theoretical modelling was implemented within the theoretical investigation (Ahrens, Zascerinska, & Melnikova, 2019). The empirical study was exploratory. The aim of the exploratory study was to propose new research questions. Data collection was based on semi-structured interviews. The obtained data were processed via content analysis. The novelty of the paper is presented by the identified issues in digital higher education in light of COVID-19.

Conceptual Framework

Digital higher education, also referred as digital environment, is centred on teaching and learning (Ahrens & Zaščerinska, 2012). Staff and students have a responsibility to work together to ensure that online sessions, whether live or asynchronous, are inclusive and that all students are encouraged to contribute equitably and their contributions are respected (Davies, 2020). Among the many lessons learned from the COVID-19 pandemic is the power of technology to connect us wherever we are (Visco, 2020). Advanced communication tools have the power to bring us together, keep us engaged and ensure we remain on a positive track toward our career and personal goals (Visco, 2020). Increased use of technologies and digital services can have an impact – both positive and negative – on students' mental, physical, social and emotional health (Davies, 2020). The on-line model which universities have adopted is designed to support staff-student and student-student interaction and engagement, in order to mitigate the risk of students feeling isolated (Davies, 2020). Using mobile messaging, push notifications, and other mobile-first strategies is a "must" for universities looking to connect with students who today are living almost constantly online (Visco, 2020). If remote learning solutions do not function across devices, student participation is likely to suffer as students struggle to connect, submit assignments, attend lectures and events and keep up with campus life (Visco, 2020). For the teaching delivery, digital environment in higher education should be ensured by the availability of teacher's and students' computers and other electronic equipment, the Internet and other necessary infrastructure such as mobile-first (Visco, 2020), and the required software on both teacher's and students' computers and other electronic equipment.

Methodology of the Empirical Study

The methodology of the empirical study was based such the key elements as the question, purpose, sample and methodology of the empirical study.

The question that guided the empirical study was formulated: What are students' views on digital higher education in light of COVID-19? The empirical

study was aimed at comparing students' views on digital higher education in light of COVID-19. It is worth pointing that individual's view is defined as his/her knowledge, skills and attitudes to a phenomenon (Ahrens, Zaščerinska, Hariharan, & Andreeva, 2016). The knowledge, skills and attitude are inter-related (Ahrens & Zaščerinska, 2015a). The inter-connections between knowledge, skills and attitude allow identifying individual's attitude to be the key element of the individual's view on a phenomenon. Traditionally, attitude is differentiated into positive, neutral or negative as illustrated in Figure 1 (Ahrens & Zaščerinska, 2014a). However, for the study purposes, only positive and negative attitude, or, in other words, view will be considered.
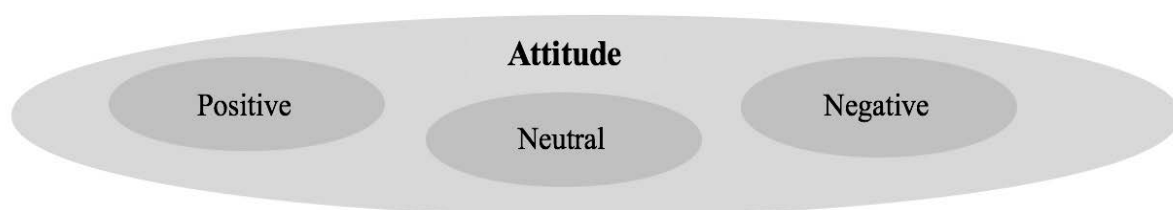
*Figure 1 **Differentiation of Attitude** (Ahrens & Zascerinska, 2014a)*

The empirical study was conducted in November-December 2020. The principles, namely sample appropriateness, sample sufficiency, and sample confidence (Ahrens & Zaščerinska, 2015b), influenced the sampling of the empirical study. The sampling process proceeded (Ahrens & Zaščerinska, 2016) from Phase 1 Identification: the identification of the target population and its accessibility through Phase 2 Formation: building the sample by specifying the sampling frame and its homogeneity, deciding on sample size, considering timing and types of sample (simple random, systematic and stratified sampling, etc), selecting the sample, etc. to Phase 3 Evaluation: the sample evaluation by non-statistical methods such as internal and external evaluation. The sample size was formed by the factors (Ahrens & Zaščerinska, 2014b). The factors were divided into external and internal factors (Ahrens & Zaščerinska, 2014b). External factors focused on surroundings' and resources' factors. These were the access to the sample and resources. The resources' factors implied time, personnel and its competences and experiences, technical support, and measurement procedures, (Ahrens & Zaščerinska, 2014b). The internal factors referred to the researcher (Ahrens & Zaščerinska, 2014b): aims of research, aims of generalisation, research methodologies, educational research paradigm, motivation, interest, skills, and experience (Ahrens & Zaščerinska, 2014b).

The sample of the present empirical study was composed of 10 respondents: three international students from Germany, two domestic students from Latvia, one domestic student from India, one domestic student from the USA, two

domestic students from the UK, and one domestic student from South Africa. For the confidentiality purposes of the present research, the respondents' names and surnames were coded as R1, R2 and R3 (Respondent 1, 2 and 3 from Germany), R4 and R5 (Respondent 4 and 5 from Latvia), R6 (Respondent 6 from India), R7 (Respondent 7 from the USA), R8 and R9 (Respondent 8 and 9 from the UK), and R10 (Respondent 10 from South Africa). All the respondents obtained or were obtaining different degrees in different scientific fields in different countries and cultures. In regard to the international students, it should be pointed that Germany is famous with enrolling students from such countries as India, China, Egypt, etc (Ahrens, Gruenwald, Bassus, Zaščerinska, & Melnikova, 2017; Ahrens, Grünwald, Bassus, Andreeva, Zaščerinska, & Melnikova, 2018; Gruenwald, Ahrens, Zaščerinska, Melnikova, & Andreeva, 2018). The international students in Germany have to keep a certain amount of money for living in the country and are allowed to work not more than 20 hours per week. The international students in Germany mostly live in a dormitory or rent a flat. The domestic students who took part in the study in the other countries mostly they lived in the parents' flats and houses. They are allowed to work in accordance with the state legislation (about 40 hours per week) if they can manage to combine studying and working. Working experience of the participating respondents was different, too. The respondents represented different professional cultures such as banking, education, business, etc. Hence, the respondents' socio-cultural context (age, working field, the field of study, mother tongue, etc.) was heterogeneous. Further on, the respondents with different cultural backgrounds and diverse educational approaches participated in the study. Thus, the study's sample was multicultural. Such the sample composition highlighted the significance of the analysis of responses received from each respondent (Luka, Ludborza & Maslo, 2009). The respondents' different cultural and educational backgrounds allow examining the process of the construction of the knowledge and opinion (Krueger, & Casey, 2000).

A generally exploratory methodology is proposed. Here the exploratory relates to being open at the outset of the study. The exploratory study was aimed at answering the questions and generating new research questions. This will allow flexibility in the assessment of digital higher education. Explanatory elements will relate to identifying common patterns of association relating to the success of embedding digital into higher education. The study employed the implementation in three main steps: conceptualisation, case studies, and culmination. The study started with the conceptualisation step (Phillips, 2006) during which a comprehensive literature review was undertaken to inform refined research methodology and tools. This step described digital higher education. The second step was case studies collecting data in semi-structured interviews with students across selected countries. The third step elaborated on the study findings in the

form of case studies to feed into the development of new research questions on digital higher education for higher education providers, stakeholders, and practitioners.

The data were collected via the semi-structured interview. The semi-structured interviews were used as the researchers had obtained the initial knowledge on the research field (Kroplijs, & Raščevka, 2004). The semi-structured interviews were conducted with the respondents in different time. The semi-structured interviews were based on the following question: What is your view on digital higher education during the pandemic COVID-19? The semi-structured interviews were recorded and detailed notes made. The semi-structured interviews were relatively open and exploratory until novel issues stopped emerging. Full transcripts were made, and thematic analysis was carried out to elucidate common themes, and topics of discussion.

The collected data were pre-processed via selection of data sets and data preparation (partition, localisation and cleaning) (Ahrens, Zaščerinska, Melnikova, & Andreeva, 2018). The collected data were further processed via content analysis (Ahrens, Foerster, Zaščerinska, Wasser, 2020). Two types content analysis were carried out (Mayring, 2014), namely the structuring content analysis and the summarizing content analysis. By the structuring content analysis, categorising the data in accordance to the previously determined criteria is meant (Budde, 2005). The summarizing content analysis intends to reduce the material in order to preserve the essential contents in a manageable short text (Mayring, 2004, p. 269). Pedagogical interpretation was applied in the proposed study. Pedagogical interpretive paradigm is conventionally used by the researcher who demonstrates a practical interest in the research question (Cohen, Manion, & Morrison, 2003). The interpretive paradigm assists in the analysis of the social building of the meaningful reality. Interpretation allows the meaning to appear. The researcher serves as the key interpreter (Ahrens, Purvinis, Zaščerinska, Miceviciene, & Tautkus, 2018) of the meaning.

Results of the Empirical Study

R1 explained that his computer broke in the middle of the semester. Due to the pandemic COVID-19, he could not find any job to earn some money for buying a computer. His parents could not support his buying a new computer.

R2 wished to updated his computer as his computer had not enough space for installing a specific software to be used for his engineering studies. The shop staff offered him to join the on-line queue for a couple of months as the demand for new computers as well as spare computer parts was higher that the offer.

R3 also had some computer problems and applied for a scholarship in order to spend the scholarship money for buying a new computer.

Respondents R4 and R5 point that the transfer of studied from on-campus format to the digital one requires more computers per family as well as space for taking part in on-line classes. The respondents explained that if a family has a couple of children who learn at school and/or study at university, the classes usually are given at the same time. Consequently, each family's child, who learns or studies, requires an own computer with the needed infrastructure as well as a separate room. Very often the child's parents also work from home, and the parents need their own computer and equipment for working as well as the room. Both respondents stressed that due to people who mostly worked from home, the Internet network was overloaded, and, consequently, the connection for the on-line classes was lost, even for a couple of times per one class. Both respondents could not find any job as many companies in the country were on lockdown, and many employees lost their jobs. In that situation, buying a computer for each family member was a demanding task for the family budget.

R6 indicated that India is a large and diverse country. In India, there are about 38 million student population in about 1000 universities and 47,000 colleges. The respondent presented a study of NCERT (2020). The study indicates that approximately 27% of the students do not have access to smartphones/laptops to participate in online classes (NCERT, 2020). Imparting online education depends on the availability of technical infrastructure that varies in India over the length and breadth (NCERT, 2020). The respondent highlighted that adopting complete online learning is also becoming a health hazard for students. Online education is a reason of such diseases like obesity, sleep disturbances, spinal problems, anxiety, and depression (NCERT, 2020). RIS1 assumed that almost 43 lakh are disabled students across the states in India. There is a danger that the disabled students may drop out as they are not able to cope with online education. The respondent pointed that WhatsApp is the dominant mode of online education delivery. Phone calls between teachers and students are also intensively used. Online teaching is an issue for teachers as half of the teachers faced problems with expensive data and slow internet (NCERT, 2020). Due to these issues, almost 84% teachers difficulties with online teaching (NCERT, 2020). The respondent also underlined that many housholds have a limited access to the technical infrastructure: only one tenth have access to the computer, and one fourth - to internet facilities (NCERT, 2020). Students digital literacy (computer and internet) has to be increased: one fourth of the students obtain the knowledge of computer and internet use (NCERT, 2020). Access to the internet in rural and urban India is of a vast disparity. While in the urban areas, the access and use of the internet reaches 43%, in the rural areas only 16% benefit from it (NCERT, 2020). In rural areas, computers are used hardly 10% while 32 % - in urban areas (NCERT, 2020). This disparity poses a huge challenge for providing online education in India. Such a situation deepens the regional digital divide across the

India states: in the poor states, household access to the internet is particularly low, and high - in the developed states. Such digital divide raises a dual challenge for poorer states: on the one hand, the poor states are already burdened by poor infrastructure and educational achievements, and, on the other hand, the poor states now face the issue of the quality of online education (NCERT, 2020). The respondent highlighted another aspect of online education such as the risk of cyber-bullying, including children's privacy, online discrimination, online sexual abuse, and harmful content. The respondent consider that online education should be safe.

R7 pointed that 93% of low-income teens say they have access to a smartphone and 75% have access to a computer at his university. The respondent opined that Students do not check their email that often, and do not open every email they receive. They are skilled at skimming subject lines and preview text and know how to use filters to organize their inbox based on preferences, so there is no guarantee a promotional email will be opened, let alone read in full. The respondent revealed that university inboxes are filled with emails from peers, professors, departments, programs, and campus activities—many of which send emails too frequently. And personal inboxes are filled with so much more. Students are a little lost in the crowd. Many students roll their eyes at poorly formatted emails, lengthy and long-winded emails, and emails that are followed by slightly different twins with correct event times or campus locations.

R8 assumed that students would get a non-qualitative university experience due to on-line learning. The students seem to lack the material resources needed for online classes. Before the COVID-19 pandemic, students could do temporary, casual and part time jobs. However, the COVID-19 pandemic forced the rapid collapse of the student economy. Students' unemployment situation also means more students' stress about paying their rent or bills. Such situation provoked students to stay on in the family home. However, home university may be unsuitable: students need a quiet place in the house for study. As many working activities are transferred to home office, another issue is to have a reliable internet connection. Against this background, there are some students who may like using online education. One of the aspects is online discussions. Some students are eager to take part in online discussions presenting and argumenting their opinion due to the relative anonymity of online discussions. Another aspect is that move to online learning also makes higher education more attractive for disabled students. Online education does not require disabled students to get to buildings on campus which might be physically difficult for such students. There are also mature students who prefer flexibility of online learning. The respondent emphasized accommodation bubbles where students will not have a social distance.

R9 stressed that 'fluid, flexible timetables' are an advantage for a student. The respondent disclosed that students need more support in many aspects from their family, community or workplace. The respondent also noted that the students' group became a broader age-range, more diverse nationally and culturally, on-campus students mixing with distance students.

R10 faced difficulties in access to both infrastructure and connectivity since they are often severely limited. If the systems and processes adopted by universities are too technocratic, a student cannot participate alongside your fellow students in an online zoom class because there is no access to the Internet. These kind of situations increase students' feeling of anxiety and isolation. R10 also reported that some students identified that they were victims of racism as they were not safe even in an environment which was supposed to be welcoming and tolerant.

Findings of the Empirical Study

Due to the structuring content analysis of the collected data, issues in digital higher education have been identified. The findings of the empirical study are presented in Table 1.

The implementation of the summarizing content analysis reveals that students' negative view on digital higher education in light of COVID-19 prevails.

*Table 1 **Issues in Digital Higher Education in Light of COVID-19 from the Students' View***
(the authors)

Digital higher education			
Teacher's and students' electronic equipment	The Internet and other necessary infrastructure	Software on both teacher's and students' electronic equipment	Other issues
A broken personal computer (1 respondent) No access to smartphones/ laptops (3 respondents) Phone calls between teachers and students (1 respondent)	The overloaded Internet connection (4 respondents) Lack of technical infrastructure (2 respondents) Expensive data (1 respondent) Slow internet (1 respondent) Limited access to internet facilities (1 respondent)	Space limit on a personal computer for installing the required (1 respondent) Use of WhatsApp (1 respondent)	No job or similar for getting the money for a new/repaired computer (4 respondents) A queue for buying or repairing a computer (1 respondent) No own room/space for taking part in on-line classes (1 respondent) No personal computer for each member in a family (1 respondent) a health hazard for students (2 respondents)

	Low use of the internet in rural areas (1 respondent) Poor infrastructure (1 respondent)		disabled students' inability to cope with online education (1 respondent) lack of knowledge of computer and internet use (1 respondent) quality education on a virtual platform (2 respondents) cyber-bullying on the Internet (2 respondents) poorly formatted university emails to students (1 respondent) accommodation bubbles (1 respondent)

Source: The authors.

Conclusions

The theoretical analysis defines that digital environment in higher education is not limited by only a technical aspect of its organisation. Digital environment also implies students' health, financial and economic situation, etc. The empirical findings allow concluding that digital higher education in light of COVID-19 is negatively evaluated by students. The most common issues faced by students are the overloaded Internet connection (4 respondents), no job or similar for getting the money for a new/repaired computer (4 respondents), and no access to smartphones/ laptops (3 respondents). Despite the difficulties met by students, the positive aspects of digital higher education highlighted by students include disabled students' benefits from flexibility of online learning (2 respondents), students' confident participation in on-line discussions (1 respondent), nationally and culturally diverse students' group (1 respondent).

Some limitation in the study have been outlined. Participation of only 10 respondents from few countries in the conducted semi-structured interviews is recognised as a limitation. The use of one method for data collection is also determined as a limitation. The new research question has been put forward: What is a training for teachers who organize a digital environment in higher education to be based on students' health, financial and economic situation as well as other aspects? Future research will involve more respondents such as university teachers, employees, local government, and wider community into the empirical study. The search for methods of data collection is planned, too. Comparative studies on digital higher education in different countries are of great interest in the scientific community.

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ПРАВОВОЕ РЕГУЛИРОВАНИЕ РЕЗУЛЬТАТОВ ВЫСШЕГО ОБРАЗОВАНИЯ И EDTECH-ИНСТРУМЕНТОВ В УСЛОВИЯХ ОГРАНИЧЕНИЙ РАСПРОСТРАНЕНИЯ COVID-19 В ЛАТВИИ И РОССИИ

Legal Regulation of Higher Education Results and Edtech Tools in the Context of Restrictions on the Spread of Covid-19 in Latvia and Russia

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Abstract. *The use of EdTech tools to achieve higher education results in the context of restrictions on the spread of Covid-19 transforms both the process of higher education and reflects the need to make corrections in the formulation of the results of traditional higher education in social and humanitarian areas of training. The article proposes an analysis of the regulation of the results of higher education and the use of EdTech-tools in accordance with the current standards. Generalization of the competence of subjects of educational activity in the formation of individual educational results allows segmenting into traditional and alternative carriers of educational products. A roadmap for achieving compliance of quality criteria of EdTech tools for improving the results of higher education is proposed.*
Keywords: EdTEch-tools, education results, standards, quality criteria.

Введение
Introduction

Актуальность исследования выражено условиями Covid-19, масштабированием цифровых технологий и трансформацией образовательного процесса. Происходит адаптация традиционных форм в виде дистанта, онлайна, смешанного, интеграционного обучения. Данный факт объясняется значительным образовательным сегментом и массовым

целевым потребителем образовательных и IT–услуг в целях сбыта IT-продукции, где с помощью государственного воздействия путем закрепления правовых норм и стандартов стимулируется совокупное предложение ведущих IT-поставщиков.

Целью исследования является предложение дорожной карты на предмет соответствия EdTech-инструментов и образовательных результатов стандартам для применения адаптивных форм обучения высшего образования Латвии и России социальных и гуманитарных направлений в условиях ограничения распространения Covid-19.

Задачи исследования:
1) анализ норм и стандартов правового регулирования результатов, в том числе компетенций высшего образования социальных и гуманитарных направлений;
2) обобщение компетенций субъектов образовательной деятельности по формированию отдельных образовательных результатов;
3) применение EdTech-инструментов в достижении образовательных результатов социальных и гуманитарных направлений;
4) отражение примеров в рамках сравнительного анализа высшего гуманитарного образования в России и социальных, гуманитарных направлений высшего образования в Латвии.

Методология исследования
Research Methodology

Объект исследования: EdTech-инструменты в достижении результатов высшего образования и их соответствие стандартам в условиях ограничения распространения Covid-19.

Предмет исследования: правовое регулирование результатов высшего образования на предмет соответствия стандартам.

Гипотеза исследования: применение EdTech–инструментов в достижении результатов трансформирует процесс, результаты высшего образования и перспективы трансформации профессиональной сферы на рынке труда.

В рамках исследования использован диалектический подход, дедуктивный подход, метод правового анализа, а также моделирование.

Результатом моделирования служит модель процесса, включающая этапы последовательности, эталонные критерии и дескрипторы по разработке образовательного контента при внедрении EdTech-инструментов. В рамках моделирования составлена дорожная карта, детализирующая принципы, факторы, классификацию форм обучения, организационно-правовые аспекты.

Дискуссия и результаты
Discussion and Results

Актуальность применения EdTech-инструментов, начиная от реконструкции кадрового состава (пересмотр и перераспределение функционального пакета педагогического работника) до применения адресных образовательных решений участниками образовательного процесса, раскрывается комплексом проблем, связанных с угрозами потери академической, финансовой устойчивости и целевой аудитории.

Высшее образование в гуманитарной и социальной сфере, в том числе экономики и юриспруденции, характеризуется применением традиционных форм обучения, непосредственным контактом между преподавателем и учащимся/магистрантом. К примеру, в сфере юридического и экономического образования, как в Латвии, так и в России традиционно применяются следующие формы обучения: лекция, семинар, практическое занятие. Тем самым в обеих странах сложилась устойчивая система традиционного обучения, направленная на максимальное получение учащимся/магистрантом знаний, умений и навыков, позволяющих достигать профессиональной и академической компетенции в рамках определённых программ. Однако период пандемии, начиная с весны 2020 года и продолжающийся до сих пор, в условиях чрезвычайной ситуации, потребовал не только формального переноса традиционных форм обучения в э-формат (англ. on-line), но и постоянного совершенствования форм обучения в целях сохранения качества образовательного процесса.

Онлайн-мониторинг отзывов получателей (194) образовательных продуктов в России (Васильева М. В., Рожкова А. Ю., 2020, с. 73) выявил дополнительные формы обучения в работе с цифровыми ресурсами, мобильными приложениями и технической оснащенности (54 %). При этом, «готовность вузов к переходу на цифровое образование отражено успехами и неудачами, в том числе связанными с дополнительными ограничениями самоизоляции от COVID» (Рис.1).

«К неудачам вузов отнесена ограниченность доступа к образовательным платформам (45), дистанционная форма диалога (32), ухудшение качества преподавания (23) и учебно-методического сопровождения (24). Успехами послужили адаптивное применение комплекса месенджеров, соцсетей, разовых Е-платформ (Zoom) (48) в целях обеспечения обратной связи. Также самоорганизация в формировании цифровых умений (41), высвобождение временных ресурсов (17) послужили улучшающим фактором формирования адаптивных умений и навыков к применению цифровых ресурсов».
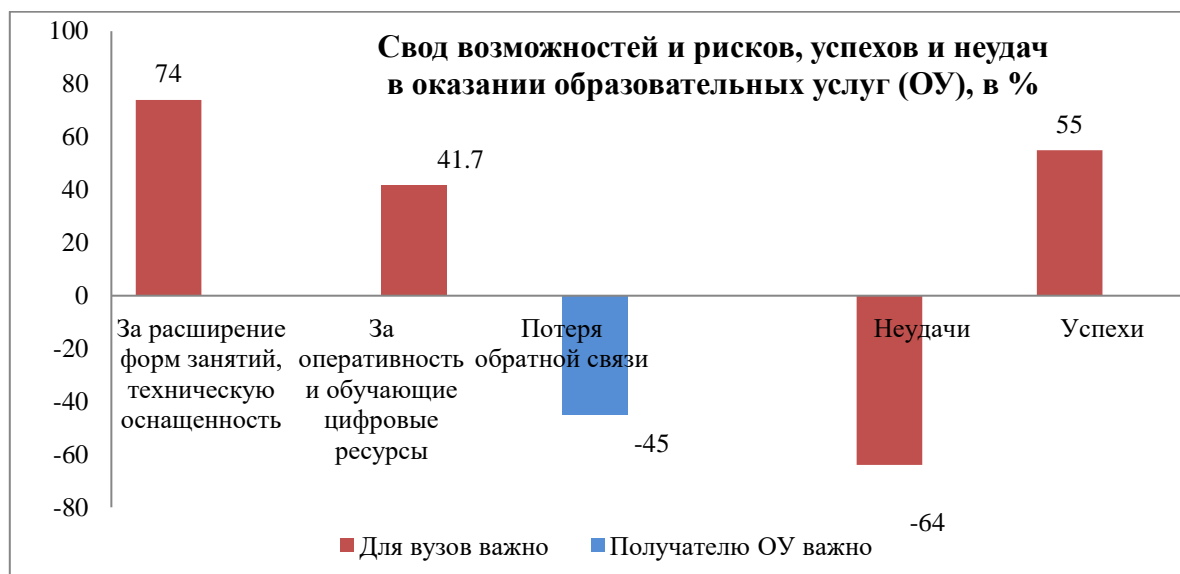
*Рисунок 1. **Уровень готовности к переходу на цифровое образование***
*Figure 1 **The Level of Readiness for the Transition to Digital Education***

В конце 2020 года Академическим сектором студенческого самоуправления Резекненской Технологичекой академии был проведён опрос, который наряду с позитивными отзывами по применению электронной среды платформы Microsoft Team и Google Meet, выявлены цифровые возможности и проблемные аспекты. Наблюдается увеличение нагрузки по выполнению индивидуальных работ. Снижается способность студентов качественно воспринимать традиционные формы подачи материалов (RTA Studējošo pašpārvaldes Sabiedriskais sektors, 2021).

В свою очередь, согласно российским нормам пункта 0.1 ГОСТ Р ИСО 10001-2009, пункта 3.3 ГОСТ Р 50646-2012 предусмотрено обеспечение «высокой степени удовлетворенности потребителя» образовательными услугами.

Так, авторы монографии (Andreyanova, Bulgakova, Motajlenko, Rozhkova et al., 2021, 135) приводят анализ положений о стандартизации понятийного аппарата IT-технологий согласно ГОСТ 33707-2016, ГОСТ Р ИСО/МЭК 38500-2017 России, в ходе которого приходят к выводу: «термин «информационные ресурсы» аналогичен термину «информация» IT-сферы. Пункт 3.2.1 ГОСТ Р 52653-2006 раскрывает «дистанционные образовательные технологии» как часть IT-технологий и ИКТ «при опосредованном (на расстоянии) или частично опосредованном взаимодействии обучающегося и педагогического работника», что соответствует части 1статьи 16 Закона № 273-ФЗ.

Таблица 1. **Дескриптивная модель разработки образовательного контента**
Table 1 **Descriptive Model for the Development of Educational Content**

Описание этапов разработки образовательного контента	Структура критериев качества		
Уникальный идентификатор УИ 12345			
Процесс разработки курса	IT-условия	Число эталонных критериев	Число дескрипт ивных критериев
Процесс оценивания и выбора дидактической концепции и методов		101	32
Процесс анализа целевой группы для обучения	Технические аспекты	103	23
Цель процесса - обоснованный выбор одной или большего числа дидактических концепций	Функциональн ое назначение	69	29
Задачи процесса - идентификация метода, альтернативы метода, присвоение приоритета методу	Хранение и обработка данных	37	14
Выбор методов согласно целевой группе для обучения, опыту преподавателей и нормам: ГОСТ Р 52653-2006 ГОСТ Р 53625 (ИСО/МЭК 19796-1:2005) ГОСТ Р ИСО 10001-2009	Теоретические аспекты	80	17
Ожидаемый результат процесса, описанные в спецификации методов	Кодирование информации	59	3
Дидактическое построение команды	Специальные режимы представления	31	0
Оценка и выбор эталонных критериев качества	Итого	480	118

Согласно пункту 6.1 ГОСТ Р 53625 предложена унифицированная дескриптивная модель процесса (Табл.1) разработки *образовательного контента курса*, где раскрывается его механизм проектирования и реализации согласно критериям оценки качества. Положения таблицы 1 отражают взаимосвязь критериев на каждом этапе по горизонтали и вертикали в рамках анализа качества и сертификации продуктов и процессов электронного обучения. Данная модель отражает последовательность процессных действий, которые должны коррелировать между собой, и в совокупности, соответствовать эталонным и дескриптивным критериям. При этом в качестве дескрипторов (их доля составляет 25 %) могут служить профильные идентификаторы, выраженные

индикаторами компетенций, учитывающие профессиональную и отраслевую принадлежность. Каждый этап процесса с применением EdTech-инструментов обеспечивает новое качество образовательного контента и результатов высшего образования, служащим фактором модификации профессиональной рамки компетенций.

В свою очередь, отсутствие законодательного закрепления дефиниции *«компетенция»* в Законе № 273-ФЗ требует раскрыть природу свойствами академичности и профессионализма, цифрового и опережающего свойства компетенций, которые могут быть востребованы, служить отдельным основанием квалификационных требований к выполнению трудовых функций и действий работником.

Так, выявлен признак прогноза компетенции в «предвидении и адекватно оценивать собственную образовательную, профессиональную траекторию» (Fatkulina, 2016, 2). Педагоги-психологи, указывают на инновационность, креативность и ролевые признаки (Panfilova, 2017, 43, Popova, 2017, 67) компетенций. Однако, указанные признаки требуют дополнения новыми (цифровыми) проявлениями в достижении конкурентоспособности работника. Поэтому, предлагается закрепить в статье 2 Закона об образовании (№ 273-ФЗ) формулировку: «Компетенция – это комплекс индикаторов знаний, умений и способностей, навыков, профессиональные признаки которых раскрывает свойство трудовых функций и степени соответствия квалификационным требованиям в условиях развития рынка труда».

Согласно части 2 статьи 16 Закона № 273 – ФЗ предусмотрено право образовательным организациям применять форму Е-обучения, уместно разграничить правовой статус образовательной организации и организации некоммерческого сектора для выявления основного носителя академической устойчивости, выраженной качеством образовательных результатов, приведенных в соответствие со спросом на комплекс компетенций на рынке труда. В силу пункта 18 статьи 2 Закона № 273–ФЗ закреплена основная образовательная деятельность в соответствие с уставными целями.

Так, отмечается, что образовательное учреждение является частным от некоммерческой организации (Matveev, 2020). В силу таких особенностей предлагается рамка компетенций по следующим уровням:

1. Комбинированная рамка компетенций – это базовый набор профессиональных, деловых, цифровых и образовательных качеств (непрерывный апгрейд профессиональной структуры) в зависимости от отраслевой принадлежности на основе применения цифровых ресурсов открытого и публичного онлайн-доступа.

2. Профессиональная рамка компетенций – это набор квалификационных требований по применению, внедрению профессиональных и автоматизированных отраслевых технологий на основе стандартов технологической оснащенности и доступности к цифровым продуктам.

3. Стратегическая рамка компетенций – это набор профессиональных, технологических и образовательных качеств, проявляемых при проектировании, разработке IT-продуктов.

Относительно *традиционных участников* применимы более высокие, 2 и 3, уровни рамки компетенций, отражающие выполнение требований к образовательным результатам по принципу «hard-skills», выпускающих кадров гуманитарной и производственной группы профессий высшего образования.

В свою очередь, в стратегии долгосрочного развития Латвии до 2030 года подчёркнуто, что мировая экономика и технологии в ближайшее двадцатилетие могут резко меняться. Эффективная и эластичная система высшего образования является решающим фактором конкурентоспособности и ценности человеческого капитала (Latvijas ilgtspējīgas attīstības stratēģija (LR Saeima, 2015)).

Стандарты высшего образования Латвии можно подразделить на стандарты первого уровня профессионального высшего образования, стандарты академического образования второго уровня (бакалаврские и магистерские программы) и стандарты профессионального высшего образования второго уровня (бакалаврские и магистерские программы).

Относительно юридических профессий стандарт профессии юриста (лат. - Jurista profesijas standarts) и стандарт профессии помощника юриста (лат. - Jurista palīga profesijas standarts) являются императивом применения во всех юридических программах Латвии. Данные стандарты содержатся в нескольких правовых документах: в Законе о высших учебных заведениях образовании (lat.-Augstskolu likums (LR Saeima, 1995)), подзаконных актах – Правилах Кабинета министров (lat.-Ministru kabineta noteikumi). Особенностью юридического образования является этап академического бакалавриата, основы которого содержат Правила Кабинета министров «Правила о государственном стандарте академического образования» (Ministru kabineta noteikumi par valsts akadēmiskās izglītības standartu (LR Ministru kabinets, 2014).

Начиная с весеннего семестра 2020/2021 учебного года, магистранты всех юридических программ Латвии будут сдавать централизованный экзамен по праву, для подтверждения квалификации юриста (Правила Кабинета Министров от 14.01.2019 № 46 «Порядок государственного централизованного экзамена профессиональной квалификации юриста»

(Ministru kabineta noteikumi «Valsts vienotā jurista profesionālās kvalifikācijas eksāmena kārtība» (LR Ministru kabinets, 2019)). Детальнее о требованиях централизованного экзамена в статье авторов 2020 года (Andrejanova, Bulgakova, Rozhkova, 2020).

Отметим проблему обеспечения и принятия экзаменов с использованием EdTech-инструментов, а именно недостаточность правового закрепления по проведению единого выпускного государственного экзамена юридических программ магистерского уровня весеннего семестра 2020/2021 учебного года. Данный экзамен предусмотрен во всех ВУЗах и будет проводиться единовременно на протяжении нескольких дней. Влияние на результаты экзамена могут оказать и новые формы обучения с использованием EdTech-инструментов в 2020/2021 учебном году. Однако стандарты юридического высшего образования в контексте с новыми технологическими вызовами и существенным увеличением влияния интернет-среды в рамках внешних нормативных актов Латвии не пересматривались.

По наблюдениям авторов статьи, не все учащиеся/магистранты гуманитарных и социальных направлений способны эффективно переориентироваться на новые формы обучения с использованием EdTech – инструментов (технические средства, оснащенные Edu-платформами, сервисами демо-версиями, онлайн–конструкторами, интерактивными симуляторами, Edu-навигационными базами данных правовыми и научными источниками, облачными и мобильными решениями). Встречаются случаи неприспособленности эффективного переориентирования и успешного продолжения обучения.

Особую актуальность в контексте применения EdTech-инструментов могут приобрести опросы и мониторинг выпускников 2020/2021 учебного года, так как в основном 2020/2021 учебный год проходит в условиях чрезвычайной ситуации. Так, по мониторингу выпускников в 2020 году Министерством образования и науки Латвии впервые опубликованы данные о занятости выпускников высших учебных заведений. В течение последующих 10 лет предусмотрен мониторинг выпускников программ бакалавриата и программ первого уровня высшего образования 2017 года, с помощью ведения регистра выпускников и учащихся (регистр VIIS).

Результаты проведённого исследования по проблеме занятости показывают, что 73 % всех выпускников ВУЗов Латвии составляли выпускники до 29 лет, из которых примерно 52 % составили выпускники бакалаврских программ (Kopskats par augstākās izglītības absolventu darba gaitām (LR IZM, 2020)). Данный позитивный пример мониторинга в перспективе может определить, соответствуют ли инвестиции в высшее образование спросу на рынке труда. Постоянный мониторинг (опрос)

выпускников продолжительного периода времени после окончания ВУЗа позволит не только обобщить занятость бывших выпускников, но и актуализировать выбор инновационных форм обучения с целью повышения качества подготовки специалистов.

Обобщение
Conclusions

Таким образом, предлагается дорожная карта последовательности достижения соответствия стандартов к EdTech-инструментам, образовательным результатам и рамке наполняемости компетенций.

Степ 1. Разработка и совершенствование нормативно-методического сопровождения по созданию сетевой рабочей группы, представителей работодателей, ведущих специалистов в области Edu & IT- технологий.

Степ 2. Классификация приоритетных и доступных EdTech-технологий на основе регионально-отраслевой специализации исполнителя образовательного процесса (преподавателя).

Степ 3. Проектирование, выбор и ревизия существующих государственных, профессиональных стандартов в синхронизации с образовательными стандартами высшей школы для приведения соответствия качества образовательных результатов и квалификационных требований. Необходимо достижение соответствия качества высшего образования актуальным требованиям рынка труда в связи с тем, что и после окончания чрезвычайной ситуации по Covid-19, прогнозируемо сохранение влияния и использования EdTech-технологий в различных сферах социальной жизни.

Степ 4. В ходе установления и де-юро закрепления локально правовой природы гибких форм онлайн-обучения закрепить постоянный мониторинг на предмет соответствия объема контактных часов и часов на самостоятельную работу в целях правомерности ценообразования и понимания студентами достигаемых результатов обучения.

Степ 5. Пересмотр локального регламента по формированию учебных и методических разработок в целях сохранения и обновления традиционных принципов и форм обучения юридического/экономического направления (лекции, семинары, практические занятия), с учетом временных и технологических затрат на основе единства образовательных и профессиональных стандартов.

Степ 6. Комплексная правовая и экспертная оценка преимуществ и недостатков стандартов как инструментов сохранения качества академического и профессионального высшего образования гуманитарных и социальных направлений (в том числе экономики и юриспруденции) в

рамках постоянного мониторинга и прогнозирования соответствия настоящих стандартов образования интересам развития общества и постоянно видоизменяющегося рынка труда.

В целом, трансформирующийся рынок труда и в Латвии, и в России, диктует видоизменение генеральной образовательной стратегии по достижению критериев качества EdTech-инструментов и Е-обучения, образовательных результатов для удовлетворения спроса рамки компетенций как фактора академической устойчивости и интеллектуализации трудовых ресурсов.

Summary

The article proposes an analysis of the regulation of the results of higher education and the use of EdTech-tools in accordance with the current standards. The article describes changes in the implementation of higher education in modern conditions of the increasing spread of EdTech-tools they are especially clearly reflected in the higher education of the social and humanitarian sciences. This is due to the fact, that since it was in the social and humanitarian specialties of higher education that before the pandemic traditional forms of education were used, associated with direct communication between a students/master's students and a teachers. Authors of the article offer conclusions on improving the standards of the learning process (using the example of economic and legal education).

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THE CHALLENGES OF DISTANCE LEARNING DURING THE COVID-19 PANDEMIC: THE CONTEXT OF LITHUANIAN PRE-SCHOOL TEACHERS' OPINIONS

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Abstract. *The COVID-19 pandemic has brought unprecedented challenges to the education system. Since Lithuania has declared the state-level emergency in February 2020, imposed by quarantine, the educational process was organized in a distance mode. Distance learning, namely, was a platform that pre-schools used to meet the learning needs of children.*
The aim of this article is to review pre-school teachers' opinions about the challenges of distance learning during the Covid-19 pandemic. The article describes the situation in Lithuanian pre-schools using distance learning during the lockdown. The authors analyse the main problems that pedagogues have faced with - lack of competence in the use of IT, poor support from management, inadequate material base, lack of time and teachers' self-confidence, the low involvement of families.
Keywords: challenges, distance learning, the covid-19 pandemic, pre-school teachers, Lithuania, content analysis, reflections.

Introduction

Today's education faces enormous challenges as the world struggles with the COVID-19 pandemic. The COVID-19 outbreak has severely disrupted education and training opportunities for learners and teachers across the European Union. Though distance education has been researched from many angles, however, this is particularly relevant in the context of a pandemic. According to Musingafi et al. (2015) „distance learning has grown into an important global strategy in resolving problems of access to education". Distance learning includes the use of assessments that promote academic self-regulation, the challenges involved in assessing online classes and collaboration with teachers / students (Moore & Kearsley, 2011, Smaldino et al., 2008, Valentine, 2002, Kearns, 2012.

Many researchers (Venčkauskas et al., 2021, Salieva, 2020, Musingafi et al., 2017, Golysheva et al., 2017, Damary et al., 2017, Kamau, 2007, Mossberger et al., 2003, Thorpe, 2002, Zirnkle, 2001, Garland, 1993) emphasize the challenges of distance learning from a student perspective - high chances of distraction, complicated technology, no social interaction, difficulty staying in contact with pedagogues, changing role of pedagogues, lack of academic writing skills, lack of material base, lack of time and technical competence.

Starting from spring 2020, distance learning is carried out in all educational institutions in Lithuania. The results of research conducted by Lithuanian researchers (Venčkauskas et al., 2021) revealed that "the situation of distance learning causes changes in the daily routine, which are extremely important in the lives of teachers, parents and children". This is illustrated by the study, which found that "the emotional state of more than a third of children deteriorated during quarantine, and children with better learning outcomes experienced more physical health problems". A top issue emerged when students spent much more time at screens. It is revealed that students' motivation to learn has decreased, which is related to the lack of social context, when students lose a direct, individual relationship with teachers and peers. However, distance learning during quarantine caused tension and stress not only for students and teachers, but also for parents who lacked guidance, assistance with planning daily activities, limiting time spent at computers, motivating children, and other challenges.

These negative aspects of distance learning are offset by the results of another study (The Impact of Distance Learning on Municipal Learning, 2020), which states that distance learning has helped students become more independent, able to plan and manage time, ask questions and ask for help. Cooperation between teachers and students was also strengthened, as the latter contributed to the development of the curriculum, were able to offer various learning methods and sources of information.

The goal of this study was to review pre-school teacher's opinions about the challenges of distance learning during the Covid-19 pandemic.

The problem of the research. In order to keep education running and to pursue educational goals, educational institutions had quickly adapt to the situation. To accommodate this, teachers had to face the challenges and organize the education process in a different way. This supposes the problem questions: How do pre-school pedagogues handle distance learning techniques and materials? Was the continuity of the pedagogical education process ensured by distance teaching and learning? What challenges of distance education have been encountered by participants of the survey?

Theoretical Basis of the Study

Distance education consists of studying from home where students and teachers are physically distant. According to Sadeghi (2019), it is different from traditional education, because „electronic means are used to keep students in touch with teachers, provide access to communication between students and bridge the gap and distribute educational material though distance learning programs". One of the most important challenges of distance learning for educators is to motivate students to learn independently and to promote responsibility for their own learning outcomes. So, determining autonomy of distance education has a critical importance (Firat, 2016, Jacobs et al., 2016, Lynch, Dembo, 2004).

Based on the analysis of the scientific literature, the advantages and disadvantages of distance learning have been identified (Figure 1). One of the advantages of distance learning is learning in a home environment where both educators and students can feel relaxed, motivated to acquire knowledge or pass it on. The cosiness of home does not oblige, it provides emotional and physical comfort, when it is possible to feel free, to model the teaching / learning process, adapting to the needs of oneself and family members. The potential for money saving is also emphasized (Bijeesh, 2017, Brown, 2017), where both children and teachers are not required to meet clothing or other requirements when learning in a home environment. Various measures for the educational process are also spared. The advantage is that learning / working remotely saves time (Bijeesh, 2017) for travel to / from the educational institution, as well as energy.

There are challenges in distance learning, such as high chances of distraction (Salieva, 2020). It is emphasized that learning or working remotely at home may not lead to timely activities due to changing motivation. Therefore, the distance learning process requires concentration and achievement of the set learning goals. Although distance learning/ teaching offers opportunities to save money on travel, clothing, educational materials, but at the same time it requires pedagogues and families to invest in information technology, various programs. One of the most significant disadvantages is the lack of social interaction (Dyrud, 2000; Hara & Kling, 2000) when working outside the educational institution. This can affect the psychological well-being of students, teachers, and parents, cause problems of self-realization, isolation, and burnout. It can also limit successful communication between students and pedagogues. One of the most pressing challenges is the lack of material base, when teachers lack educational tools, computer equipment, and everything that would ensure high-quality transmission of educational content remotely. Damary et al. (2017) emphasizes the changing role of the teacher in the

virtual classroom, where the focus is on the student, the relationship between the teacher and the student becomes equal.
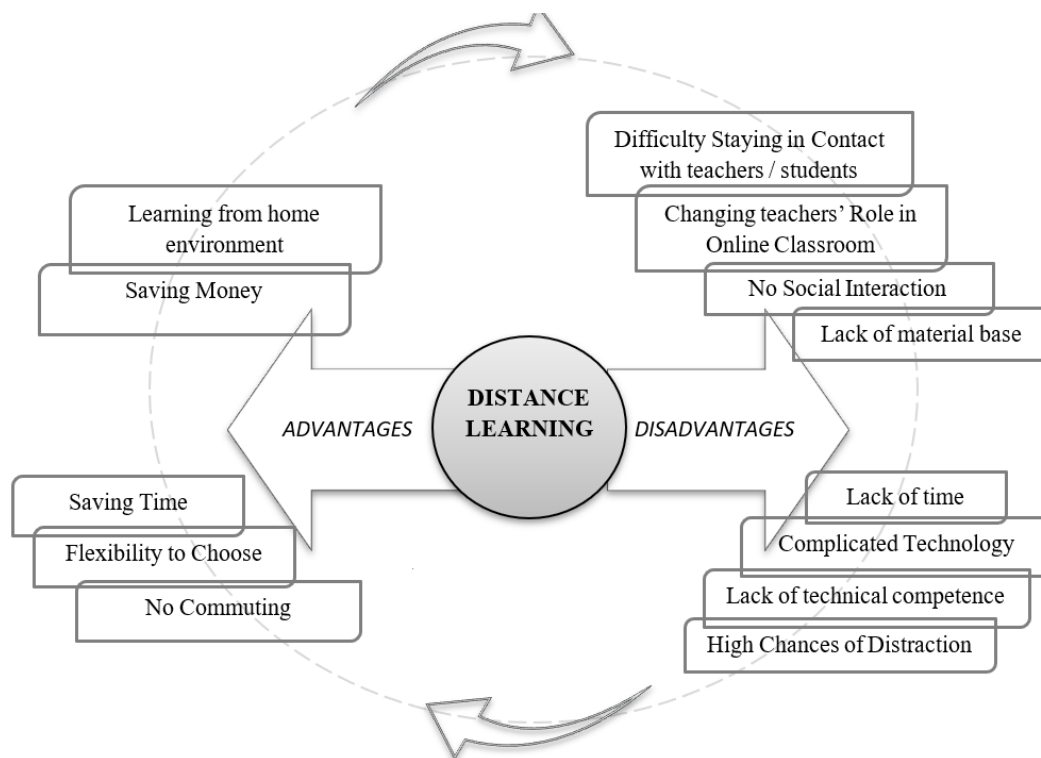
Figure 1 **Advantages and Disadvantages of Distance Learning**
(composed by the authors on the basis of Salieva, 2020, Musingafi et al., 2017, Golysheva et al., 2017, Bijeesh, 2017, Brown, 2017, etc.)

Having summarised the discussed advantages and disadvantages of distance learning, it can be stated that in the distance learning process it is necessary to focus on strengthening students' self-directed learning, focusing on setting learning goals, time planning, finding, and organizing necessary information, independent tasks, learning and capacity building for self-assessment of results.

Research Methodology

The article presents qualitative analysis of the reflections of pedagogues, employing the method of content analysis which enabled objective and systematic investigation of the features of the text, generalisation of information and formation of appropriate conclusions. 69 reflections of X Lithuanian kindergartens were analysed from September to November 2020. The content of the reflections was transcribed in separate protocols. The analysis has been conducted by consistently analysing the content of a text, dividing the content under investigation into analytical units, i.e. categories, sub-categories, which are

particular aspects of pupils' perception of interculturality, expressed through the representing statements. The latter are coded (e.g. [1] etc.) according to the order of essays presented by the surveyed, aiming at anonymity of the research participants.

Research Results

The content of teachers' reflections on the challenges of distance learning reveals the essential categories and subcategories (Figure 2), illustrating the opinion of specialists in the context of the analysed problem. During the first quarantine, teachers most often faced the **lack of material facilities**, when "*computers* were not provided" in educational institutions [9], or "teachers lacked them" [24], and "there was no possibility to take a printer / scanner, laminator to their homes" [25], as a result of which teachers "had to work on their computers at home" [9, 13], "all IT equipment" [20]. In such a situation, the pedagogues took the initiative and "purchased a computer, a camera at their own expense" [36]. The distance learning process did not run smoothly because "not all educators were able to attend ZOOM meetings" [16] and "some students were unable to join activities because they did not have the means to do so" [6]. The problem of *lack of methodological tools* was also highlighted, noting that "there was a lack of textbooks, educational publications for work with pre-school children in the digital space" [20], "tools for various works at home" [26], "work materials" [27, 21]. , "methods" [28]. Teachers overcome this challenge "by working with the personal tools at their disposal" [27, 20], or by creating them themselves, "filming tasks, using the help of children and grandchildren" [13]. The participants of the study highlight the *lack of clear guidelines* in the absence of a "description of distance learning" [20], no uniform information on "what and how to do specifically, how to assess whether the work done is appropriate" was provided [26]. All this led to a lack of systemic work [20]. There is *a lack of training* when "no distance or platform training was organized" [58, 69]. However, management expected good results from educators [1]. Information on the organization of distance education was scattered, leading to a lack of "*a single platform* for generating all the necessary information, tools, sharing experiences" [28].

The title of the category **Lack of teachers' IT competence** reveals its content, which testifies to the *lack of knowledge about IT management*, when teachers lacked "knowledge to work with platforms" [9, 40], which was the most difficult to master because "not all teachers knew how to use information or smart technologies" [7, 14], "smart technologies" [14], "could not work properly on a computer" [38]. Teachers "lacked some knowledge of how to work remotely" [11] and "computer skills" [34], technological competences [31]. Therefore, the study participants note that they could not use all the methods of distance

teaching, when, due to the lack of experience of working with new digital programs, they "did not know how to organize a virtual quiz" [1], "look for information sources in virtual space that could contribute to the curriculum" [36]. It can be concluded that if an analogous situation were to recur, it would be difficult to work remotely, as there would be a "lack of computer literacy" [9]. The content of the sub-category *Lack of ICT skills of elder teachers* reveals a lack of ICT skills among elder educators [42], which has led them to "choose holidays rather than distance work during the quarantine period" [26]. This has affected the quality of the results of the work of the whole institution: not all barriers to distance learning have been overcome due to "many retirees who are unable to take advantage of IT innovations" [20].

Educators often noted that one of the challenges of distance learning was **Poor support from management**. This category is based on *the transfer of responsibility*, noting that the management recommends that educators "agree with the parents themselves on the acceptable ways of educating their children" [57], decide on "methods to involve and motivate children in the educational process" [15]. This testifies to the fact that educators made decisions about the educational process, its content, and solved the problems with the help of colleagues. *Lack of support / respect* is highlighted, when in such complex situations, which educators had to adapt to very quickly, there was a lack of simple support, help, understanding and, above all, respect from managers, authorities [25, 27, 63, 33], because "there were quite a lot of worries" [35]. It is revealed that "the administration has done nothing to help the elderly teachers" [42], which suggests that in the already mentioned situation, when the latter lack ICT competences, they do not receive the necessary help from managers, as a result of which the educators did not work and their work load was not redistributed to other colleagues. Such situation causes tension between colleagues, complicates their daily activities. The *lack of information* is also emphasized, when leaders did not provide precise instructions, did not inform "what to do" [27]. The content of the sub-category *High Obligations* highlights another difficult situation, when "management required teachers to persuade parents to engage in distance learning and for children to be more active" [15].

Figure 2 **Schematization of the Challenges of Distance Learning**
(composed by the authors)

The content of the category **Poor Family Involvement** reveals the reasons for the non-participation of parents and children in distance learning. The sub-category *Parents' attention to school-age children* highlights the passive involvement in distance activities in families where school-age children grow up together with pre-schoolers. Parents could not distribute their time and attention equally to all children, so priority and "full attention was paid to the education of school-age children" [7], when with the younger ones "they were able to watch videos at best and did little work with" [66]. Parental involvement was also aggravated by the *lack of time*, when the latter could not "actively engage, participate in activities, provide feedback through children's works, photos" [2, 3]. This situation was due to the fact that the parents worked remotely at home and took care of the children at the same time, thus "being burdened with their own work and the homework of their children" [8]. Pedagogues singled out the *lack of cooperation* when "some parents lacked cooperation, understanding, and

respect" [40, 22]. Some families were poorly involved in the distance learning process, as the *importance of education was underestimated* when "parents did not attach much importance to pre-school education" [7]. *Reluctance to participate in distance education* also became apparent when "more than a half of parents refused to participate in distance education. Many of them asked for the tasks to be uploaded and they would do them when they had time, together with the children" [57]. Reasons why it was more difficult for parents with children to engage in distance education were *parental lack of IT competence* ("very poor knowledge of computer-virtual application management of parents" [17]) and *the lack of IT tools*, when teachers found it difficult to "ensure education process with parents, children, because not everyone had computers" [16], "there was no internet connection and computers for every child in some homes" [62].

One of the most frequently highlighted categories is **the lack of live communication**, its content reveals a lack of interaction with children. It is noted that "no one will replace live, natural communication, contact with the child" [4, 12], direct work [21], "live" education [41]. At the time of distance education, teachers lack interaction with children the most [13], as there is no "feedback that is expected" [21], and teachers miss children [32]. However, it is not only teachers who lack live communication, which is supported by the opinion: "after a month of distance work, children lacked live communication with teachers. They used to say that they wanted to show us the work they did live, not through the camera" [30]. The *lack of connection* is emphasized, when "there is a lack of children's emotions, connection with the students, because they work virtually, communicating "through the screen" [21]. The participants of the research revealed the benefits of *Communication for the educational process* - "better explanation of information, more attention focusing" [10], more open communication, less fatigue [62, 17].

The most emphasized category is **the lack of time**, the name of which presupposes the allocation of time resources by teachers to prepare for distance education. It is noted that during the quarantine, teachers *had limited time to prepare for activities*. They "lacked the time to transfer tasks into the digital space" [20], "to implement and prepare for activities" [22, 40], as they had to prepare all the materials for distance learning within a week [2]. It is noted that "the content of the videos, with morning activities, was modelled by the teachers themselves, they collected and developed tools, methods, etc. They themselves looked for ways to reveal the material through video (not live) so that children could understand it as much as possible" [2]. As the time to prepare for the activities was limited, the teachers were not provided with the necessary tools and created them themselves, they used what they had [20], "worked as they understood and knew" [27]. The *complexity of reconciling time for family and work* is highlighted, when working remotely at home made it difficult for teachers

to "do the household chores and at the same time be able to upload tasks for children, communicate with them, evaluate the tasks completed" [52]. It also reveals *a change in routine*, when during the quarantine "there was a lack of normal routine, leaving home, usual activities" [21].

The category **Pupils' teaching/ learning difficulties** reveals difficulties faced by both children and pedagogues. It is stated that pupils felt *a lack of competition*, which was noticed by the teachers from the material recorded during the activities. The participants of the study note that "children lacked competition, which deprived them of half the fun of their tasks" [3]. The content of the sub-category *Non-completion of tasks* highlighted that some families had difficulties in completing tasks, "there were families who did nothing" [7, 3] and some children "did not complete all tasks" [48]. This was due to pupils' *lack of motivation*, when "children are less motivated and it is harder for them to concentrate when they are at home. The parents were worried about that" [4]. Educators encountered *the complexity of assessing children's achievement*, "it was obvious that parents contributed to the work" [4]. The *reduced attention of teachers* to the child is actualized, which manifests itself in more frequent direct communication with parents [21], when tasks and daily activities were coordinated.

One of the challenges of distance education is **the lack of knowledge about working in a distance environment**, when teachers lack experience [13], knowledge, understanding, information and skills [19, 12, 26, 29], how to start working remotely [39], how to communicate with parents, children, what to do in case of problems [19]. In this situation, teachers worked with the tools they had and knew how to work best with [12].

The content of the categories **Poor feedback** reveals difficulties in communicating with children and parents. The research data emphasize *poor parental involvement*, when teachers' relationship with parents was weaker during distance learning, because less feedback was received [2], not all parents communicated [4, 11]. It is concluded that poor parental involvement weakened the effectiveness of distance learning ("I did not like distant education with my children because there was no feedback from my parents, so I didn't always get pictures of children's works, I didn't know how they were doing" [32]). *Poor feedback from children* is also actualized, when there was no quality communication with children [22] and there was a huge lack of it [28], because it is important for pedagogues to communicate with children, know how they felt in the home environment or participated in activities and completed tasks.

Distance learning is described by pedagogues as **emotionally hard work**, tedious [20], leading to "professional burnout" because quarantine was understood as vacation and leisure time at home, although it required a great deal of time and effort [29]. Working in cyberspace was different from working in

kindergarten, when it was noted that "we had live chats in Zoom, but there was a bit of chaos because the work was done with young children who wanted to play on a computer and had difficulty to concentrate because of extraneous sounds in the background" [30]. One of opinions when assessing the differences between remote and direct work with children becomes clear - "it was more difficult to work than directly, because from the morning, when you upload the day's topics to Facebook, until the evening, you are tensed, constantly working and following each activity review, waiting for children photographs of the works completed" [15]. However, distance learning has been challenging not only for pedagogues but also for parents. It is stated that "parents who worked with children at home remotely realized that it was really difficult and required a lot of time, attention, concentration, and patience" [41]. Distance work during quarantine is described as a **Challenge.** For teachers, this was a *new experience* when "working in this situation was a challenge because it had not been tried anywhere" [7]. It is emphasized that the educational institution and educators were able to adapt to the challenge and organize education in a different way [30]. However, the view has emerged that not all pedagogues are prepared for distance learning [8]. It is noted that these were *Sudden changes*, "teachers were provided with too much and too abrupt information that they had to process in a very short time" [22]. *Uncertainty* about the nature of the work [26], implementation of activities, communication difficulties were also felt.

The meaningful content of the category **Cooperation / Communication gap** revealed the gaps in communication with parents, colleagues, administration [7]. It is regrettable that "teachers were left alone to deal with this situation [15], there was a lack of information on how to work, there was a lack of cooperation, there was a lack of consensus [23] - there was confusion among all teachers [18]. Statements in the category **Non-management of working time** reveal that "working hours remotely have no limits because there were parents who used to send works at night" [4]. An example of full-time pre-quarantine workload "was tripled at the time of quarantine, lacked time" [20] due to constant day-to-day communication with parents and children [32]. Emphasis is placed on **the need to adapt the curriculum**, when educators had to adjust their artistic activities and assignments while working remotely, taking into account the parents' ability to perform tasks [3]. Pedagogues had to get out of the situation, think about how to prepare and adapt, and pass on the tasks to the students and their parents [16]. **The lack of teachers' self-confidence** became apparent when they noted they lacked belief in oneself [39, 26] and the ability to adapt to a difficult situation. The emphasis is also placed on **Poor motivation of teachers** to take an interest in themselves and to do something [29] and the **lack of quality**, when distance learning was completely of poor quality, as pedagogues focused more on themselves than on students [22]. The participants of the study also highlight the

position when there are **no advantages**, only disadvantages in distance education [20], because it is stated that "children already learn to use computers and digital technologies by themselves" [10].

Conclusions

The results of the study reveal that during the pandemic, the problem of lack of competence in the use of IT by pedagogues (especially the elderly) became more pronounced after the introduction of distance education. Educators lacked support from management, adequate material base, training, and time to prepare for activities. One of the most obvious challenges is poor involvement of families in the distance learning process. Distance learning eliminated the possibility of direct, "live" communication with children, complicated the processes of motivating students and assessing achievement. The lack of teachers' self-confidence and low motivation to participate in the distance learning process actively became apparent. For many teachers this was an absolutely new experience, creating uncertainty, tension and changes for which the latter were not prepared.

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OPPORTUNITIES AND CHALLENGES OF ORGANIZING AND IMPLEMENTING DISTANCE PRE-SCHOOL EDUCATION: TEACHERS' OPINIONS

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Abstract. *The Council of the European Union (2020) points out that the COVID-19 pandemic has had a major impact on education and teaching systems and has fundamentally changed the way we learn, teach, communicate and collaborate within and between our education and teaching communities. The aim of this study is to explore the opinion of pre-school teachers on the opportunities and challenges faced by them in organizing and conducting pre-school education at a distance. The strategy of qualitative research was chosen for the study, Klaipėda city pre-school education teachers were interviewed. The study revealed that teachers did not change the content of education programs, sought to maintain the continuity of education and develop all the competencies of preschool children. Various digital and technical tools for distance education were used. Participants of the educational process experienced a variety of emotions and disturbances. Teachers missed for more decisive action of the institution's administration. The opinion of educators discovered during the research helped to highlight advantages and disadvantages of distance pre-school education.*
Keywords: *COVID-19, distance education, organization of pre-school education.*

Introduction

The global spread of COVID-19 has led to unprecedented disruptions in education around the world that have animated increased interest among policymakers, educators, researchers and the general public in knowing about how education systems have responded to the pandemic and how educational process and teachers' and children's' experiences have changed. There was a need

to know and to take account of children's developmental levels is necessary, as well as to find online learning tools, which are appropriate and which can promote children's participation and learning (Jinyoung, 2020).

As indicated in the United Nations Publication *Policy Brief: Education during COVID-19 and beyond (*2020), the COVID-19 pandemic has created the largest disruption of education systems in history, affecting nearly 1.6 billion learners in more than 190 countries and all continents. The crisis is exacerbating pre-existing education disparities by reducing the opportunities for many of the most vulnerable children, youth, and adults. On the other hand, this crisis has stimulated innovation within the education sector. There were innovative approaches in support of education and training continuity: from radio and television to take-home packages. Distance learning solutions were developed thanks to quick responses by governments and partners all over the world supporting education continuity. Despite these actions, the results of a *Survey on online and distance learning (2020)*, which attracted 4,859 respondents from more than 40 countries (of whom 86% were teachers or school heads), show that, following COVID-19, the majority of teachers (66.9%) had to teach online for the first time. Additionally, many teachers had problems in accessing technology (computers, software, reliable internet connection, etc.).

On the basis of the conducted studies, J. Bertling, N. Rojas, J. Alegre and K. Faherty (2020) claim that a vast body of research has shown that the use of digital learning technologies is associated with learning gains. However, evidence suggests that learning technologies in pre-school education are most effective as supplements to other modes of teaching, rather than as replacements for more traditional approaches (Donohue, Johnson, Lucas, Lynd, Mukerjee, Thouvenelle, 2020). Distance education became ubiquitous as a result of the COVID-19 pandemic during 2020. Because of these circumstances, online teaching and learning had an indispensable role in early childhood education programs, even though debates continue on whether or not it is beneficial for young children to be exposed extensively to Information and Communication Technology (ICT). Early childhood teachers' efficacy in using technology is another issue in the effectiveness of distance education. The attitudes and skills of early childhood teachers in the use of technology also affect children's motivation and learning. Early childhood teachers often use technologies in their teaching, but usually as teaching tools to show pictures or videos. They need to take on additional roles if they are to teach online (Kalogiannakis, 2010).

The aim of this study is to explore the opinion of pre-school teachers on the opportunities and challenges faced by them in organizing and conducting pre-school education at a distance.

Methods: analysis of scientific literature and documents, qualitative research (interview), qualitative content analysis.

Methodology of Research

In order to determine the challenges and opportunities faced by pre-school education teachers while organizing distance education during the Covid-19 quarantine, methodology of qualitative research was chosen (Creswell, 2014; Žydžiūnaitė, Sabaliauskas, 2017). The interpretative paradigm (Cohen, Manion, Morrison, 2007) and the constructivist approach (Berger, Luckamann, 1999) were used to justify the research. They are adapted in order to provide an interpretive, holistic view of the analysed situation, the "experiences" of persons involved, and an explanation arising from the analysis of the situation. A semi-structured interview method was chosen. In planning research questions, six topics were identified: *assessment of the situation (in the context of administration and employees); organization of educational activities while conducting distance learning; assessment of children's achievements and progress in the analysed situation; feelings, experiences of teachers, children and parents; advantages and disadvantages of distance pre-school education and the preparation strategy for future distance education.* Research was carried out in October-November 2020. A targeted, criteria selection of research participants was applied. The main criterion was the pre-school education teachers, who worked remotely in spring 2020, during the Covid-19 quarantine. An invitation to participate in the research was sent to all Klaipėda city educational institutions providing pre-school education. *Research participants.* 15 pre-school education teachers of the Klaipėda city (Lithuania), who have worked remotely in spring 2020, during the Covid-19 quarantine agreed to participate in the research. Demographic characteristics of the research participants: all research participants were female, whose average age was 51 years, average pedagogical experience of teachers was 28 years. Of these, there were four teachers, four senior teachers, and seven teacher-methodologists.

Data collection and analysis. Research participants were sent a consent form, which contained all the information about the organization of the research: aim of the research, process, assurance of confidentiality, duration of the research, etc. After receiving signed consents, research time with each participant was agreed upon. Conversations were conducted remotely using the ZOOM application. Conversations were recorded. The total duration of individual conversations is more than 8 hours and 65 pages of transcribed text. Confidentiality is maintained, personal data of research participants were depersonalized and the research material is available only to the researchers. Research data were processed using qualitative content analysis. Each transcribed text was read by the group of researchers. The text is read in order to form an overall picture, essential sentences or their parts related to the analysed topic were highlighted. The text is divided into key units, which are represented by phrases,

sentences, keywords, directly related to the phenomenon under analysis, key units are grouped in order to combine them into an overall structure. In case of further questions, everything was once again clarified with the research participants. After the research report was prepared, informants were offered to get acquainted with it. Informants provided no comments. In presenting research results, statements were presented in coding, e.g. M1, M2, etc. The language of the teachers' speeches was not corrected. The article presents only a part of the research results: *the situation of education in the educational institution after the announcement of quarantine: the adaptation of the administration and teachers of the educational institution; peculiarities of the distance education process: content of education, organization of the educational process.*

Research Results

The research sought to find out how pre-school education teachers assessed the situation of education in their educational institutions after the announcement of quarantine in Lithuania due to COVID-19. The research revealed that a distant organization of pre-school education was a challenge for all participants of education: administration of institutions, teachers and parents.

In order to assess circumstances in the educational institution after the announcement of quarantine in more detail, interest was taken in how administration and employees responded to the changed situation. The following actions of the administration and teachers of the educational institution became apparent (Fig. 2).
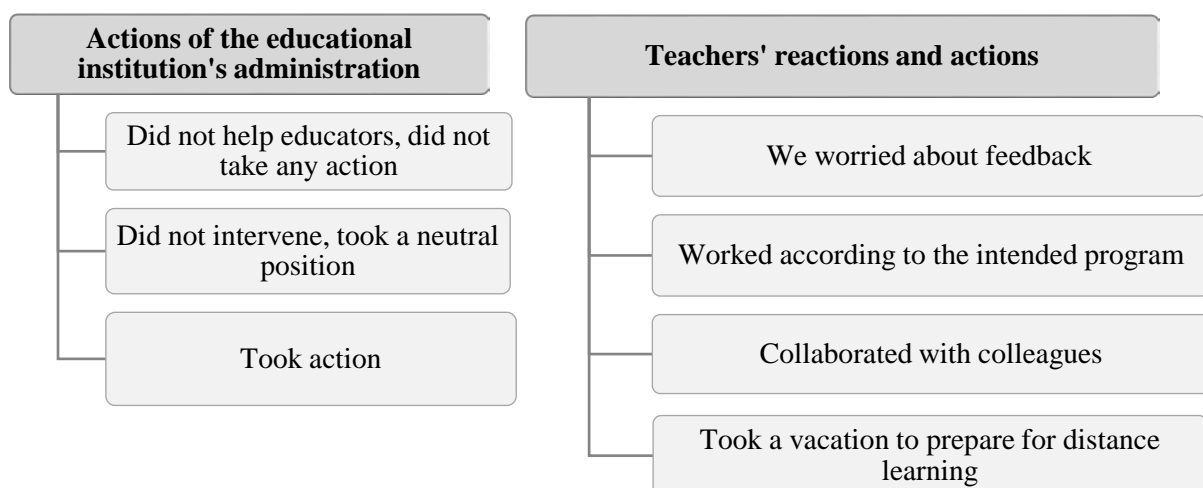
Figure2 ***Actions of the Administration and Teachers of the Educational Institution after the Announcement of Quarantine***

According to teachers, administrative staff took the following steps: trusted the educators, supported and comforted them (2), e.g.: *"administration supported us <...> even comforted, that girls be calm, we will manage with everything, we will do it"* (M4); reacted quickly, created a joint group, offered to participate in trainings (4); endorsed the teachers' suggestions, discussed, provided recommendations (2), e.g.: *"The director of the institution <...> created a "Classroom" group on the Google platform, where we, educators, received all the information about remote activities: getting acquainted with the orders of the Minister of Health, filling in questionnaires, use of information technologies, links, access to seminars – Webinars, conferences for teachers on the "Zoom" platform, and the involvement of educators, and sharing of various activities that took place in Lithuania"* (M7).

However, there were teachers, who lacked the initial more decisive actions of the institution's administration. Some educators claimed that the administration of the educational institution did not help and did not take any actions: did not help, did not provide recommendations (3), there was no system created in the institution (2), e.g.: *"The administration, to tell you the truth, left the employees behind <...>. They didn't help us much, we just expected more of that, advice, how to do, what to do, and we were left to our fate, they advised that maybe do everything remotely and that's all"* (M2). One informant stated that the administrative staff of her educational institution did not intervene and left the pre-school education process to chance (1).

The analysis of the initial reaction and actions of educators highlighted the following circumstances (Fig. 1): emotional reaction of educators: worries about pre-school children's achievements and feedback in order to qualitatively prepare for learning at school (1), e.g.: *"We were worried a lot <...> that there would be no feedback from parents, but we received, of course, not one hundred percent, but that anxiety gradually subsided"* (M3). In their speeches, teachers emphasized that they had collaborated with colleagues, and that was particularly important at the beginning of distance learning (5); worked according to the intended program (1); one educator mentioned that she took a vacation to prepare for distance learning, e.g.: *"Somehow, we friendly agreed upon who was on vacation, who was working <...>. A colleague took a vacation"* (M4).

It was sought to find out how the adaptation of activities to distance education in pre-school educational institutions and groups was carried out. The tools used by teachers for distance learning could be divided into 2 main types: information communication technologies (hereinafter: ICT) and traditional tools. The used ICT tools consist of the following 4 groups: online platforms and social networks; digital programs; applications for creating educational materials, and educational games; smart digital devices (Fig. 3). Traditional tools are tasks in

exercise books; various assignments from aids; tasks that develop fine and gross motor skills, etc.

Groups of ICT tools used for distance learning			
Online platforms and social networks	Digital programs	Applications for creating educational materials, and educational games	Smart digital devices
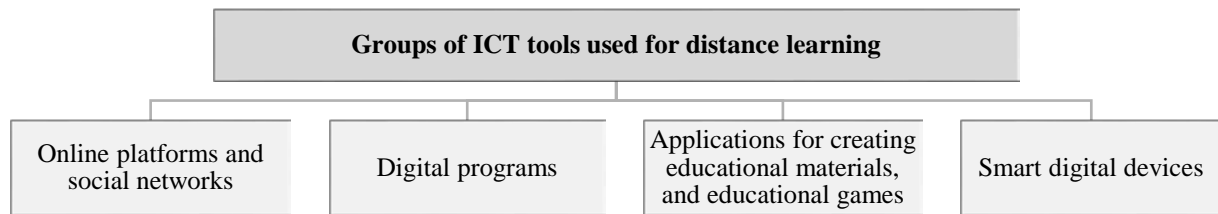
Figure 3 **Groups of ICT Tools Used by Educators for Distance Learning**

ICT tools were mostly emphasized by the informants. The vast majority of educators used Facebook groups, created them and invited parents to join, or used parent-created ones (14). Some educators (4) used the electronic gradebook Musudarzelis.lt or the electronic learning environments EMA (2) and Eduka.lt (1). All teachers (15) used emails and the Google platform, some (3) used Youtube and Pinterest (1). In order to maintain close contact with parents and ensure the continuity of children's education, educators used various online applications. The most popular and commonly used were Zoom (7) and Messenger (5). Skype (4), Viber (2), WhatsApp (1), Googledrive (2) were used. In developing educational tools, not only did educators use the already mentioned platforms, but also created educational materials and games using various digital programs: Padlet.com (5), PowerPoint (2), Bookcreator.com (2), Worldwall.net (2), LearningApps.org (1), Jigsawplanet.com (1), Mudubudu.lt (1). Educators used various digital programs not only to keep in touch with children and their parents, but also to create educational materials and educational games. When asked about which smart devices were used for distance learning, it was revealed that all educators (15) used personal mobile phones, almost all (14) used computers, and a small part (2) used tablets, e.g.: "*A computer, tablet and a smartphone were the main tools*" (M15). Some informants (2) mentioned that they had a possibility to take a computer from the educational institution home (but it was not necessary), e.g.: "*We used our phones. If a computer was needed, it was possible to take it from the kindergarten*" (M5), and one (1) informant mentioned that one had to work using only a personal phone and a tablet, e.g.: "*The kindergarten didn't give me a computer. So I had a tablet. That's why the phone, tablet were the main tools. We used our personal means*" (M9).

In addition to the ICT tools, the majority (11) of the respondents used traditional ones: "Opa Pa" workbooks (11), e.g.: "*We worked in accordance with the "Opa Pa" methodology*" (M6), exercise books (7), other teaching aids (11) for drawing, writing, development of fine and gross motor skills, music and non-

formal education, e.g.: *"I've pointed out which pages should be done from the notebook that children had at home. I've shared morning exercises, audio tales and poems that were necessary according to the educational materials in a closed FB group..."* (M10).

It was sought to determine whether educational goals have changed, what were the main tasks set during the period. Changes in educational goals and tasks are shown in Figure 4.

Changes in educational goals	Changes in educational tasks
Educational goals have not changed	Educational tasks related to the involvement of parents in the educational process
Educational goals were slightly adjusted	Tasks related to the changes in the educational process as it became distant
Educational goals changed according to quarantine conditions	Changes of tasks related to the implementation of the curriculum (information retrieval, creation of material, transmission)
	Tasks related to the management of ICT tools and information

Figure 4 **Changes in Educational Goals and Tasks after the Transition to Distance Learning**

Informants stated (4) that educational goals did not change significantly, e.g.: *"No, educational goals did not change"* (M4). However, they were adjusted by taking into account the existing situation (9), e.g.: *"We adjusted the goals by taking into account that we could not implement all the activities..."* (M3). A small number of educators (2) indicated that the goal did change, e.g.: *"The educational goal had changed, as parents had to get actively involved, participate in performing various tasks. There was no longer direct communication with children"* (M7).

The main tasks indicated by the majority of informants (8) were the involvement of parents in the educational activities and the interest of children and parents in the educational process and tasks provided (6), to adapt to the needs of parents, to establish a sincere connection with them (11), e.g.: *"One of the tasks: to convey most comprehensive learning materials to parents, to assign enough tasks so that everyone can select them according to their individual needs and develop properly"* (M10). Some informants (5) pointed out that, first of all, it was

necessary to find the most appropriate ways to contact and maintain constant connection with parents, provide them with information about the continuity of the educational process, consult on issues related to education, in individual cases provide pedagogical psychological assistance, as well as help manage stress (3), e.g.: "*The most important thing was to be able to organize everything, be able to communicate and cooperate with parents, pupils of the group […] to ensure the continuity of pre-school education at a distance, so that there is mutual sincere feedback from parents and children*" (M11).

Educators adjusted the content primarily with regard to the fact that parents would be able to transmit educational tasks to their children, and that the process of children's education would be continuous and purposeful in order to achieve outcomes provided in the *General Curriculum Framework for Pre-school Education (2014).*

The majority of educators used the pre-school education toolkit "Opa Pa" (11), e.g.: "*…we used the "Opa Pa" toolkit, […] we were guided exactly by the "Opa Pa" program*" (M3). Some educators used this tool, but adjusted the order of topics (5), duration of education (3), e.g.: "*…we have expanded some topics up to two weeks. It turned out that it was necessary to work longer*" (M9), adapted tasks to home conditions (9). Teachers consulted with parents on how to work remotely (5), searched for examples of tasks (2), selected tasks so that children could perform them independently (2), e.g.: "*…since it was already the beginning of spring […] we simply selected […] tasks that children could perform independently*" (M4), prepared integrated tasks (4), e.g.: "*According to the topic chosen for the week, we offered to perform simple exercises, tasks for developing fine motor skills, as well as to perform mathematical tasks in developing children's logical thinking*" (M11).

Informants state that they prepared tasks by collecting and systemizing information from various sources, searched for technical solutions (14), used video materials, made video clips, created short films and educational games (10), e.g.: "*We adjusted the content to make it interesting for children. We searched for short films on the topic, systematized information*" (M5). Teachers sent parents information on how tasks should be completed (5), e.g.: "*We searched for different ways of contacting parents so that they would understood how to perform activities, would complete them*" (M5), suggested parents to make use of the available home spaces (1), tried for the tasks to be interesting for both children and parents (14), e.g.: "*When choosing the content of education (topics, activities), I sought to make them clear, fun, interesting for everyone – not only for educators, but also for the family, and especially for children*" (M15). Educators sought to develop all children's competencies, thus got together and worked as a team: educator, speech therapist, teacher of arts and non-formal education (5), e.g.: "*Speech therapist sent the exercises*" (M11). "*The non-formal*

education teacher joined in: PE teacher showed exercises to be performed outdoors. We collaborated with other teachers and music teacher and others, we worked as a team" (M9).

High workload and working time related to the necessity to prepare and provide teaching materials in a distant way, were distributed by educators in a variety of ways. Some educators joined together in groups, distributed topics, prepared teaching materials and tasks, and shared them with each other (7), e.g.: *"We've divided among 3 groups who would prepare what material: nature, mathematics, hand training, reading, etc. We shared accumulated and prepared materials. Jointly to make it easier"* (M8). Other educators worked individually and prepared all the educational material on their own (3).

Some educators (7) did not perform activities directly with children, e.g.: *"There was no direct contact with children. We communicated with parents. We carried out distance education through them"* (M5). Educators prepared teaching materials, tasks, and sent them to parents daily (4) or once a week at a specified time (6), others connected directly once a week (6), e.g.: *"Our distance lessons were held at 4 p.m. By that time, parents had already finished their work. We agreed upon that, we sought that, we wanted them to help their children. Because parents were really benevolent"* (M6). Some educators connected several times during the whole period of quarantine (2). The nature of communication with parents and pupils is illustrated in Figure 5.

Nature of contact with parents	Nature of contact with pupils
Constantly maintained mutual connection, communicated through various means of communication	There was no direct contact
Communication was initiated by the educator, provided teaching materils, etc.	Educators and children had direct remote contact once a week
There was no communication due to parents' decision not to participate in distance education	Communicated directly 1-2 times during the entire period of quarantine

Figure 5 **Nature of contact between the educators and Pupils and Their Parents during Distance Learning in the Period of Quarantine**

Educators claimed that they were accessible to parents by various means, remotely provided individual consultations: by phone, email, Skype, Messenger, Viber, and other means (7), e.g.: *"We chose easier-to-manage conference calls by Messenger, Skype programs. With their help we shared insights, observations, explained what is good, what was successful, and what still needs to be improved"*

(M12), "*Individual conversations were held using Viber, Messenger, Zoom platforms*" (M11).

Some educators (3) mentioned that they conducted parents' surveys, during which they found out that parents would like to receive a curriculum, teaching materials and assignment for a week, e.g.: "*A parent survey was conducted on what is better for them...*" (M5).

Educators received feedback from children's parents on the outcomes of education, completed tasks, children's works, in various ways. Some educators indicated that they had a hard time doing that (4), e.g.: "*But somehow the number of participating parents and children started to decrease...*" (M1). However, a larger part of respondents were happy with the parents' activity and encouraged them to provide feedback by posting their children's works and completed tasks on the Padlet board (2), parents themselves shared their children's works in a closed Facebook group (3). During quarantine, there were individual cases (2) when the educational process was interrupted by the parents' decision while they were in quarantine, e.g.: "*Only one family was not connected. They said they had no means, were self-isolating and would not participate*" (M6).

Several educators mentioned that during this difficult period, they participated in republican projects (2) and carried out an international project (1), e.g.: "*Parents together with children participated in project activities. There were republican projects, children with parents participated in projects: "Mommy is a part of my heart", "My mommy is the most beautiful". International project "Where the Easter egg will roll", in which children of my group participated. Participants were from England, America*" (M13).

Conclusions and Discussion

The analysis of the qualitative research results highlighted the following findings:

–   The organization of distance education, after the announcement of quarantine in Lithuania, posed new challenges for all participants of pre-school education: administration of educational institutions, teachers, parents. Some teachers lacked leadership of the heads of the educational institution in making responsible decisions about the organization of distance education. Other teachers claimed that the administration of the educational institution had taken actions: supported, calmed down, quickly reacted, discussed, offered to participate in trainings, provided recommendations.

–   Educators tried not to change the goals set in the *General Curriculum Framework for Pre-school Education (2014)* and to achieve them, but adjusted educational tasks by taking into account the changed situation

in terms of quarantine. Educators were able to quickly master digital programs, manage information flows, cooperate with colleagues and parents, maintain the continuity of pre-school education, individually respond to the situation of each child. Teachers used ICT and traditional tools for distance learning. Educators adjusted the content, first of all, with regard to the fact that parents would be able to transmit educational tasks to their children, and the process of education for children would be continuous and purposeful. In order to provide feedback to parents, teachers used various ways that were most easily managed and accessible to parents. Teachers constantly provided individual consultations for parents on all issues related to their children's education.

Research limitations and possibilities for research continuity. The limitation of the qualitative research is related to the inevitable subjectivity in the qualitative research. Even though when planning and conducting the following research requirements for this type of research were met, the generalization of results and possibilities of their application are limited in part by the small number of research participants. It would be incorrect to apply the findings of the research to all pre-school education institutions, but it is likely that the opinion expressed by the participants of research allow to predict continuity of the further research on the following phenomenon in order to find out the opinion of parents and single out the most important steps in organizing distance education.

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DISTANCE LEARNING AND COVID-19 FROM STUDENTS' PERSPECTIVE: DO THEY HAVE THE SKILLS TO DEAL WITH THE UNPRECEDENTED SITUATION?

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Abstract. *As a result of the COVID-19 pandemic, more than 1,6 billion children worldwide were forced to discontinue face-to-face education and continue with distance learning (OECD, 2020). To many students as well as teachers this was their first experience with distance learning. Students' ability to adapt to distance learning varies and depends on different factors, including individual factors such as the ability to cope with new situations, solve problems and manage their own learning process. In order to successfully deal with the new circumstances in education, it is necessary to work at all levels - including the level of policy development, level of schools as organizations, and at the individual – the student – level. This article focus on the level of the students and look on the distance learning from the perspective of students' skills, attitudes and ability to adapt to the situation. The aim of this article is to summarize what has been studied so far in different countries about COVID-19 related distance learning and students' difficulties and ability to cope with this situation; and to suggest practices to develop students' skills such as self-management and problem-solving skills to better adapt to new situations in the future.*
Keywords: *students, adolescence, COVID-19, distance learning, problem-solving skills, self-management skills.*

Introduction

COVID-19 pandemic has created pressure on all sorts of domains of life, including mental and physical well-being of individuals, as well as stability of industries and economics of countries. For students, it has brought up the challenge to maintain their academic performance and motivation to study, to continue with receiving their education and to maintain psychological and physical well-being above all that. A simulation research issued by World Bank has warned about increasing inequality among students that may escalate even further because of pandemic, and for the most vulnerable groups of children it may even lead to discontinuing their education (Azevedo et al., 2020). Simulations also show that school closures could lead to a loss of learning in amount of at least one school year, and there is a risk that children will have

hardship keeping up with the curriculum also after returning to schools and face-to-face learning (Kaffenberger, 2021), therefore policy makers and schools are advised to plan in advance on how to help children after returning to schools, and how to strengthen their abilities and skills. The aim of this article is to summarize currently available research about students' difficulties and ability to cope with the distance learning during COVID-19 pandemic, and to suggest practices to develop students' skills such as self-management and problem-solving skills to better adapt to such unprecedented situations. The research methods included analysis of literature and research reports, by searching in the publications' databases.

Challenges in Education during Pandemic

A report published by the OECD emphasizes the need to strengthen resilience at all three levels: the level of systems, the level of schools and the level of individuals, together creating a strong, cohesive ecosystem (OECD, 2020). Various suggestions can be found on how to organize distance learning at school level, as well as methodological advice for teachers (e.g., issued by state agencies). However, there is a lack of studies published (at the moment of drafting this article) on actual assessment of skills (e.g., problem-solving skills or self-management) of students during COVID-19. The preservation of the quality of education is sometimes discussed at the political level from the position of "teaching", not "learning", focusing on strengthening the capacity of the school as an organization and teachers' capacity, as the "first aid" during such pandemic is to come up with ideas as to how to maintain studying process remotely and implement these ideas immediately, as many countries have done.

As mentioned above, it is equally important to strengthen the individual level during the pandemic. A "resilient individual" is defined by the ability to accept changes and uncertainty, having confidence in one's skills and critical thinking skills (OECD, 2020). With COVID-19 pandemic developing, public resources in some countries were very soon available with recommendations for pupils and students on how to manage their distance learning and maintain their psychological well-being (e.g. in Australia, https://schools.au.reachout.com/covid-19). Students were also offered various online modules to learn about specific skills, such as self-efficacy, flexibility in thinking, how to cope with learning stress during COVID-19 and other important topics. UNESCO and the World Health Organization (WHO) have published various support materials on distance learning, mental health and other issues relevant to the healthy functioning of people due to the changes brought about by COVID-19 (e.g., https://en.unesco.org/covid19/educationresponse/solutions; WHO, 2020, https://www.who.int/docs/default-source/coronaviruse/mental-health-

considerations.pdf). There are also digital self-help tools and applications available that can help with self-management and problem-solving skills. However, if self-management skills have not been trained before the crisis, it could be hard to individually and independently initiate development of such skills via online learning, especially for young students whose self-regulation skills are only in the development process and if such skills have not been systematically developed in school before.

Data from 98 countries were gathered about the response of the national level and school level to COVID-19 related education disruption (Reimers & Schleicher, 2020). Most countries reported that ensuring the continuity of academic learning for students, supporting the students who lack skills for independent study, ensuring the well-being of students and of teachers are challenging and they are important issues that must be dealt with. Also, majority of respondents optimistically share an opinion that distance learning might lead to increase in the autonomy of students to manage their own learning. This article by Reimers and Schleicher also highlights some data from PISA2018 study regarding students' home settings for studying, and it shows that on average 91% of students have a quiet place at home for schoolwork and 34% to 95% have a computer they can use for studying (based on OECD PISA 2018 database). Numbers may seem high, but they also mean that there are enough children who do not have appropriate home settings for effective studying remotely. Once again, it puts such children at risk for increasing inequality, both by decreasing their ability to keep up with the curriculum during and after the pandemic, and at risk of decrease in well-being, as stated in other reports (Azevedo et al., 2020).

Distance learning during the pandemic increases the risk of decline in academic performance, and schools and policy makers must think in advance about how to mitigate the losses in education (Kaffenberger, 2021). In a UNESCO publication "Guidance on Active Learning at Home during Educational Disruption: Promoting student's self-regulation skills in COVID-19 outbreak" (Huang et al., 2020) there is a call for students to become active learners during the distanced learning. But it can be harder for students whose self-regulation skills are lower at baseline and for those who lack external support from their family. Students need to develop self-management skills, including planning skills, self-monitoring and problem-solving skills to be active learners and to be able to manage their own learning. Therefore, it is essential, that students learn strategies of self-management and problem-solving to effectively engage in distance learning due to COVID-19 or other unexpected situations that might come in the future.

Research on Students' Skills and Attitudes during the COVID-19 Related Distance Learning

Once the COVID-19 pandemic developed, researchers, as well as official institutions, started implementing research and suggesting recommendations regarding difficulties that students were facing with distance learning process, various aspects of psychological well-being and other problems related to pandemic (e.g., WHO, 2020; Singh et al. 2020).

The research was done at a country level and internationally. For example, The Ministry of Education and Science of Latvia immediately after the start of distance learning (spring of 2020) launched an online survey to understand how distance learning was perceived by schools, pupils and parents, and what improvements were needed; survey was completed by more than 23,000 children and 27,000 parents (Latvia has a population of 1, 92 million people in 2019). The initial survey showed that 55% of parents supported the child by helping him or her plan their time (because the child needed help with it) (Ministry of Education and Science of Latvia, 2020). The study found that some students had difficulty in distance learning due to the lower work pace and lack of face-to-face support from the teacher, while other students liked to be able to plan their own time and prioritize. In a similar survey at the end of study year (after more than 2 months of distance learning), students were asked "What helped you study successfully during the distance learning?" and 57% of students (n=9930) reported that the family supported their learning, 55% noted that they could sleep for longer (and it helped), and 51% chose also the option "I could plan my daily schedule". Interestingly, 26% of students reported that it was easier for them to study alone, compared to learning in the classroom settings. Students were also asked: "What were the biggest challenges for you during distance learning?" and 45% reported they had stress whether they would manage to do all assignments on time (n=10,051), 42% reported lack of motivation, and 29% chose also the answer option "It was harder to study alone" (IZM, 2020). The various results point to a gap between different students' ability to cope with distance learning and overall attitude, which may be not only due to lack of family support or environment, but also due to differences in students' transversal skills, such as ability to manage themselves effectively and to deal with problem situations that arise during this new situation, and their psychological well-being.

There are studies that have focused on psychological and other difficulties of students during COVID-19 pandemic. A qualitative analysis of high school students' self-reports (n=719) on the challenges they are facing during COVID-19 pandemic summarizes important categories of students' problems: 1) mental health, 2) physical health, 3) family, 4) friends, 5) social connection and community, 6) academics, 7) missing important events, 8) socioeconomic issues,

9) routine, 10) COVID rules and adjustment, 11) contraction/exposure to COVID, 12) technology, and 13) future plans (Scott et al., 2020). Challenges related to studying were mentioned most frequently, including difficulty to stay motived, productive and manage one's time; followed by challenges with mental and physical health. Another study compared students' mental health measures before and during the pandemic (n=406, age M=15,24) using valid inventories for assessment of depression symptoms, affect, as well as other measures, and it was found that both anxiety, loneliness and depression symptoms show small, but statistically significant increase (Rogers, Ha & Ockey, 2021). Also, this study reported changes in students' relationship dynamics with friends and family, indicating challenges in their socio-emotional functioning.

There are also studies with university students showing that a certain part of students find distance learning as effective as face-to-face learning, at the same time reporting difficulties (69%), such as loss of interest and fatigue (67%) and have also reported less gain of knowledge compared to traditional education (e.g., Tuma et al., 2021); also, an international study with 26 participating countries (Van de Velde et al., 2021) has taken place, investigating university student well-being and comparative results are yet to be published. In another study during COVID-19 distance learning, first-year undergraduates reported that they had hard time with discussions and conversations with lecturers and classmates, while distance learning gave them more time to read the materials themselves and to do their individual homework (Amir et al., 2020). Interestingly, more than half of the students (tertiary education level) noted that distance learning increased self-directed learning, for example, it motivated to carefully prepare for group discussions. Authors discuss that satisfaction with distance learning could be also related to students' age and level of education: whether they are learning introductory theory or need practicing specific professional skills at that point of studies, which is particularly difficult during the distance learning process.

The time elapsed since the beginning of the pandemic has not probably been long enough for a vast number of scientific studies to be caried out and published in peer-reviewed journals, but in general, the amount of various materials and first results of research is what we can analyze to draw first conclusions. Currently there is a lack of research involving secondary and high-school students, especially with assessment of students' skills and abilities. OECD has published an extensive survey tool for a comprehensive assessment of the distance learning situation "The PISA Global Crises Questionnaire Module" (Bertling et al., 2020), based on which we could eventually gain comparable data from many countries of the world. The limitation with some of the currently available research is that they do not show the full picture of psychological constructs (e.g., depression, anxiety) and rarely measure students' skills and abilities; some conclusions are based on single question measurements. While the large-scale international

studies can provide comparison of the situation in different countries, it is also important to study the situation in each country and to also focus on specific domains such as aspects of psychological well-being, socio-emotional skills, problem-solving skills and self-management skills to help students develop the ability to deal with such unprecedented situations in the future.

To conclude, studies in different countries show that students face serious difficulties in many domains during pandemic, including psychological functioning and learning, indicating there is a lack of certain skills and received support. It can be concluded that distance learning and the new, unprecedented situation in general impose that students now more than ever need the ability to manage themselves and their learning, as well as to deal with novel situations and everyday problems.

Developing Skills to Effectively Deal with Unprecedented Situations

Global reports stress the need to develop students' skills, for example, socio-emotional skills, problem-solving skills and self-management skills (World Bank, 2020). This article focuses mostly on problem-solving and self-management skills of students. But how do we define problem-solving and self-management, and what exactly students must develop?

Problem solving is defined as a process that occurs when an individual encounters a problem (or a goal) that cannot be achieved immediately by a particular action, instead one must use thinking to understand how to get from the current state to the goal state (Duncker, 1945). Doing an automated task is not considered problem-solving, however, dealing with an unprecedented situation is considered problem solving. Researchers have further developed the definition: problem-solving as a process involves multiple thought operations and actual activities (Frensch & Funke, 1995). The international education survey PISA defines problem-solving as the ability of an individual to use cognitive processes to understand and resolve real, interdisciplinary situations where the solution is not immediately apparent and where the knowledge is not limited to only one of the core fields of mathematics, reading or science (OECD, 2003; OECD, 2013). Problem solving skills are transversal skills (they can be applied to various situations in various domains) and the problem-solving process involves managing and directing actions to cope with a problem toward changing the nature of the situation, changing the reaction to the problem, or both (Nezu, 2004). Problem-solving consists of main processes: 1) exploration and understanding; 2) representation and formulation; 3) planning and executing; 4) monitoring and reflecting (OECD, 2013).

Self-management is a part of self-regulated learning, defined by the ability to 1) plan, 2) monitor and 3) evaluate (Zimmerman, 2008). Self-regulated learning

includes skills that provide ability to manage one's actions regarding learning. The individual thinks about one's learning needs, plans them, then monitors the process, directs and regulates actions toward goals of information acquisition, expanding expertise, and self-improvement. A student with highly developed self-management skills is able to motivate oneself, plan tasks, as well as evaluate the results (Veenman et al., 2014). We can see that both problem-solving and self-management share some similar underlying processes.

Research results indicate that both problem-solving and self-management skills are important to succeed academically. Problem solving skills have strong correlations to different types of cognitive abilities (e.g., Danner, Hagemann, Schankin, Hager, & Funke 2011; Kretzschmar et al., 2016) and academic achievement (e.g., Greiff, Kretzschmar, Müller, Spinath, & Martin, 2014; Greiff, Wüstenberg, Molnár, Fischer, Funke, & Csapó, 2013). Self-management skills have also been shown to be significantly correlated with academic performance, as they are a strong predictor for learning outcomes (e.g., Abd-El-Fattah, 2010; Veenman et al., 2014).

How can the development of self-management (an important part of self-regulated learning) and problem-solving skills help students to better deal with the current crisis and its aftermath? First, there are two issues to consider: 1) how to support development of students' skills during the distance learning and 2) how to develop their skills after the return to face-to-face learning?

Regarding the first issue, it must be considered what kind of distance learning approach is used during the pandemic. There are different types of distance learning, for example, synchronous, asynchronous and blended learning, where the methods are mixed (Fidalgo, Thormann, Kulyk, & Lencastre, 2020). There were different approaches used in countries around the world (Reimers & Schleicher, 2020), based on available infrastructure and other factors (for example, in case of bad internet coverage or lack of computers, teachers could distribute printed materials with tasks). In Latvia, various forms of learning were implemented in the distance learning process during the pandemic, for example, teachers organized both online video lessons at a specified time (synchronously) and recorded videos with lesson content or videos with comments on frequently asked questions that students can watch at their preferred time (asynchronously), as well as gave students written or practical tasks (Ministry of Education and Science of Latvia, 2020).

In an article analyzing online tools for assessment and development of self-regulated learning it is discussed that online approach can be effective and can include methods for raising metacognition, for example, when student is asked to stop at a certain point of task and reflect what has been done so far (for detailed analyses see Araka et al., 2020). In another recent article researchers analyze appropriate approaches for self-regulated learning while studying remotely and

they note that students under stress (such as pandemic) might have difficulties with self-directed learning as they must be aware of what they do know and do not know and independently make decisions about what exactly must be done; also, the use of artificial intelligence tools to assist learners is discussed (see Carter et al., 2020 for a detailed analysis).

Regarding the second issue (how to develop students' skills after they return to face-to-face learning) it is important to assess students' skills during and after the pandemic, including assessment of difficulties they had during the distance learning. Also, it has to be understood how transversal skills can be best taught, in general. As research show, transversal skills can be most effectively developed if 1) teachers explicitly talk about what is being done and why (e.g., "First, we have to understand the task to the smallest detail: what concepts are included in this problem?", "Now we will try to come up with several possible solutions so we can choose the most appropriate."), and give feedback to students; and if 2) the development of skills is a part of curriculum or a certain field of action, not being taught independently without a context (e.g., Perels, Guertler, & Schmitz, 2005). And in this case, if a student has not previously trained a skill of problem-solving, one might not recognize when it needs to be used, and what exact steps to follow. Recognizing when to use a skill, being aware of it, and training (using) a skill is necessary to develop it to a profound level. The unprecedented situation during pandemic demanded students to use self-management and problem-solving skills at the level they had at that moment, for example, they were forced to plan and execute school tasks independently, to use new technologies (with or without support from family) without a teacher being there to support. And, based on the research discussed previously, students had problems with this, indicating that students' problem-solving skills and self-management skills were insufficient when they entered the distance learning situation (for example, in Latvia students have previously showed only average results in the ability to cope with non-standard situations in one of previous PISA studies (OECD, 2017)). It is still unclear to what extent these important skills could be developed during the pandemic, as longitudinal research have to be caried out to examine this point.

To sum up, we can assume that both self-management skills and problem-solving skills are essential for students to achieve high academic performance and to successfully engage in learning process. And schools must think in advance about methods how to help students develop these skills also after the pandemic. Feedback from teachers and training the self-reflection can be some methods to start with (Carter et al., 2020) that can be implemented online if the distance learning continues or in face-to-face learning after students return to schools. It is best if teachers integrate a specific sub-skill into daily activities of teaching a certain field and explicitly talk about the skills that are being trained.

Conclusions

It is clear from the studies that have been published at the point of preparing this article that students worldwide have faced many challenges during COVID-19 related distance learning, and they were forced to adapt to this unprecedented situation in ways that they could. Studies show that students have had difficulties in dealing with the new situation based on lack of certain skills, e.g., self-management skills and problem-solving skills, as well as lack of support. Additionally, worldwide organizations have warned about the risks of learning challenges in the future for the students currently affected by the pandemic. It is crucial to think about the possible means of strengthening students' ability to cope with the situation while they are learning remotely, as well as when they return to face-to face learning.

Ability to deal with this unprecedented situation and its aftermath can be associated to many factors, including socio-economic situation and environment, external support from family, and students' skills (the individual factor attributed to students). As can be concluded from the research, the main skills that students need to effectively deal with the situation can be arranged in several categories: social-emotional skills, self-management skills, problem-solving skills, technical (IT skills) and others. As stated in the introduction, this article focused mostly on the research of two of the abovementioned skills: ability to solve problems and manage oneself.

Based on the literature analysis it can be concluded that there is a certain overlap between the constructs "self-management skills" and "problem-solving skills" in the theory - especially with regard to cognitive processes that manifest in the case of both skills, such as planning, monitoring and evaluation. But the main difference is that self-management skills are manifested in the ability to cope with one's own "internal problems" or to "manage oneself", including motivating, planning one's time, goal setting, the ability to avoid obstacles, focus and successfully implement the set tasks, and to analyze oneself during and after the whole process. In turn, problem-solving skills include the ability to deal also with various "external problems", everyday situations, challenges, such as using a new technology, creating an appropriate learning environment, choosing priorities from incoming tasks (by evaluating them and making decisions), as well as solving relationship problems and communicating effectively (with peers, with teachers, etc.), to plan time and other resources, to involve other people in team work, and also be able to initially explore and precisely define where the problem is. As mentioned in the previous section, self-management skills are a part of self-regulated learning, thus they are important to effectively engage in the learning process, especially during distance learning.

Also, it must be noted that self-management and problem-solving skills refer to a broader scope of individual's functioning (e.g., daily life), not only school-learning. Therefore, they are both important transversal skills that are necessary to cope with novel situations, and they can be developed as a part of curriculum via online learning (if remote learning continues), or during face-to-face learning. Nevertheless, guidance and support from teachers during the development of these skills is crucial, especially for those students who lack the resilience, self-management skills, or support from parents (Reimers & Schleicher, 2020).

Research show that students have faced serious difficulties in dealing with the pandemic, therefore indicating that their skills to deal with novel situations and such pressure are not sufficient. Thus, the next research question arises: "How can we help students deal with the aftermath of COVID-19 when they return to face-to-face learning?" and "How can their skills be strengthened and developed further to better deal with unprecedented situations in the future?"

Acknowledgment

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MĀSU PROFESIONĀLO ATTIEKSMJU VEIDOŠANA DARBĪBAI ĀRKĀRTAS APSTĀKĻOS

Formation of the Nurses' Professional Attitudes for Work in Emergency Situations

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Abstract. *While the transformation of the medical education in general is competence-oriented and practice based, the article focuses on the role of the attitudes for the development of the nurses' education and profession. Covid-19 critical conditions created new complicated cognitive, professional and psycho-emotional challenges for health care specialists. Nurses' work ability and professional attitudes have become the central factor to solve clinical and personal problems in order to provide patient-centered and effective medical care. However, it shows that nurses do not have all the necessary competences to quickly adapt, react and keep psycho-emotional balance, working in critical situations. Theoretical analyses and empirical investigations are aimed at finding out what skills and attitudes are essential for medical specialists in Covid-19 pandemic conditions and how students feel about their readiness to use necessary skills and attitudes in practice in unexpected and complicated conditions The article discusses how to transform the organisation of the medical college study process and content to give students opportunities to acquire experience and develop necessary attitudes for the complicated practice. The focus is on studying the nurses' attitudes necessary for the Covid 19 situation and possibility to promote them in the authentic work-based study process. The study of theoretical sources and survey results give evidence that practice-based studies can promote medical students' professional attitudes and psycho-emotional capacity, if medical studies are aimed at forming emergency oriented skills and structured in the practice-based environment. Implementation of attitudes as outcome into programmes and effective transition of attitudes into practice can promote higher quality of nurses' professional and responsibility level.*
Keywords: attitudes, capacity, emergency, practice-based education.

Ievads
Introduction

Pandēmijas Covid-19 ārkārtējā situācija visā pasaulē izvirza medicīnas darbinieku sagatavošanai jaunas prasības, jaunu kompetenču nepieciešamību darbam specifiskos un veselībai bīstamos apstākļos. Tas aktualizē medicīniskās izglītības transformēšanas virzienu uz sarežģītu spēju un prasmju veidošanu, kas balstās teorētiskās atziņas par mūsdienu augstākās izglītības attīstības tendencēm; "Augstākajā izglītībā fokusa maiņa ir no zināšanām un satura uz sarežģītām

spējām un prasmēm, ko var adaptēt augstākās izglītības kontekstiem" (Zlatkin-Troitschanskaia, 2017). Pedagoģiskās paradigmas maiņa prasa jaunas pieejas, kas sniegtu iespējas attīstīt nepieciešamās kompetences atbilstoši mainīgajiem sociālajiem apstākļiem. Latvijas zinātniece I. Žogla raksta, ka izglītības saturs, kas ir orientēts uz izglītojamā kompetenci-zināšanām, prasmēm un attieksmēm, ir starp nozīmīgākajiem faktoriem, kas ietekmē pedagoģisko nodrošinājumu un didaktisko dizainu" (Žogla, 2019). Modernās sociālās un psiholoģiskās zinātnes akcentē sniegumu saistībā ar afektīvajiem, emocionālajiem, situatīvajiem un sociālajiem procesiem (Jones, 2008). Pārresoru koordinācijas centrs (2010) "Izglītība2030" ietvarā uzsver trīs domēnus, kas liecina par attieksmes nozīmes pieaugumu nākotnē: ilgtspēja, inovācija, izturība (sustainability, innovation, resilience) un to saista ar darbību, refleksiju, paredzēšanu (anticipation), atbildību, spriedzes un dilemmu pārvarēšanu, jaunu vērtību radīšanu, kas ir būtiski, lai pilnvērtīgi sagatavotos profesionālās darbības izmaiņām un izaicinājumiem.

Eiropas stratēģiskie virzieni "Veselība 2020" aktualizē jaunās māsu kompetences, norādot, ka šobrīd māsu profesija prasa no māsām lielu atbildību, uz cilvēkiem orientētas pieejas veselības pakalpojumu sniegšanā, kas nozīmē, ka pakalpojumi ir visaptveroši, nepārtraukti, droši un atbilst indivīda vajadzībām. Covid-19 ārkārtas apstākļos veselības aprūpes vajadzības ir saistītas ar kvalitatīvu, drošu un pacientcentrētu pakalpojumu sniegšanu, kas lielā mērā ir atkarīgas no medicīnas personāla profesionālajām, personīgajām un sociālajām attieksmēm. Tātad, māsu izglītībā par prioritāru kļūst attieksmes dimensija.

Prakse liecina, ka māsu loma un atbildība pieaug, jo māsa ir centrālā ārstniecības procesa figūra, kas veic pamatprocedūras, seko pacienta veselības stāvoklim un no viņu aprūpes kvalitātes lielā mērā ir atkarīga pacientu sekmīga atveseļošanās. Krīzes situācijā medicīniskā aprūpes darbība ir kļuvusi sarežģītāka, jo pacientu aprūpē ir jāsaskaras ar jauniem izaicinājumiem: augsts risks ārstniecības personas veselībai, pastiprināti drošības pasākumi medicīnas iestādēs, jauni aizsardzības līdzekļi un medicīniskais aprīkojums, jauni medikamenti, īpašas pacientu vajadzības paaugstināta stresa apstākļos. Ārkārtas apstākļi pieprasa jaunas kompetences, un medicīnas prakse liecina, ka māsām pietrūkst attieksmes kompetences, lai ātri pielāgotos, reaģētu un saglabātu psihoemocionālo līdzsvaru krīzes situācijās.

Medicīniskās izglītības pētījumi analizē attieksmju jēdzienu mijiedarbībā ar zināšanu un prasmju kopumu, kā "vērtību un vēlmju kombināciju, kas kalpo par pamatu cilvēka rīcībai pasaulē noteiktā jomā" (Hoskins & Fredrickson, 2008). Taču attieksmes dimensijas attīstība reālā studiju procesā, un kā māsas spēj to demonstrēt praksē ir maz analizēta. Tas arī noteica raksta mērķi - izpētīt, kādas attieksmes māsām ir iespējas attīstīt studiju procesā un vai tās ir pietiekamas darbībai ārkārtas apstākļos. Otrkārt, kā praksē un darba vidē balstīts studiju

process veicina profesionālo attieksmju attīstību. Empīriskā pētījuma objekts ir attieksmes kā dominējošais faktors profesionālajai darbībai ārkārtas apstākļos.

Rezultātu ieguve un analīze balstās socioloģiskās pētīšanas metodes kvantitatīvā pieejā, izmantojot aptauju ar anketēšanu.

Pētījuma mērķis: Teorētiski pamatot attieksmju lomu profesionālajā darbībā un Covid 19 ārkārtas apstākļos un veikt empīrisko pētījumu, kā medicīniskās izglītības studenti novērtē zināšanu, prasmju un attieksmju pietiekamību darbam ārkārtas situācijā.

Rezultātu ieguve un analīze balstās socioloģiskās pētīšanas metodes kvantitatīvā pieejā, izmantojot rakstisku aptauju. Mērinstruments ir autores veidota anketa, lai noskaidrotu studentu izpratni par profesionālo darbību ārkārtas apstākļos, topošo māsu un ārstu palīgu profesionālās prasmes ietekmējošus faktorus un nozīmīgākās attieksmes sekmīgai darbībai veselības aprūpē.

Lai būtu augstāka pētījuma datu ticamība, to vākšanas mērķis un procedūra respondentiem tika izskaidrota, pasvītrojot nozīmīgu aptaujas aspektu, kā praksē un darba vidē balstīts studiju process veicina profesionālo attieksmju attīstību.

Ņemot vērā māsu darbības ārkārtas apstākļos aktualitāti, tika izvirzīti šādi pētnieciskie jautājumi:

1) kādas attieksmes ir nepieciešamas māsām darbībai ārkārtas apstākļos un kādas pietrūkst vai ir pilnveidojamas studiju procesā;
2) kāds ir koledžas studentu viedoklis par gatavību darboties ārkārtas apstākļos un kādi ir problēmu risinājumi;
3) kā praksē un darba vidē balstīts studiju process sekmē attieksmju attīstību profesionālajai darbībai krīzes situācijās.

Pētījuma metodoloģija :

1) Avotu par pētījumiem medicīnas jomas speciālistu profesionālās kompetences teorētiskā analīze, aktualizējot attieksmes komponentu, kuram būtu jādominē veselības aprūpē neparedzētos apstākļos.
2) Empīriskais pētījums tika pakārtots pētījumā gūtajām atziņām.
3) Aptauja tika veikta starp medicīnas koledžas 1.-3.kursa studentiem.
4) Datu analīze tika apkopota grafikos.

Pētījuma bāzi veido 110 kopumā 1.kursa, 2.kursa un 3.kursa studenti. Pētījumā dalībnieki piedalījās interneta aptaujā, kurā respondentiem bija jāsniedz vērtējums apgalvojumiem par savām zināšanām, prasmēm un attieksmēm un to pietiekamību darbībai ārkārtas apstākļos. Rezultātu analīzei tika izmantotas 110 anketas, 8% respondentu ir vīrietis, 92 % ir sieviete, 41 % ir vecumā no 21-25 gadiem, 23% jaunāki par 21, 7% ir vecumā no 26-30, 15% (31-35 gadi), 9% vecumā no 36-40 gadiem, 3% vecumā no 41-45 gadiem, 2% vecāki par 45 gadiem.

Māsu attieksmju dominējošā loma darbībai ārkārtas apstākļos
The Dominant Role of Nurses' Attitudes for Work in Emergency Situations

Medicīniskā prakse pandēmijas laikā atklāj, ka krīzes apstākļos pieaug māsu attieksmes nozīme. Māsas darbojas atbildīgākajā aprūpes posmā par pacienta ārstēšanu, dzīvību un garīgo līdzsvaru, jo viņas ir vistuvāk pacientam un no viņu uzmanīgās, precīzās un atbildīgās attieksmes ir atkarīgs veiksmīgs ārstēšanās process. Māsām jāprot pārvarēt grūtības un negatīvos personīgos pārdzīvojumus, lai sniegtu kvalitatīvus medicīniskos pakalpojumus un pozitīvu atbalstu pacientiem. Strauji izmainītos apstākļos ir daudz sarežģītāk aprūpēt pacientus ar smagām hroniskām slimībām, vecāka gada gājuma cilvēkiem, kuriem ir jāārstē vienlaicīgi vairākas infekcijas, kuriem ir bailes, panika, jo atrodas situācijā, kad ģimenes nedrīkst apmeklēt slimniekus un viņiem pašiem jātiek galā ar negatīvajām emocijām un stresu. Tas liecina, ka ārkārtas apstākļi izvirza māsu studiju transformācijas un jaunu, paplašinātu profesionālo kompetenču attīstības nepieciešamību, liekot akcentu uz attieksmēm. Medicīniskajā izglītībā attieksmes ir vienmēr bijušas uzmanības centrā, bet šobrīd tiek aktualizēta attieksmju dominante un jaunas attieksmes dimensijas, kas atbilstu strauji mainīgajiem sociālajiem apstākļiem.

"Izglītojamā humānām kvalitātēm jābūt prioritārām apzinātās (deliberate) izglītības vidēs, un atbilstošām pārmaiņām jāpalīdz padarīt mācīšanos jēgpilnu. Izglītotu cilvēku 21.gadsimtā raksturo" racionāla domāšana un emocionalitāte, viņiem jābūt zinošiem un izglītotiem pārmaiņām (Bereiter & Scardamalia, 2008). Medicīniskās jomas speciālista profesionālās kompetences attieksmes domēna attīstība balstās humānpedagoģijas pieejā, kas ir vienmēr bijusi medicīniskās izglītības un profesijas centrā. A. Špona humāno izglītību traktē šādi: "Humāni virzīta izglītība ir orientēta uz cilvēku kā augstāko vērtību, tā dabiskās un sociālās attīstības pilnveidošanās procesiem, brīvas pašattīstības iespējām un priekšnoteikumiem. Humānisma princips paredz vispārcilvēcisko vērtību izcelšanu pedagoģiskajā procesā, pasaules kultūras mantojuma un garīgo vērtību integrēšanu izglītībā. Tas nozīmē, ka cilvēks ar viņa personības individualitāti, savdabību, iespējām un to īstenošanas veidiem tiek atzīts par pamatvērtību. Skolai jāveido cilvēcīga personība ar humānisma uzskatiem, jūtām un attieksmēm" (Špona, Žogla, & Maslo, 2001).

Humānisma idejas uzsver "personības unikālās īpašības, atbildību, emociju pārvaldīšanu, nepārtrauktu izglītošanos un pilnveidošanos, izaugsmi un attīstību" (Rubana, 2004), kas ir svarīgas veselības aprūpes jomā un ir būtiskas nākotnes medicīnas darbiniekam. Transformējot pasauli pēc Covid-19 pandēmijas ir svarīgi izcelt humānus risinājumus, kur "humānā sadarbība un labizjūta (well-being) kļūst par galveno prioritāti, un lai sasniegtu šos mērķus ir nepieciešams "iespējot" (enact) humānās vērtības (OECD, 2016).

Mūsdienu pedagoģijas fokusēšanās uz digitālo tehnoloģiju balstītām mācībām ir aktualizējusi problēmu, kā "digitālās paaudzes izglītojamos virzīt uz humāno kvalitāšu attīstību, pavadot laiku virtuālajā vidē un kā pārvērst digitālās tehnoloģijas efektīvos mācību rīkos" (Jones, 2008). Mūsdienu izaicinājumi palielina caurviju kompetenču un attieksmju – kā piemēram, elastības, mobilitātes un veiklības – nozīmīgumu (Ling, 2020). Šajā rakstā attieksmes tiek izprastas kā "afektīvas reakcijas, kas ietekmē motivāciju, uzvedību un rīcību, kas sniedz iespēju pielāgoties pārmaiņām, gatavību reaģēt uz jaunām idejām un situācijām" (Bohner & Dickel, 2011).

Attieksmi A. Špona raksturo kā integrētu personības īpašību, kas veidojas no apgūtajām zināšanām un pārdzīvojuma un izpaužas vērtībās, mērķos, ideālos un normās (Špona, Žogla & Maslo, 2001). Tātad, attieksmes kā vērtību izpausmes ietekmē mērķus, uzvedību un spējas. Šobrīd pieaug tādu profesionālo spēju kā modifikācijas, adaptācijas spēja un elastība nozīme, kuru attīstībai ir nepieciešama "visu personības resursu, zināšanu, pieredzes, individuālo spēju, prasmju un interešu izmantošana" (UNESCO, 2020). Teorētiskie avoti liecina, ka attieksmes ir saistītas ar izziņu, motivāciju, emocijām un uzvedību, kuru integrēšanas rezultāts ir afektīvās reakcijas. "Attieksme pārstāv novērtējošu atziņu un ietekmju integrāciju saistībā ar objektu. Attieksme ir vērtējoši spriedumi, kas integrē un apkopo šīs kognitīvās/afektīvās reakcijas. Šīs vērtējošās abstrakcijas atšķirīga izturība, kas, savukārt, ietekmē noturību, pretestību, attieksmes un uzvedības konsekvenci" (Bohner & Dickel, 2011).

Medicīnas prakse ārkārtas apstākļos ļauj apgalvot, ka šīm spējām un īpašībām ir noteicoša loma efektīvai darbībai pacientu aprūpē un ārstniecībā, kā arī norāda uz attieksmju dominējošo pozīciju. Šie faktori nosaka attieksmju pilnveides nepieciešamību māsu izglītības transformācijas procesā un nozīmē, ka attieksmes ir iekļaujamas studiju mērķos, uzdevumos, studiju rezultātos un studiju sasniegumu vērtējumos. Pētījums ir saistīts ar māsu ārkārtas apstākļiem atbilstošu attieksmju izpēti un noteikšanu, jo attieksmes ietekmē profesionālās darbības un personības attīstības daudzus aspektus. "Attieksmes ir personīgie un sociālie uzskati, kas ietekmē, kādā veidā indivīds izturas pret citiem cilvēkiem, personīgo izaugsmi, profesionālo darbību, cilvēku grupu vai sabiedrību kopumā" (Reber, 1995).

Medicīnas studentu attieksmes kompetence ir pētīta emocionālās inteliģences un profesionālā stresa kontekstā. Goulmens (Goleman, 1995) uzskata, ka emocionālā inteliģence var sekmēt cilvēka sasniegumus profesionālajā darbībā - palīdz indivīdam iesaistīties komandas darbā, atrast efektīvākus darba veidus un integrēties darba vidē. Savos vēlākajos darbos Goulmens emocionālo intelektu saista ar līderības spējām un sasniegumiem darbā un runā par emocionālo kompetenci, kas ir: "iemācīta spēja, kas bāzējas uz emocionālo intelektu un, kura izpaužas izcilos sasniegumos darbā" (Goleman,

2001). Zinātnieki izceļ emocionālo inteliģenci kā faktoru, kuram ir potenciāls veicināt pozitīvu attieksmi, uzvedību un darba rezultātus (Shutte, 2002). Citā ārzemju pētījumā tiek uzsvērts, ka izglītotājiem un praktizējošajām māsām, kuras strādā ar studentiem, ir jāattīsta izpratne par emocionālās kompetences spēju attīstības nepieciešamību veselības aprūpē (Wilson & Carryer, 2008).

Latvijā veiktais pētījums par māsu emocionālo spēju attīstību (Deklava, 2012) atklāj, ka attieksmju kompetencei ir būtiska loma profesionālo uzdevumu veikšanai un efektīvai māsu praksei, kas ietver māsu spēju atpazīt emocijas un vadīt emocionālās reakcijas darba vidē, attiecībās ar pacientiem un kolēģiem. Pētījumā ir secināts, ka emocionālā kompetence, kas ir personīgās un sociālās kompetences komponents, ir pamatfaktors māsas prakses sagatavotībai. Pētījumos par veselības aprūpes darbinieku stresa pārvarēšanu ir uzsvērta tās saistība ar psihoemocionālo kompetenci, ko raksturo attieksme pret sevi, darbu un apstākļiem, kas ietver spēju tikt galā ar sarežģītām situācijām, attiecībām, pārmaiņām un stresu. Pētījumi uzsver izaicinājumus, kas parādās attīstoties māsas lomai veselības aprūpē, paplašinoties un mainoties pienākumu lokam, atbildībai, kad māsa tiek uztverta kā aprūpes vadītāja. Grīnglas un Burke (Greenglas & Burke, 2001) pētījuma rezultāti par māsu iekšējo resursu un pašefektivitātes sakarību apstiprināja, ka stress darbā, stresa izpratne un prasmes pārvarēt stresu, korelēja ar apmierinātību ar darbu, lojalitāti un psihosomatisku sindromu attīstību. Taču pētījumā atklājās, ka lielākajai daļai māsu vadītāju trūkst zināšanas un izpratne par stresoriem darbā, viņu stresa atpazīšanas prasmes bija vājas. Tas apstiprina medicīnas darbinieka psiho-emocionālās attieksmes nozīmi un pilnveides nepieciešamību.

Māsu praksē ārkārtas apstākļos kļūst aktuālas attieksmes pamatfunkcijas, kas saistītas ar noteiktu cilvēka vajadzību apmierināšanu: adaptīvā/utilitārā (attieksmes virza subjektu uz tiem objektiem, kuri kalpo mērķu sasniegšanai), zināšanu (attieksmes dod saīsinātas zināšanas, kā rīkoties situācijā), pašregulācijas (attieksmes kalpo gan kā līdzeklis cilvēka iekšējās spriedzes regulēšanai, gan kā cilvēka personības pašizteiksmes līdzeklis) un aizsardzības (attieksmes palīdz sekmīgi risināt iekšējos konfliktus). A. Harisons (Harrison, 1976, pēc Pļaveniece & Škuškovnika, 2002) izdala trīs attieksmju komponentus: kognitīvo, emocionālo un uzvedības. Teoriju izpēte liecina, ka šie komponenti darbojas mijiedarbīgi un ir savstarpēji atkarīgi. Kognitīvie attieksmes komponenti(pārliecība, idejas) nosaka galvenās vērtības, no kurām ir atkarīgas emocionālās attieksmes ar pozitīvu vai negatīvu reakciju, kas atbilstoši ietekmē uzvedību un rīcību. Tas norāda uz to, ka ir būtiski integrēt attieksmes zināšanu un prasmju attīstības procesā. Sagatavojot nākamos medicīnas speciālistus sarežģītai profesionālajai darbībai ārkārtas apstākļos, jāveido attieksmes, kas noteiktu prognozētu rīcību, kas ļautu pārvarēt grūtības un pārvaldīt sarežģītas situācijas.

Pandēmijas situācija atklāja māsu garīgā un emocionālā noturīguma nozīmi, jo māsas nebija gatavas darbam ekstrēmos apstākļos, kuros bija fiziskā pārslodze, apdraudējums viņu veselībai un dzīvībai, jo nebija atbilstošu aizsardzības līdzekļu, nebija izpratnes par koronavīrusu, par tā simptomiem, slimības gaitu, ārstniecības metodēm, drošības pasākumiem, kas izraisīja bailes, paniku un apjukumu. Tas parāda, ka ārkārtas apstākļos, kad neparedzēti izaicinājumi rada ārējo un iekšējo nestabilitāti, ir aktuālas attieksmes dimensijas, lai saglabātu spēju darboties, kas ir saistīta ar emociju pārvaldīšanu un regulēšanu, ētisko principu ievērošanu, atbildību un patstāvību.

Attieksmes ir būtiskas, lai risinātu gan ikdienas dzīves, gan profesionālās dzīves problēmas mainīgajos sociālajos un darba tirgus apstākļos. "Lai kompensētu ārējo nestabilitāti, indivīdiem jāattīsta droša iekšējā stabilitāte, integrējot pieredzes nepārtrauktību caur identitāti un kapacitāti darboties. Profesionālo, sociālo un personīgo problēmu risināšanai nepieciešamās kompetences ietver pašregulāciju, pašrefleksiju un rīcību" (Chur, 2018). Tas norāda, ka attieksmju kompetences ir nozīmīgi veicināt māsu izglītības attīstībā kā spējas sekmīgi rīkoties kompleksās situācijās, mobilizēt psiho-sociālos resursus, kas ietver kognitīvos, mentālos un emocionālos resursus, lai risinātu konkrētus uzdevumus atbilstoši strauji mainīgiem apstākļiem. Lai pilnvērtīgi sagatavotos profesionālajai darbībai ārkārtas apstākļos ir būtiski apzināt un iekļaut studiju saturā sekojošos aspektus: "pazīt sevi, līdzjūtības attīstīšana, samierināties ar nenoteiktību, pieņemt sarežģītību ar toleranci" (Igarashi et.al, 2018). Šie aspekti ir kritiski pandēmijas apstākļos, jo māsām ir jāpielāgojas jaunu, daudz sarežģītāku uzdevumu un pienākumu pildīšanai, nepieciešams pārvarēt negatīvos psihoemocionālos stāvokļus, jāapgūst jaunas prasmes, lai veiktu akūtu aprūpi, strādātu intensīvajā terapijā, tiktu galā ar fizisko un garīgo pārslodzi.

Lai veidotu profesionālās attieksmes un uzvedību, kas ļautu sekmīgi tikt galā ar aprūpes uzdevumiem un pildīt aprūpes pienākumus, ir jāizprot to attīstības kopsakarības. Tāpēc tika izveidota shēma, kas atspoguļo attieksmes veidošanās faktorus (1. attēls).

1.attēls. **Attieksmes kā zināšanu, prasmju un uzvedības veidošanās faktors** (autore)
Figure 1 **Attitudes as a Factor of Knowledge, Skills and Behaviour** (author)

Izveidotais modelis parāda, ka attieksmes ir centrālais faktors, lai veicinātu zināšanu, prasmju un profesionālās uzvedības attīstību. Uzvedība tiek saistīta ar atbildību, precizitāti, veiklību, ātru reakciju mainīgos apstākļos. Rīcībai ir svarīga pārliecinoša prasmju demonstrēšana, kas balstās atbildīgā attieksmē pret studēšanu, prasmju trenēšanu, pieredzes gūšanu.

Pandēmijas apstākļi liecina, ka māsu izglītībā ir nepieciešams veikt izmaiņas, lai māsas kā nozīmīgākais medicīnas vidējā posma personāls, varētu kvalitatīvi darboties savā profesijā krīzes situācijās. Māsām ir jānodrošina zināšanas un prasmes, jāattīsta attieksmes, kas palīdzētu pārvaldīt krīzes problēmas, veikt aprūpi sarežģītos darbības apstākļos akūtiem pacientiem un elastīgi pielāgoties pārmaiņām. Māsām ir jābūt gatavām autonomi pieņemt lēmumus, risināt ārstniecības un aprūpes problēmas, pielāgoties jauniem, nepazīstamiem un ārkārtas darba apstākļiem, uzdevumiem un pienākumiem. Kritiskās situācijās medicīnas darbiniekam ir svarīgi prast analizēt, būt gataviem apgūt jaunas prasmes, mācīties un pilnveidot nepietiekamo kompetenci. Pieaug šo kompetenču trenēšanas un pieredzes gūšanas studiju procesā loma, lai atbilstoši rīkotos kritiskās situācijās, kas akcentē darba vides nozīmi kompetenču un attieksmju attīstībā un pilnveidē.

Darba vidē balstītu studiju ietekme uz attieksmju pilnveidi
Influence of the Practice-based Studies on Improvement of the Attitudes

Pandēmijas Covid-19 apstākļi liecina, ka attieksmju kompetences ir nozīmīgi veicināt kā spējas sekmīgi rīkoties kompleksās situācijās, mobilizējot psiho-sociālos resursus, kas ietver kognitīvos, mentālos un emocionālos resursus, lai risinātu konkrētus uzdevumus atbilstoši apstākļiem. Kognitīvo, profesionālo un personības kompetenču attīstības mērķu sasniegšanai ir būtiski sniegt studējošajiem iespējas tās apgūt reālā profesionālā situācijā, lai tās kļūtu jēgpilnas un pieredzē balstītas.

Darba vides nozīme vai kompetences apguves praktiskā būtība pedagoģiskajā literatūrā ir formulēta lietpratības kontekstā. Autori (Hoskins & Fredriksson, 2008) profesionālo kompetenci saista ar lietpratību un to definē kā indivīda spēju kompleksi lietot zināšanas, prasmes un paust attieksmes, risinot problēmas mainīgās reālās dzīves situācijās, savukārt, Čur-Heidelberga pamatprasmes, kuras ietver arī afektīvo dimensiju, definē kā ģeneratīvas, kontekstatkarīgas spējas, kas ir cieši saistītas ar darbības kompetencēm. Tās aptver plašas cilvēku attieksmes un aktivitātes cilvēka un pasaules mijiedarbībā: "pamatprasmes vienmēr ir sarežģītas zināšanu, pārliecības un rīcības sistēmas" (Chur, 2018). Čur-Heidelberga mācību jomas izaicinājumus saista ar ilgtspējīgas izglītības nodrošināšanu, kuras centrā ir spēja pielāgoties atvērtām un mainīgām profesionālās darbības un sociālajām situācijām, un attiecas uz personības

vairākiem līmeņiem: domām, darbībām, jūtām un vērtībām. Tas dod iespēju apgalvot, ka attieksmju attīstība medicīnisko darbinieku studiju procesā ir saistīta ar to veiksmīgu pārnesi uz profesionālās darbības situācijām un ļauj "sasaistīt apgūstamo vielu ar pieredzi, studentu vērtībām un attieksmēm, attīstot studentu spēju reflektēt un paplašināt zināšanas, ko var pielietot un adaptēt profesionālās prakses dažādās jomās" (Zlatkina-Troischanka, 2017).

Ārkārtas situācija sakarā ar Covid-19 pandēmiju Latvijā un pasaulē parādīja, ka medicīnas darbiniekiem ir būtiski demonstrēt ne tikai profesionālo un sociālo atbildību (Iobst, 2010; Ten Cate, 2017; Mylona, 2016), bet arī prast pieņemt netradicionālus lēmumus, ātri reaģēt, pielāgoties darbībai citās specialitātes jomās, strādāt ar mūsdienīgām tehnoloģijām netradicionālā darba vidē, u.c. Šo kompetenču attīstību nevar nodrošināt teorētisko studiju vidē, topošajiem speciālistiem nepieciešams veidot specifiskās prasmes un attieksmes reālā praktiskā darbībā un pieredzes gūšanā, lai varētu veikt profesionālos pienākumus ne tikai kāda virsvadībā, bet arī patstāvīgi, apgūstot caurviju kompetences, kas ir noteiktas teorijās un jaunākajos normatīvajos dokumentos (European Council, ESCO, 2018).

Attieksmju un prasmju apguve darba vidē ir pārneses un profesionālās kompetences veicinošs faktors, jo tādā veidā darbojas starpdisciplinaritātes princips, kam ir svarīga nozīme zināšanu nostiprināšanā un daudzveidīgu profesionālo iemaņu apguvē. Šajā mijiedarbīgajā studiju procesā tiek iegūta labāka izpratne par darba pienākumiem, nepieciešamajām zināšanām, darba apstākļiem un attiecībām ar personālu un pacientiem. Tas nosaka pārmaiņas māsu izglītībā un māsu praksē, kur svarīga loma ir zināšanu pārnesei uz profesionālās darbības vidi, uz ko norāda reālā situācija saistībā ar Covid-19 ieviestajiem jaunajiem nosacījumiem un prasībām medicīnas darbinieku, tai skaitā māsu izglītības attīstību.

Kompetences definīcijas un apraksti (Garleja, 2004; Mylona, 2016; Epstein & Hundert, 2002; Frank et al., 2010; O'Sullivan & Burce, 2014; EC, 2018; Weinert, 1999) liecina, ka kompetencei ir nozīme, ja to var demonstrēt un novērot kā spēju darboties. Tātad, jāpilnveido kompetenču pārneses struktūras, samazinot studiju laiku auditoriju vidē, bet liekot lielāku akcentu uz praktisko darba vidi, kur profesionālā kompetence tiek apgūta autentiskā veidā reālās situācijas neviendabīgajos apstākļos.

Darba vide ir nozīmīga, lai koronavīrusa apkarošanas laikā māsu praksē pieaugtu klīnisko procedūru veikšanas kvalitāte, atbildības, precizitātes un patstāvības nozīme, nodrošinot komfortablu un drošu vidi pacientam un ārstniecības personālam; veicot atbilstošu vispārīgo un precīzu medikamentozo aprūpi, veicot adekvātu un savlaicīgu pacienta stāvokļa novērtēšanu. Tikai darba vidē ar reāliem pacientiem var iemācīties realizēt uz indivīdu centrētu aprūpi, un tādas prioritāras māsas kompetences kā atbildība, kritiskā domāšana, lēmumu

pieņemšana, elastība un empātija. Pandēmijas ārkārtas apstākļi liecina, ka darba vides domēna attīstībai ir nozīmīga loma profesionālās kompetences pilnveidē, jo tas sniedz iespējas attīstīt kognitīvo, psihomotoro, afektīvo un tehnoloģiju kompetenču dimensijas. Izveidotā māsu profesionālās kompetences attīstības tabula iekļauj kognitīvā, psihomotorā, afektīvā, darba vides un tehnoloģiju domēnus un atbilstošās prasmes (1. tabula).

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1.tabula. **Māsu profesionālās kompetences attīstības domēni** (autore)
Table 1 **Domains of Nurses' Professional Competency Development** (author)

</div>

Profesionālās kompetences domēni	Māsu profesionālās kompetences attīstības prasmes
Kognitīvais domēns	Pētnieciskās, kritiskās domāšanas, problēmrisināšanas, pašvadības, sadarbības, radošās prasmes, atbildība
Psihomotorais domēns	Efektīva, indivīdcentrēta un vecumposmu orientēta komunikācija, multidisciplināra un starpdisciplināra saskarsme darbam komandā, efektīva saziņa multikulturālā vidē
Afektīvais domēns	Atbildība, precizitāte, pacientcentrēta attieksme, partnerība, empātija, cieņa, ētika, sociokultūras izpratne
Tehnoloģiju domēns	Tehnoloģiju mediēta sadarbība, atbildība, kritiskā domāšana, radošums, problēmrisināšana
Darba vides domēns	Praktiskā pieredze, sadarbība, komunikācija, komandas darbs

Māsu prasmju attīstības tabula atklāj, ka noteiktie domēni un atbilstošās prasmes ir mijiedarbīgas un savstarpēji atkarīgas, kas pamato darba vides nozīmi to attīstībai. Turklāt, attieksmes tādas kā atbildība, sadarbība, komunikācija un kritiskums ir būtiskas visos domēnos.

Studiju kursu programmās ir nepieciešamas iekļaut ārkārtējām situācijām, tādām kā Covid-19, atbilstošu personīgo, sadarbības, attieksmes, sociālo kompetenču attīstību, kas sagatavo ekstrēmiem profesionāliem, psihoemocionāliem, neierastiem, kritiskiem, komunikatīviem, saziņas un tehnoloģiskiem izaicinājumiem. Māsu darba vidē balstītas izglītības pārmaiņas sniegs iespēju speciālista efektīvākai profesionālajai darbībai, elastīgākai pārejai uz citu medicīnas jomu, kvalitatīvāk veikt pacientcentrētu aprūpi, strādāt stardisciplinārā komandā, pilnveidoties profesionāli un individuāli.

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Empīriskā pētījuma rezultāti
The Results of the Empirical Research

</div>

Pētījuma kontekstā tika veikta medicīnas koledžas pirmā, otrā un trešā kursa studiju programmu "Māszinības" un "Ārstniecība" studentu aptauja (kopā 110

respondenti). Aptaujas mērķis bija noskaidrot, vai studentiem ir pietiekamas zināšanas, prasmes un attieksmes darbībai veselības aprūpē ārkārtas apstākļos.
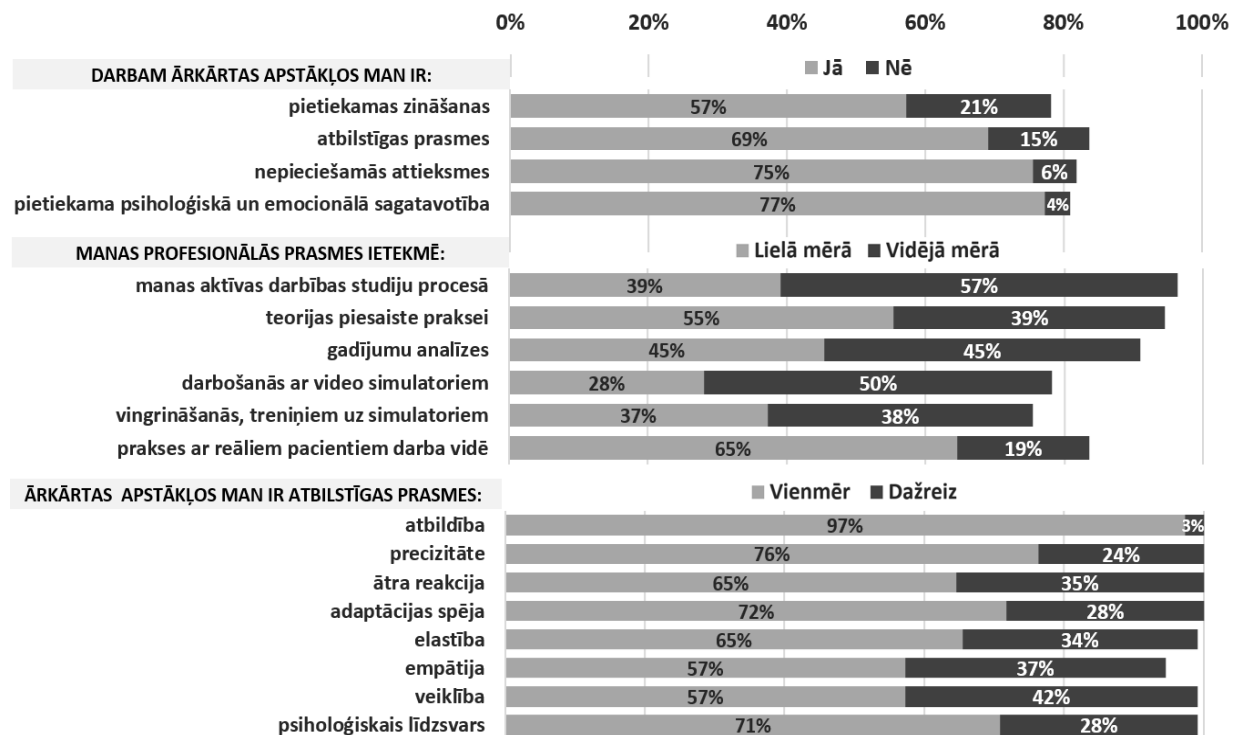
*2.attēls. **Medicīnas koledžas studentu atbildes (% no kopējā) uz jautājumiem par darba pienākumu izpildi ārkārtas apstākļos un dažādu mācību metožu efektivitāti prasmju apguvei** (autore, aptaujas rezultāti, 2021)*
*Figure 2 **Answers of Medical College Students (% of total) to Questions on Fulfilment of Duties in Emergency Situation and Effectiveness of Various Learning Methods for Skill Attainment** (author, survey results, 2021)*

Kā redzams 2. attēlā, darbs ārkārtas situācijā lielai daļai studentu atklāja apgūto zināšanu nepietiekamību – tikai 57% atbildēja, ka tiem bija pietiekamas zināšanas darba pienākumu izpildei šādos apstākļos un 21% norādīja uz nepietiekamām zināšanām. Arī Ashcroft et al. (2020) veic meta analīzi un secina, ka standarta apmācību režīms nav pietiekams studentu sagatavošanai pienākumu veikšanai ārkārtas situācijās – viņu novērtējumā šādu specializētu ārkārtas situāciju programmu apguve uzlabo prasmju (43.5% gadījumos no pētījumiem, kas veica šādu programmu efektivitātes novērtējumu), attieksmju (60.9%), bet jo sevišķi – tieši zināšanu (78.3%) apguvi. Vieta uzlabojumiem ir arī prasmju apguvē, kamēr savu attieksmju un psiholoģiskās un emocionālās sagatavotības līmeni darbam ārkārtas apstākļos studenti novērtēja apmierinoši. Vērtējot mācību metožu efektivitāti prasmju apguvei studenti kā visnoderīgāko atzina sevis pašu aktīvas darbības studiju procesā – 39% vērtēja, ka tā ietekmē profesionālo prasmju apguvi "lielā mērā" un vēl 57% - ka ietekmē "vidējā mērā". Par

efektīvām prasmju apguves metodēm studenti atzina arī teorijas piesaisti praksei, gadījumu analīzes un prakses ar reāliem pacientiem darba vidē. Darba ar simulatoriem vērtējums ir mazāk pozitīvs, kas saskan ar Mian & Khan (2020) atziņām, ka, lai arī plašākai tehnoloģiju pielietošanai ir milzīgs potenciāls, uz šo brīdi prasmju apguvei tomēr nekas neatsver kontaktu ar īstiem pacientiem.

Visbeidzot, vērtējot specifisku savu prasmju atbilstību darbam ārkārtas situācijas studenti gandrīz nekad nesniedza atbildi "nekad nav pietiekamas" (izņemot prasmei "empātija" – 6%), taču zināmu ieskatu ļauj veikt atšķirīgais atbilžu "vienmēr" un "dažreiz" sadalījums. Kā redzams attēlā, studenti ir ļoti pārliecināti par savu atbildības līmeni (97% atbildēja, ka tas vienmēr ir atbilstošs), kamēr tiem ir mazāka pārliecība par empātiju un veiklību (tikai 57% abos gadījumos). Tālāk aplūkosim atsevišķus no šiem jautājumiem detalizētāk, dažādu vecuma grupu, kā arī studiju kursu un programmu griezumos.

Raksta problēmas aspektā nākošais pētījuma jautājums "Vai ir atbilstošas attieksmes darbībai neparedzētos apstākļos'': atbildība, precizitāte, elastība, ātra reakcija, veiklība, empātija, psiholoģiskais līdzsvars, emocionālā noturība (atbilžu varianti – "vienmēr", "dažreiz", "nekad"). Respondenti visbiežāk sniedza atbildi "vienmēr" (97%) attieksmei "atbildība", kas ir viena no nozīmīgākajām medicīnas jomā. Atbildes apliecina, ka studenti apzinās savu nozīmīgo profesionālo lomu un lielo atbildību, it īpaši krīzes apstākļos. Ar otro augstāko vērtējumu tai seko attieksme "precizitāte" (76%) , kas parāda studentu izpratni par to, ka tā ir būtiska medicīnisko manipulāciju kvalitātei un drošas veselības aprūpes nodrošināšanai. Attieksme "ātra reakcija" (65%) attiecas uz prasmju apguvi un demonstrēšanu. Aptauja parāda, ka studentiem ir iespējas labi apgūt prasmes, kur visaugstāk ir novērtēta prakse ar reāliem pacientiem un trenēšanās uz simulatoriem, un tādēļ šīs attieksme ir ar augstu "vienmēr", nelielu "dažreiz" un praktiski neeksistējošu "nekad" atbilžu proporciju. Attieksmei "elastība" atbilžu "vienmēr" proporcija ir tikai 65% - tā pēc jaunā vispārējās aprūpes māsas standarta prasībām ir nepieciešama daudz vairāk, kad māsām būs jādarbojas daudz plašākā jomā, būs nepieciešama lielāka mobilitāte un jābūt gatavām uz straujām pārmaiņām. Attieksmes "veiklība" pietiekamu atbilstību ar atbildi "vienmēr" novērtēja tikai 57% respondentu (zemākais vērtējums), kaut pandēmijas apstākļos tā ir kļuvusi aktuāla līdz ar strauju pacientu skaita pieaugumu un māsu pienākumu paplašināšanos, tātad, perspektīvā attieksmi "veiklība" kā nozīmīgu profesionālo spēju vajadzētu iekļaut apgūstamo prasmju sarakstā (3.attēls).
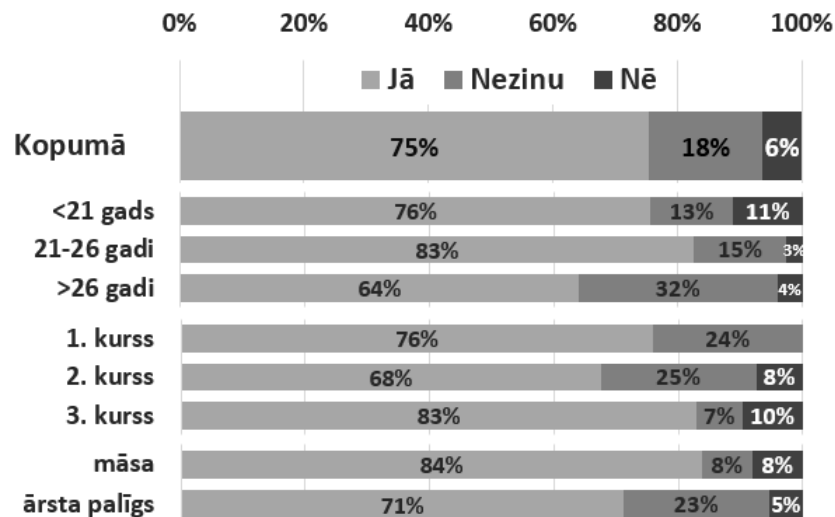
*3.attēls. **Medicīnas koledžas studentu atbildes ("jā", "nē" vai "nezinu", % no kopējā) uz jautājumu "Mācības un prakse apliecināja, ka man ir nepieciešamās attieksmes (atbildība, precizitāte, pacientcentrētība) aprūpes uzdevumu veikšanai ārkārtas apstākļos", kopumā un vecuma grupu, studiju kursu un studiju programmu griezumos***
(autore, aptaujas rezultāti, 2021)
Figure 3 Answers of Medical College Students ("yes", "no" and "don't know", % of total) to the Question "Studies and practice showed that I have the necessary attitudes (responsibility, patience, customer focus) for completion of care duties under extreme conditions", Total and by Age Group, Study Year and Study Programme
(author, survey results, 2021)

Padziļināta rezultātu analīze par attieksmi "atbildība" parāda, ka, jo vecāks ir respondents, jo augstāks ir atbildības līmenis(pieaug no 96% līdz 100%). Māsu un ārsta palīgu studiju programmām atbildes neatšķiras (97% atbilžu "vienmēr").

Kā redzams 4. attēlā, psihoemocionālo līdzsvaru un emocionālo noturību apstiprinoši ("jā") ir novērtējuši 77% , noliedzoši ("nē") - 19% un "nezinu" - 4% respondentu, kas var būt izskaidrojums ar to, ka medicīnisko jomu izvēlas cilvēki ar noteiktām īpašībām un, otrkārt, studentiem ir pārāk maza praktiskā pieredze Covid-19 apstākļos, lai apzinātos reālās situācijas un to radītos izaicinājumus. Taču daudzi 3.kursa respondenti, kuriem bija atļauja strādāt praktiski ir atbildējuši "dažreiz" (27%) vai "nezinu" (7%), kas liecina par nepietiekamu psihoemocionālās noturības spēju.

Aptaujas rezultāti liecina, ka ārstu palīgiem ir augstāks psihoemocionālais līdzsvars nekā māsām, atbilstoši 79% pret 73%. Tam varētu būt pamatojums, ka māsas ir tiešā saskarē ar pacientiem pastāvīgi un ilgstoši, līdz ar to viņām jārisina daudz vairāk problēmu un ir vairāk psihoemocionālu izaicinājumu. Atbildes "nezinu" (19%) un "nē" (4%) sastāda diezgan lielu proporciju no kopējām, kas rosina uzlabot studiju saturu, lai būtu lielākas iespējas pilnveidot šīs attieksmes.
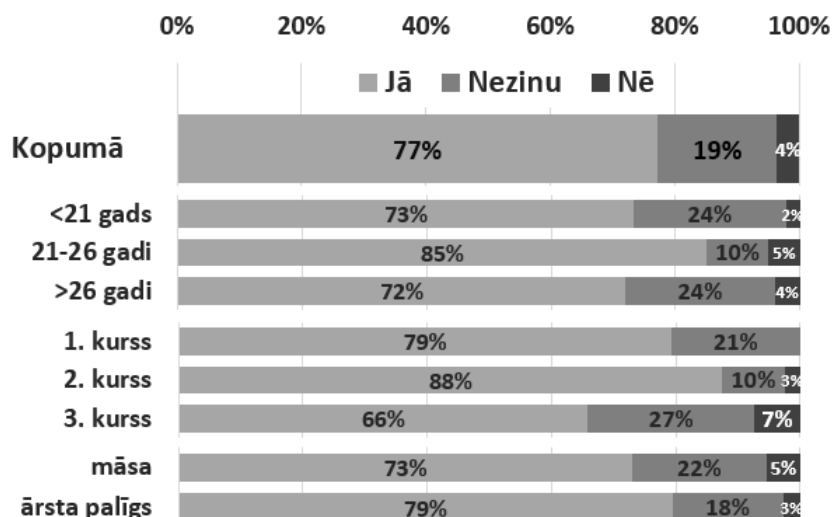
*4.attēls. **Medicīnas koledžas studentu atbildes ("jā", "nē" vai "nezinu", % no kopējā) uz jautājumu "Mācības un prakse apliecināja, ka man ir pietiekama psiholoģiskā un emocionālā sagatavotība darbam ārkārtas apstākļos", kopumā un vecuma grupu, studiju kursu un studiju programmu griezumos** (autore, aptaujas rezultāti, 2021)*
*Figure 4 **Answers of Medical College Students ("yes", "no" and "don't know", % of total) to the Question "Studies and practice showed that I have sufficient psychological and emotional preparedness for professional work under extreme conditions", Total and by Age Group, Study Year and Study Programme** (author, survey results, 2021)*

Medicīniskās aprūpes pamatā vienmēr ir bijušas humānas un ētiskas attieksmes, kuras lielā mērā ir saistītas ar empātiju. Aptaujas rezultāti liecina, ka tā ir nepietiekami novērtēta – tikai 57% ir snieguši atbildi "vienmēr" (37% - "dažreiz", 5% - "nekad"). Empātija ir būtiska profesionālā iezīme mūsdienu pacientcentrētas un ētiskas veselības aprūpes kontekstā.

Pētījuma dati apliecina, ka medicīnas studentiem nav pietiekamas prasmes un attieksmes sekmīgai profesionālo uzdevumu un pienākumu veikšanai ārkārtas apstākļos, atbilstoši mūsdienu veselības aprūpes vajadzībām un attīstības tendencēm.

Secinājumi un diskusija
Conclusions and Discussion

Teorētiskā pētījuma ietvarā analizētās teorijas par veselības aprūpes speciālista profesionālo kompetenci un attieksmes nozīmi ārkārtas apstākļu radītajā darbībā, rosina Latvijas medicīnas sistēmas reformas gaitā veikt būtiskas izmaiņas, lai māsas kā nozīmīgākais medicīnas vidējā posma personāls, varētu kvalitatīvi darboties savā profesijā krīzes situācijās. Apgūtā informācija par Covid19 izplatību, MK noteikumi par māsu un ārstu palīgu rīcību epidemioloģiskās situācijas ierobežošanā un novēršanā aktualizēja attieksmju

kompetences nozīmi, izvirzot to priekšplānā kā dominējošu elementu profesionālās kompetences pilnveidē.

Tas veicināja noteikt nozīmīgākās, attieksmes, kas palīdzētu pārvaldīt krīzes problēmas, veikt aprūpi sarežģītos darbības apstākļos akūtiem pacientiem un elastīgi pielāgoties pārmaiņām: padziļināta pašorganizācija, profesionālā atbildība, tehnoloģiju, ētikas, komunikācijas, lai pildītu sarežģītos uzdevumus un paplašinātos pienākumus, kā arī pielāgotos jaunajām aprūpes prasībām.

Kritiskā veselības aprūpes situācija parādīja, ka māsu profesijā nevar iztikt bez padziļinātām pašorganizācijas, profesionālās atbildības, tehnoloģiju, ētikas, komunikācijas un attieksmes kompetencēm, lai pildītu sarežģītos uzdevumus un paplašinātos pienākumus, kā arī pielāgotos jaunajām aprūpes prasībām.

Teorētisko avotu analīze liecina, ka attieksmju pilnveide var veicināt personīgo un profesionālo īpašību attīstību, kas var palīdzēt pārvaldīt krīzes problēmas, veikt aprūpi sarežģītos darbības apstākļos un elastīgi pielāgoties pārmaiņām. Empīriskā pētījuma rezultāti liecina, ka studiju laikā iegūto profesionālo zināšanu un prasmju augstajam līmenim ir pārliecinoša sakarība ar praktiskajā darbībā demonstrēto. Savukārt, pētījuma laikā praktiskajā darbībā uzrādītais attieksmju komponenta vērtējums liecina par tā apgūšanas pilnveides nepieciešamību, kas varētu izpausties transformējot studiju procesu.

Empīriskā pētījuma rezultāti ļauj secināt, ka daļai medicīnas koledžas studentiem nav pietiekamas zināšanas, prasmes un attieksmes darbībai ārkārtas apstākļos. Aptaujas dati liecina, ka respondenti nav pārliecināti par savām prasmēm(15%) un viņiem pietrūkst tādas attieksmes, kā psihoemocionālais līdzsvars(23%), elastība(35%), empātija(43%), kaut arī tām ir liela nozīme ārkārtas apstākļos. Šie rādītāji ļauj secināt, ka trūkst prasmes un attieksmes, kas ļautu elastīgāk pielāgoties jaunām, sarežģītām situācijām, pienākumiem, darba vides un sociālajām pārmaiņām. Tas rosina pievērst lielāku uzmanību šo attieksmju attīstībai medicīniskās izglītības studiju procesā.

Pētījuma rezultātu analīze liecina, ka ir nepieciešama studiju satura un profesionālās pilnveides modernizācija, lai studenti iegūtu jaunajiem apstākļiem atbilstošas prasmes un attieksmes, kas sniegtu iespējas kvalitatīvi darboties arī neparedzētos apstākļos, attīstītu spēju pielāgoties un saglabāt psihoemocionālo līdzsvaru. Darba vides un attieksmes domēna kompetences ir nepieciešams pilnā mērā iekļaut māsu studiju programmās un saturā, lai veicinātu krīzes laika aktuālajām ārstniecības un pacientu vajadzībām atbilstošu profesionālo kompetenci, kas balstās aktīvas darbības pieredzē. Tā ļaus māsām būt elastīgām un mobilām, lai strādātu dažādas prakses jomās, izietu ārpus savas specializācijas, ātri pielāgotos un apgūtu jaunas prasmes, attieksmes, aprūpes paņēmienus un medicīniskās tehnoloģijas.

Summary

Pandemic emergency conditions have caused variety of challenges in health care around the world. Medical specialists meet unexpected professional, physical and psycho-emotional problems. Nurses have to be ready for more complicated medical care duties with long working hours and work overload, changed work specifics, threat to own health and life, professional burn-out and psycho-emotional problems. Attitudes have become a dominant factor for work in unknown and complicated medical care situations when nurses need high adaptability, flexibility, responsibility and dexterity. Medical practice shows that they need more previous training for specific skills and attitudes.

Theoretical and empirical study was done to justify attitudes importance in medical education and to estimate medical students' attitude development to meet challenging professional and personal conditions.

Theoretical sources define attitudes as an important component together with knowledge and skills, but it is necessary to focus on attitudes dimension more as they affect development of values and behaviour. Transforming medical education, it means to base on humanistic approaches and aims, developing competences, which can help to prepare for uncertain and unpredictable situations in the future.

In the empirical study the survey was carried to find out if students have appropriate knowledge, skills and attitudes for professional activity in emergency situations. The results of the study revealed that respondents think they have skills and attitudes on average extent as well as they value their attitudes higher than knowledge and skills. The results also show that from attitude list, the students possess "responsibility" almost always (98%), which is followed by "precision" (76%). The psycho-emotional stability, that has caused a lot of challenges in pandemic situation, is self-assessed to be always possessed by a mere74% of students, which is definitely not sufficient, therefore this characteristic should be promoted in the learning process. In reference to such attitudes as "flexibility and adaptability" the proportion of answers "always" (possess) are lower than average (respectively, 65% and 72%) with relatively large proportion of answers "sometimes" (34% and 28%) that also shows the need for improvement. Considering the importance of ethical attitudes for patient-centred health care, empathy results (57%) are rather contradictory, but they should be prioritised for the new aims of medical care.

To sum up, the survey analyses reveals that respondents possess good, but not fully sufficient knowledge, skills and attitudes for work in emergency health care conditions. The results show variety of high-level professional attitudes like responsibility, precision and fast reaction, but rather low values of attitudes like flexibility, adaptability and empathy. Consequently, attitudes dimension should be focused on to a greater extent as the medical practice and theoretical research identify the growth of their importance in the development of the professional competence in medical education.

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Acknowledgment

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DEJU PEDAGOGA PROFESIONĀLĀS DARBĪBAS SPECIFIKA 2020.GADA KRĪZES APSTĀKĻOS

The Specifics of a Dance Teacher's Work in the Crisis of 2020

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Abstract. *The 2020 has been a year of many challenges in many professions and also for dance teachers. The daily challenge is to replace existing dance classes with a totally different class structure, which is defined by the governmental restrictions. The dance teachers must react to these restrictions immediately and without any methodological materials and support. In the crisis the dance teachers must use such learning organizational forms as: group, individual and online, and use them as alternatives to one another. Can a dance teacher reach their professional (curriculum) goals by alternating components of the study process? How do the changing circumstances affect dancers and their attendance? The aim of this article is to analyse the possibilities of a dance teacher to reach their professional goals with group, individual and online classes and to determine the dancers satisfaction with these classes. The research is realized in terms of one dance studio and in two stages. The first stage (March-July 2020) were an experimental video-instruction independent training analysis. 40 video materials were grouped in 20 classes and sent to 20 dancers. The second stage (September-January 2020) were group, individual and online class analysis from the teacher's and dancers perspective. In the second stage 27 dancers and 5 dance teachers were surveyed.*
Keywords: learning organizational forms, Covid-19 crisis, dance teacher's professional work.

Ievads
Introduction

2020. gads ir bijis pārbaudījums daudzu profesiju pārstāvjiem, tai skaitā arī deju pedagogiem un pārbaudījumi turpina ietekmēt pedagogu profesionālo darbību un sadarbību ar dejotājiem. Sociālajos tīklos galvenokārt var novērot negatīvus secinājumus par ierobežojumu kaitējumu deju pedagogu darbībai un labklājībai. Tomēr ikdienas izaicinājums ir un paliek - kā savas ierastās nodarbības aizstāt ar cita veida nodarbību struktūru. Šo maiņu nosaka valstī ieviestie ierobežojumi, turklāt pedagogiem ir jāreaģē nekavējoties, bez metodiskā atbalsta un ieteikumiem. Krīzes situācijā deju pedagogi ir spiesti izmantot tik dažādas mācību organizācijas formas kā: grupu, individuālās un tiešsaistes nodarbības, turklāt izmantot tās kā alternatīvas. Galvenā problēma ir aizvietošanas princips un tā saistība ar deju pedagogu izvirzīto profesionālās

darbības mērķi. Ja mērķis ir gada beigās izveidot koncertu un deju izrādi, tad šī mērķa sasniegšanai tiek izvēlēta attiecīga nodarbības forma. Diemžēl ar individuālo nodarbību starpniecību veiksmīgāk būtu iestudēt solo kompozīcijas un caur tiešsaistes nodarbībām pat solo deju apgūšana zaudētu iespējamo amplitūdu.

Vai deju pedagogs var sasniegt sevis izvirzīto un mācību programmā paredzēto mērķi un uzdevumus ar mainīgiem mācību procesa komponentiem? Kā mainīgie apstākļi un vide ietekmē dejotājus un viņu izvēli apmeklēt nodarbības? Raksta mērķis ir analizēt pedagogu iespējas realizēt savu profesionālās darbības mērķi ar grupu, individuālo un tiešsaistes nodarbību starpniecību, kā arī noteikt dejotāju apmierinātību ar šo nodarbību norisi.

Metodoloģija
Methodology

Lai gan nenoliedzami deju treniņstundas/nodarbības struktūra kopumā neatšķiras no tradicionāli veidotas stundas jebkurā citā skolu mācību priekšmetā, tomēr ir nepārprotamas atšķirības un stūrakmeņi, bez kuru ievērošanas nevar notikt pilnvērtīga deju nodarbība. Viens no tādiem stūrakmeņiem ir Telpa. Kustībai/Dejai ir nepieciešama telpa – griezieniem, lēcieniem, kustību kombinācijām ar virzību un visbeidzot deju kompozīciju un uzvedumu iestudēšanai. Otrs svarīgākais stūrakmens ir drošība – deju pedagogs ir atbildīgs par dejotāju fizisko veselību un fizisko drošību nodarbību laikā, kurā ietilpst traumu un sasitumu novēršana ar pareizas metodikas - skaidrojumu un demonstrējumu palīdzību. Pedagogs fizisko drošību var garantēt tikai klātienes nodarbībās, līdz ar to tiešsaistes nodarbībās nedrīkstētu iekļaut akrobātikas elementus vai sarežģītu elementu apmācību.

Skolēns ir mācību procesa subjekts, cilvēks, kurš mācās un kura mācīšanās ir atkarīga ne tikai no paša vēlēšanās un prasmes to darīt, bet arī no programmā ietvertajām prasībām viņa mācīšanās kvalitātei kā arī no pedagoga palīdzības (Žogla, 2001). Deju nodarbībās skolēns tiek dēvēts par dejotāju un deju pedagogam ir sava izstrādāta un oficiāli apstiprināta mācību programma, kā arī izvirzīts mērķis, katrai nodarbībai un gadam kopumā. Ja deju pedagoga profesionālās darbības mērķis ir audzināt harmonisku un vispusīgi attīstītu personību (psihiski, fiziski, garīgi un sociāli), tad jebkura veida ierobežojumi traucē šī mērķa īstenošanu. Ierobežojumi traucē arī augstāk minēto pedagoga palīdzības sniegšanu un kvalitatīvu programmas realizāciju. Turklāt jāņem vērā arī pedagoga izvirzītais mērķis gadam/sezonai un katrai nodarbībai, kas parasti rezultējas kā uzstāšanās, koncerts, deju uzvedums.

Pareiza nodarbības plānošana ir garantija veiksmīgai nodarbības gaitai. Dažādos literatūras avotos (Kozhevnikov, 1984: Korkin, 1981) tiek minēti

nedaudz atšķirīgi nodarbības iedalījumi, tomēr visiem ir kopīga tradicionāla nodarbības uzbūve: ievada daļa, sagatavošanās daļa, galvenā daļa un noslēguma daļa.

Ievada daļa parasti ilgst līdz 5 minūtēm un tajā pedagogs paskaidro nodarbības prognozējamo gaitu, mērķi, u.c. nepieciešamo informāciju. **Sagatavošanās daļas, jeb ķermeņa iesildošās daļas** vingrinājumu izvēlē ir nepieciešams ievērot ne tikai šo vingrinājumu fizioloģisko efektu, bet arī izglītojošo vērtību. Izglītojošo vērtību tāpēc, ka no šiem vingrinājumiem pārsvarā ir atkarīga kustību kultūras audzināšana.

Sagatavošanas daļas mērķis ir audzēkņu/dejotāju sagatavošana pamata elementu izpildīšanai ar centrālās nervu sistēmas un veģetatīvo funkciju nostiprināšanas palīdzību (Droznyn, 1983).

Pamata daļā tiek risināti galvenie izvirzītie uzdevumi: Kustību, psiholoģiskā un gribas spēka nostiprināšana; Vingrinājumu tehniskā izpildījuma uzlabošana; Pedagoģisko zināšanu, prasmju un iemaņu formēšana; (Korkin, 1981); Repertuāra apguve un trenēšana. Šie uzdevumi ir savstarpēji saistīti un tos ir jārisina katru nodarbību neraugoties uz audzēkņu sastāvu un vecumu (Korkin, 1981). Sarežģīti elementi jāapgūst ļoti uzmanīgi, vēlams, pieredzējuša pedagoga vadībā. Grupu nodarbībās var vislabāk pārbaudīt savas kļūdas (Ferda, 1968).

Noslēguma daļa paredzēta pakāpeniskai ķermeņa slodzes samazināšanai - muskuļu, iekšējo orgānu un nervu sistēmas darbības pakāpeniskai nomierināšanai (Kozhevnikov, 1984). Pakāpeniski ir jāpazemina slodze, lai sagatavotu ķermeni atpūtai vai citai darbībai (Droznyn, 1983). Noslēdzas nodarbība ar refleksiju – padarītā izrunāšanu un uzdevumu izvirzīšanu (Korkin, 1981).

Mēdz gadīties, ka audzēkņi, neskatoties uz pedagoga aizrādījumiem, pārāk ātri (pirms apgūti pamati) pašmācības ceļā cenšas apgūt sarežģītus elementus, piemēram, akrobātikā - stājas uz rokām, salto utt. It sevišķi sociālo mediju un interneta vietnēs publicēto video iedrošināti. Šāda loģiskās secības neievērošana rada tikai sarežģījumus, jo pašmācības ceļā iegūtās kustību kļūdas traucē izaugsmei, to izlabošana prasa daudz laika (Korkin, 1981). Pedagogam ir uzmanīgi jāseko vingrojumu izpildījuma tehnikas precizitātei un nekavējoties jāizlabo katru, pat niecīgāko kļūdu un neprecizitāti. Nepamanītu un laicīgi neizlabotu kļūdu vēlāk izlabot ir daudz grūtāk. Pedagogam dejotājā ir jāattīsta drosme un mērķtiecība.

Taču pat regulāras nodarbības mazāk kā divas trīs reizes nedēļā nedod pārliecinošus rezultātus, jo neļauj izmantot visas atjaunošanās procesu likumsakarības, kas rodas organismā pēc fiziskām slodzēm un paredz iespēju palielināt nodarbību intensitāti un slodžu apjomu no nodarbības uz nodarbību (Droznyn, 1983). Bez tam, lieli pārtraukumi treniņos izdzēš nosacītos refleksus un nākošajās nodarbībās nākas tos atjaunot (Milovzorova, 1972).

Rezultāti
Results

Pētījums realizēts vienas deju studijas ietvaros un divos posmos. Pirmā pētījuma daļa tika realizēta no 2020.gada 14.marta līdz 2020.gada 14.jūnijam. Pētījuma dalībniekiem tika izsūtīti 40 videomateriāli ar vingrinājumu kompleksiem, kuri dejotājiem patstāvīgi jāpilda norādītajās dienās, aizvietojot klātienes nodarbības, kā arī tika izsūtīti videomateriāli ar repertuārā esošajām deju kompozīcijām. Kopumā videomateriāli tika sagrupēti 20.nodarbībās, kuras tika izsūtītas 20 dalībniekiem (skat 1.attēls).
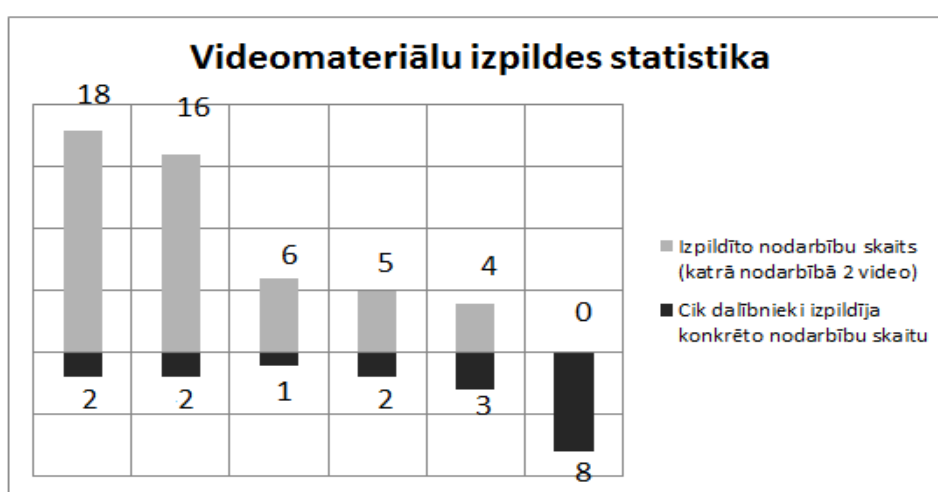
1.attēls. ***Dejotāju patstāvīgā darba efektivitāte krīzes apstākļos***
Figure 1 ***Efficiency of Dancers Independent Work in Crysis***

Šī eksperimenta rezultātā tika konstatēta patstāvīgā darba neefektivitāte, jo tikai 2 no 20 respondentiem izpildīja gandrīz visas nodarbības, lielākais pārsvars (6 respondenti) izpildīja 4-6 nodarbības no 20 un 8 respondenti neizpildīja nevienu no dotajām nodarbībām. Līdz ar to pēc eksperimentālā pētījuma secinājumiem deju studijas vadība un pedagogi nolēma neizmantot videomateriālu starpniecību mācību programmas realizācijā un pēc jaunieviestajiem ierobežojumiem grupu nodarbības tika aizstātas ar individuālajām nodarbībām, kā arī epidemioloģiskajai situācijai saasinoties nodarbību vadīšana norisinājās attālināti.

Šo pētījuma daļu var sadalīt trijos posmos, kur pirmajā posmā no 01.08.2020 līdz 14.10.2020 deju nodarbību organizācijas forma bija grupāla. Otrajā posmā no 14.10.2020 līdz 06.11.2020 nodarbību organizācijas forma tika pārorientēta uz tiešsaistes/attālinātu. Šajā mācību organizācijas formu funkcionalitātes pētījumā piedalījās 27 dejotāji vecumā no 12-34.gadiem un pieci pedagogi, kuru darba stāžs

variējas no 2-50 gadiem un, kuri pārstāv latviešu tautas deju, klasisko deju, džeza deju, mūsdienu deju, skatuves kustību/akrobātiku.
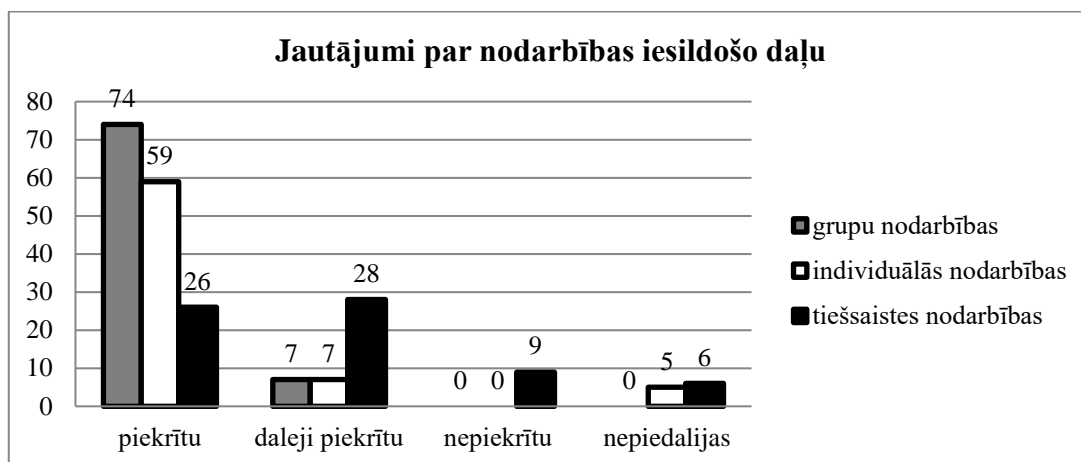
*2.attēls. **Apgalvojumi par deju nodarbības iesildošās daļas veiksmīgu norisi dažādās mācību organizācijas formās***
*Figure 2 **Statements about Successful Warm-up Part of the Dance Lesson in Various Forms of Learning Organization***

91.4% atbilžu ir pozitīvas jautājumos, kuri skar nodarbības iesildošo daļu. Respondenti jūtas pārliecināti pildot jau ierastos vingrinājumus, jauni un sarežģīti elementi ir saprotami un dejotāji saņem no deju pedagoga norādes par pareizu izpildījumu. Līdzīgi ir ar individuālajām nodarbībām (89.4% pozitīvu atbilžu) un tomēr ir pieaudzis to respondentu skaits, kuri individuālās nodarbības izvēlas neapmeklēt, kā galvenos iemesls minot laika veltīšanu mācībām, slimību, un faktu, ka ceļā uz nodarbību paiet lielāks laika posms nekā pašas nodarbības ilgums, kurš ir īsāks nekā grupu nodarbībām.

Kas attiecas uz tiešsaistes nodarbībām, tad - tikai 41.3% atbilžu ir pozitīvas un 44.4 % atbilžu ir daļēji pozitīvas, kas liecina par to, ka respondenti jūtas pārliecināti par jau ierasto kustību izpildījumu, tomēr jaunu un sarežģītāku vingrinājumu saprotamība ir traucēta, kā arī mazāk var saņemt personalizētus ieteikumus no deju pedagoga. Faktiski neapmeklētība krītas salīdzinoši maz (6 respondenti) un tomēr novērojumu rezultātā nākas secināt, ka vidēji tiešsaistes nodarbības apmeklē tikai 45% no respondentiem.

3. attēlā var novērot deju pedagogu viedokli un iespējas realizēt mācību programmā paredzēto ķermeņa iesildošās daļas saturu. Diemžēl deju pedagogi tiešsaistes nodarbību laikā var realizēt tikai 59% no paredzētajiem vingrinājumiem, kustībām, amplitūdas.
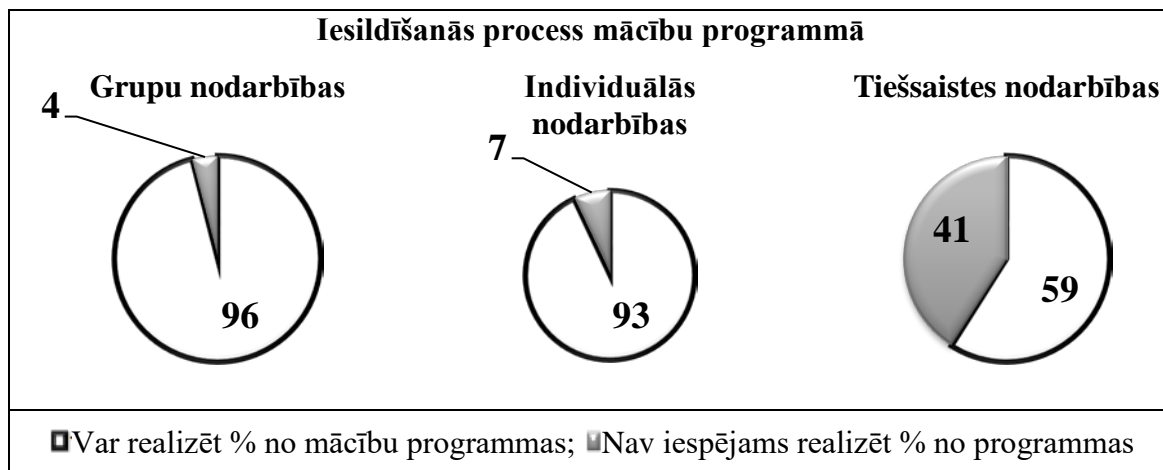
3.attēls. **Pedagogu iespēja realizēt iesildīšanās procesu, kas paredzēts mācību programmā**
Figure 3 **Possibility of Dance Teachers to Realize the Warm-up Process Provided in Their Curriculum**
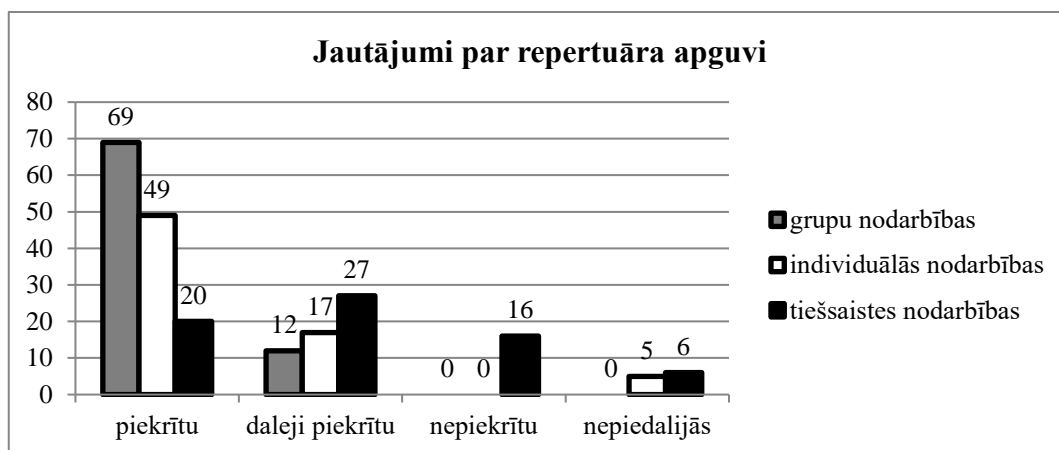
4.attēls. **Apgalvojumi par veiksmīgu repertuāra apguvi deju nodarbībās dažādās mācību organizācijas formās**
Figure 4 **Statements about Successful Repertoire Acquisition in Dance Classes in Various Forms of Learning Organization**

Nākamais jautājumu komplekss tika veltīts repertuāra apguvei – esošu deju trenēšana, jaunu deju apguve un sarežģītāku dejas kompozīcijas elementu iestudēšana. Grupu nodarbību apmeklētāji atzīmē 85.2% pozitīvu atbilžu un apgalvo, ka dejojot labi zināmas dejas viņi jūtas ērti, mācoties jaunas deju kustības viņi var sadarboties ar pedagogu, kā arī dejotājiem ir iespēja patstāvīgi trenēt deju kustību izpildījumu. Nedaudz mazāk pozitīvu atbilžu (74.3%) tiek veltītas individuālajām nodarbībām. To var izskaidrot ar grupu deju nepiemērotību individuālajam izpildījumam.

Neapmierinātības rādītāji aug ar tiešsaistes nodarbību ieviešanu un nākas secināt, ka repertuāra apguve ir apgrūtināta šāda veida mācību organizācijas

formā. Tikai 31.7% no respondentu atbildēm ir pozitīvas, ko var saistīt ar labi zināmu deju izpildīšanu. 25.4% atbilžu ir negatīvas, jo atrodoties mājas apstākļos un saņemot norādes no ekrāna ir apgrūtinoši veidot jaunas deju kompozīcijas un pilnībā sadarboties ar pedagogu un visbeidzot veltīt laiku patstāvīgajam darbam.

Repertuāra apguves process mācību programmā
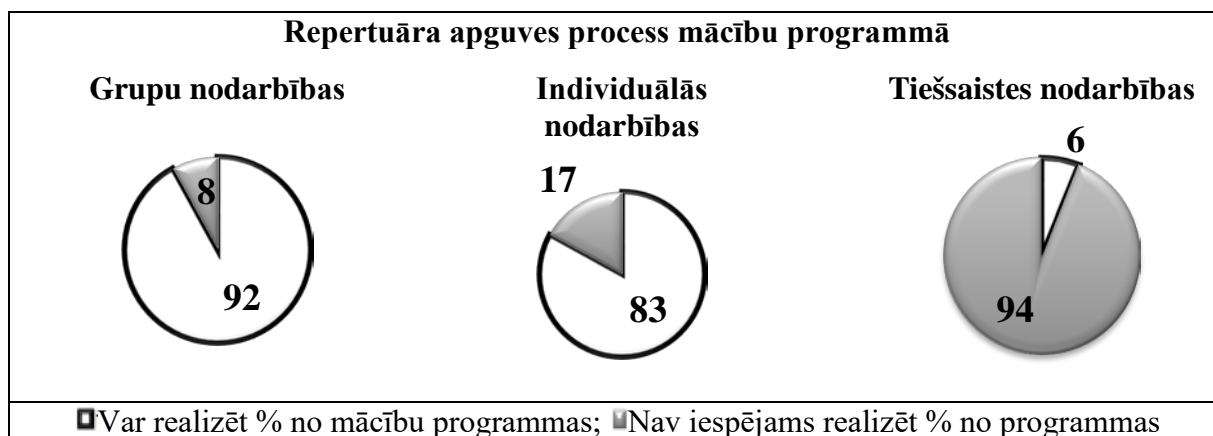
*5.attēls. **Pedagogu iespēja realizēt repertuāra apguves procesu, kas paredzēts mācību programmā***
*Figure 5 **Possibility of Dance Teachers to Realize Repertoire Provided in Their Curriculum***

5. attēlā atspoguļo repertuāra apguvi – esošu deju trenēšanu un jaunu deju mācīšanu. Diemžēl tiešsaistes nodarbībās ir iespējams apgūt vidēji 6% no deju repertuāra mācību procesa.
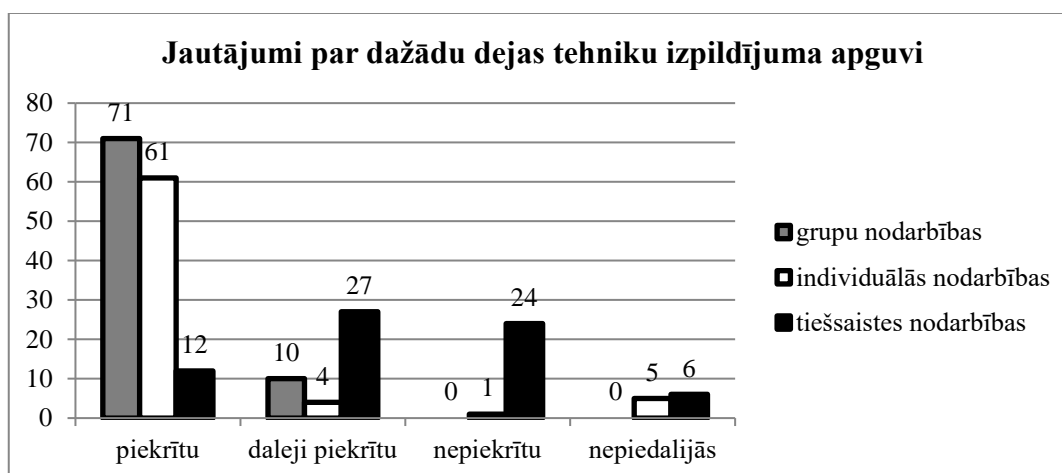
*6.attēls. **Apgalvojumi par veiksmīgu dejas tehniku izpildījuma apguvi deju nodarbībās dažādās mācību organizācijas formās***
*Figure 6 **Statements about Successful Dance Technique Acquisition in Various Forms of Learning Organization***

Jautājumos par jaunu deju tehniku apgūšanu pozitīvo atbilžu pārsvars ir gan grupu (87.7%), gan individuālajās (92.4%) nodarbībās. Abos nodarbību veidos ir iespēja realizēt pietiekami efektīvu dejas tehniku izpildījuma treniņu, jaunu un sarežģītāku elementu apgūšanu, sadarbību ar pedagogu, pietiekamu telpu kustībām ar virzību un veicināt drošības izjūtu.

Tiešsaistes nodarbību rādītāji turpina pasliktināties un pozitīvo atbilžu statistika ir 15.9%, savukārt negatīvo atbilžu pārsvars pieaug līdz 38%. Kā iemesli šādam kritumam ir pietiekami plašas telpas neesamība, lai varētu veikt lēcienus un kustības ar virzību. Sarežģītāku kustību un elementu traucēta uztvere un nespēja saņemt drošības izjūtu pedagoga klātbūtnes trūkuma dēļ.

Noslēdzošais jautājumu komplekss atspoguļo gandarījuma un kolektīva izjūtas, kā arī kopējā mērķa realizācijas tematus.
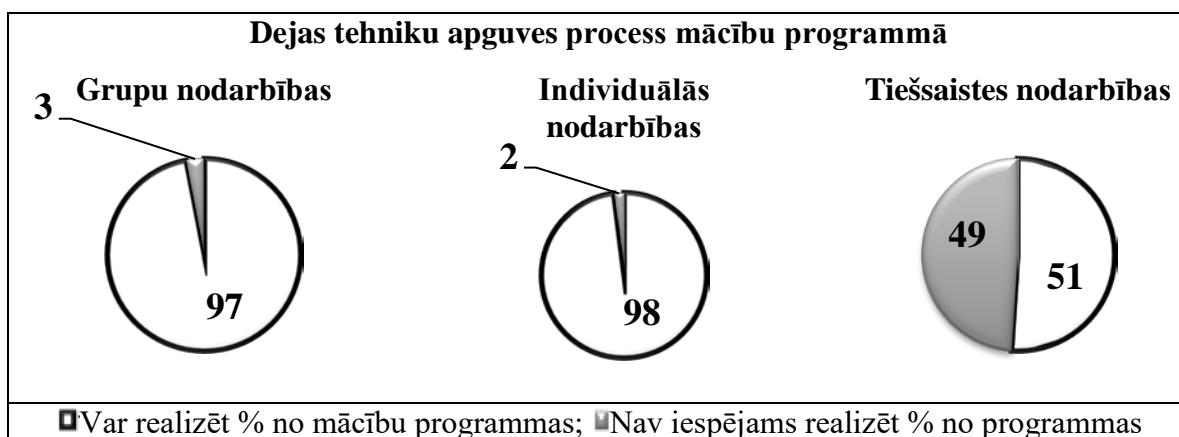
7.attēls. ***Pedagogu iespēja realizēt dažādu dejas tehniku apguves procesu, kas paredzēts mācību programmā***
Figure 7 **Possibility of Dance Teachers to Realize Dance Techniques Provided in Their Curriculum**

7. attēlā var novērot, ka deju pedagogi praktiski visu iecerēto programmu dažādu deju žanru kustību tehnikas izpildījuma trenēšanai un apguvei var realizēt grupu un individuālajās nodarbībās. Tiešsaistes nodarbībās pedagogi atzīst ka gandrīz pusi no iecerētā mācību satura nav iespējams realizēt, kas iekļauj tādus kustību vingrinājumus, kuriem ir nepieciešama plaša virzība, telpa, un, kuriem ir augstāka sarežģītības pakāpe.

8. attēlā atspoguļo vispārējus jautājumus par mācību programmas sasniegumiem un mērķa realizāciju. Grupu nodarbībās pedagogiem ir iespēja veicināt kolektīva izjūtas stiprināšanu dejotāju vidū un pilnībā var realizēt uzveduma iestudēšanas procesu, kas ir arī viens no galvenajiem mērķiem mūsdienu deju kolektīvu vidū. Tomēr pedagogi atzīst ka nedaudz mazāk (81%) ir iespējams veltīt laiku katram no dejotājiem un ierobežotā laika dēļ cieš sadarbības

process. Individuālajās nodarbībās savukārt šis ir viens no augstākajiem rādītājiem, jo sadarbību ar dejotāju ir iespējams realizēt pilnībā. Individuālajās nodarbībās ir iespēja realizēt ierobežotu repertuāru, kā arī kolektīva vienotības izjūtu var veicināt tikai teorētiski. Tiešsaistes nodarbībās ir viszemākie rezultāti un pedagogi atzīst, ka pilnīgi visi paredzētie uzdevumi lielā mērā nav realizējami – ir iespējama gandarījuma sajūta, bet nevar saliedēt kolektīvu, sadarbība ir iespējama ļoti limitētā veidā un praktiski nav iespējams iestudēt deju uzvedumu, tā klasiskajā izpratnē, neņemot vērā mūsdienu tehnoloģiju videomontāžas radošās izpausmes.

Pedagogu iespēja realizēt iecerēto (% no vēlamā rezultāta)
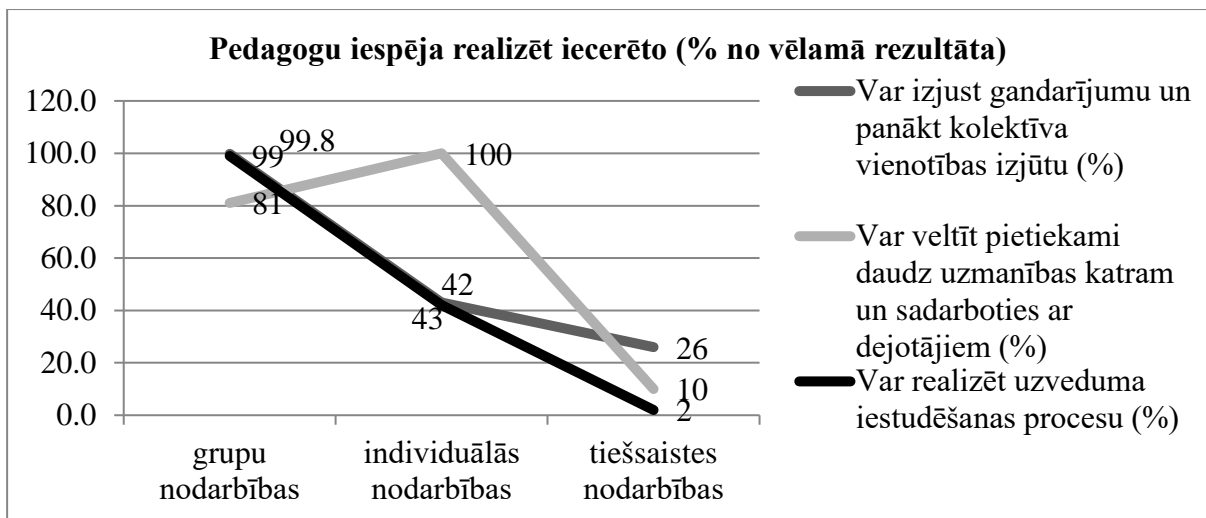
*8.attēls. **Deju pedagogu iespēja realizēt iecerēto rezultātu***
*Figure 8 **Possibility of Dance Teachers to Realize Their Expectations***

Dejotāji savukārt pozitīvi atsaucas uz visiem trīs apgalvojumiem tieši saistībā ar grupu nodarbību procesu. Mazāk pozitīvu izteikumu ir par individuālajām nodarbībām, jo ir grūti panākt kolektīva izjūtu un kolektīvā uzveduma realizācijas process ir traucēts. Savukārt par tiešsaistes nodarbībām dejotāji atzīmē, ka var izjust gandarījumu, tomēr kolektīva vienotības izjūta izpaliek, kā arī repertuāra iestudēšana un apguve ir maz iespējama.

Secinājumi
Conclusions

- Deju nodarbības iesildošo daļu ir pilnā mērā iespējams realizēt grupu un individuālajās nodarbībās, tomēr tiešsaistes nodarbībās daļu no vingrinājumu klāsta realizēt ir apgrūtinoši;
- Dažādu deju tehniku apguve ir veiksmīgāk iespējama individuālajās nodarbībās, grupu nodarbībās nedaudz zūd kvalitāte dalībnieku skaita dēļ un

tiešsaistes nodarbībās daļu no paredzētās mācību programmas apgūt nav iespēju: kustības ar virzību, lēcienus un vingrinājumus ar amplitūdu;

- Repertuāra iestudēšana ir apgrūtināta individuālajās nodarbībās un maz iespējama (6% no repertuāra) tiešsaistes nodarbībās;
- Mācību programmā izvirzīto mērķi deju pedagogi nevar sasniegt ar individuālo un tiešsaistes mācību organizācijas formu palīdzību;
- Individuālās nodarbības un tiešsaistes nodarbības nevar aizstāt grupu nodarbību procesu, tās var tikai papildināt un veicināt grupu nodarbību atsevišķu aspektu kvalitāti un izaugsmi;
- Dejotāji izmaiņas nodarbību formās izjūt ne mazāk kā deju pedagogi un atzīst, ka tiešsaistes nodarbībās iegūtās prasmes, zināšanas, sadarbība, kolektīva vienotības izjūta, socializācija un drošības izjūta kā arī kopīgais mērķis – dejot uz skatuves, ir salīdzinoši daudz mazāks, nekā grupu un individuālajās nodarbībās.

Priekšlikumi
Proposals

- Krīzes situācijās deju pedagogiem ir jāmaina savas profesionālās darbības mērķis un lielākā daļa mācību programmas;
- Jaunizvirzīto mērķi un rīcības plānu ir jāpaziņo un jāapspriež ar dejotājiem;
- Vadot tiešsaistes nodarbības ir jābalstās uz jau apgūtām kustībām un dejotājiem zināmiem vingrinājumiem;
- Jauniem vingrinājumiem un kustībām tiešsaistes nodarbībās jābūt viegli saprotamām un to izpildījums jādemonstrē dažādos rakursos;
- Sarežģītus un potenciāli traumatiskus elementus būtu jāizslēdz no attālinātās mācību programmas;
- Repertuāra apguvi tiešsaistē var aizvietot ar dejisku kustību izmantošanu iesildošajā daļā, ar dažādu individuālo deju kombināciju videomateriālu veidošanu un citu radošu uzdevumu organizēšanu;
- Grupu nodarbībās atlicināt laiku individuālajam darbam, jo dejotāji to novērtē pozitīvi;
- Organizēt seminārus deju pedagogiem par krīzes situāciju pārvarēšanu, tehnoloģiju izmantošanu un metodikas maiņu;
- Izstrādāt metodiskos materiālus un ieteikumus deju pedagogiem par individuālo un tiešsaistes nodarbību organizēšanu un vadīšanu krīzes situācijās.

Summary

The daily challenge is and will remain - how to replace your usual dance classes with a different structure of classes. This change is determined by national restrictions, and teachers must respond immediately, without methodological support and advice. In a crisis situation, dance teachers are forced to use such different forms of learning organization as: group, individual and online classes, moreover, to use them as alternatives. The main problem is the principle of substitution and its connection with the goal of professional activity set by dance teachers.

The warm-up part of a dance class can be fully realized in group (96%) and individual (93%) lessons, however, in online classes it is difficult to realize part of the range of exercises (41% not possible). Learning different dance techniques is more successful in individual lessons, in group classes the quality is slightly lost due to the number of participants and in online classes it is not possible to learn part of the planned curriculum (49% not possible): crossing floor, jumps and exercises with amplitude.

Repertoire staging is slightly difficult in individual lessons (83% of repertoire) and unlikely (6% of repertoire) possible in online classes.

The goal set in the curriculum cannot be achieved by dance teachers with the help of individual and online learning organizational forms. The group classes cannot be replaced with individual or online classes, they can only complement and promote the quality and growth of certain aspects of group classes.

Dancers feel the change in the learning forms no less than dance teachers and admit that the skills, knowledge, cooperation, sense of collective unity, socialization and sense of security acquired in online classes, as well as the common goal of dancing on stage are relatively much less than in group and individual lessons.

The author of this article advise the dance teachers to change their professional goal and most part of their curriculum in the crisis situation and discuss it with the dancers. Also there is a necessity for some methodological material and seminars for dance teachers concerning such questions as using technology in times of restrictions, organization of different learning forms, changes in methodology caused by crisis and other questions that will help to more successfully overcome the Covid-19 caused restrictions.

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GRAFISKO PRIEKŠMETU PASNIEGŠANAS PROBLĒMAS UN TO RISINĀJUMI ATTĀLINĀTĀS APMĀCĪBAS REŽĪMĀ

Problems and Solutions for Teaching Graphic Subjects Online

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Abstract. *Due to the COVID-19 pandemic, schools and universities around the world are moving to online learning. Various technologies and techniques have been invented around the world, but they do not solve simple problems such as task logistics between teacher and student. There is a large non-creative additional work load. The article discusses the problems encountered in teaching graphic subjects online and the tools and techniques that can be used. Breakout rooms in ZOOM have been found as a good option for practical work in engineering graphics. The aim of the article is to describe the experience gained in teaching engineering graphics online in the spring and autumn semesters of 2020, as well as to analyse the results of the survey at the end of the year.*
Keywords: Breakout rooms, descriptive geometry, higher education, online education.

Ievads
Introduction

Pandēmija, kas pārklājusi visu pasauli un apstādinājusi daudzas dzīves jomas, būtiski skārusi arī izglītību, faktiski pārvēršot to par attālināto apmācību. Var teikt, ka šobrīd pasaulē notiek milzu eksperiments, kas pārbauda attālinātās izglītības iespējas gan no tehnoloģiskā, gan cilvēciskā aspekta (Eun-Jung Kim, J.J. Kim, Han, 2021). Pasaulē jau iepriekš ir izstrādātas neskaitāmas dažādas tehnoloģijas, platformas, lietojumprogrammas, online kursi (MOOC's), datorspēles (Jurāne, 2015) un saziņas sistēmas, kurām pēkšņi ir radušies neskaitāmi lietotāji, kas izmeklē no tām savai specifikai vispiemērotāko (Watermeyer, Crick, Knight, & Goodall, 2020). Salīdzinoši nesāpīgi ir tiem procesa dalībniekiem, kuru kursos jau iepriekš bija iekļauts zināms daudzums digitālo rīku un sagatavoti attālinātai mācīšanai piemēroti materiāli (Nuere & de

Miguel. 2020). Taču pasaulē ne visi ir tam gatavi. Pasniedzēji masveidā ir spiesti pāriet uz attālināto apmācību, taču izrādās, ka tikai aptuveni 49% ir tam gatavi vai uzskata, ka ir tuvu tam (Watermeyer et al. 2020). Katrai nozarei ir sava specifika un labāk sagatavoti ir IT jomā strādājošie pasniedzēji. Grafisko priekšmetu pasniegšanā mācību rezultāts ir attēls - rasējums, kas prasa precizitāti. Inženieru un arhitektu izglītībā liela nozīme ir grafiskajiem priekšmetiem, tādiem kā tēlotāja ģeometrija un inženiergrafika, kas tradicionāli izpildāmi klasiskajā tehnikā ar roku. Rokas tehnika nav nekāda vecmodīga lieta, Tā ir un paliek neatņemama arhitekta izglītības sastāvdaļa (Suzuki, 2014). Taftebergs Jakobsens piemin piemēru savā praksē par divām studentu grupām ar atšķirīgu apmācības modeli. Studenti, kas līdz pat 4 semestrim savus darbus izstrādāja ar roku, pretstatā tiem, kuri strādāja jau no pirmās dienas ar CAD programmatūrām, labāk izjūt rasējumu, rasējuma mērogu un uzrāda labākas vizualizācijas un telpiskās izpratnes spējas (Tafteberg Jakobsen & Matthiasen, 2014). Tokio Tehnoloģiskajā institūtā (Tokyo Institute of Technology) tēlotājas ģeometrijas kursa aprakstā rakstīts "Student learning outcomes: (...) 3. Draw with beautifully and accurately by finding the right sollution" (Tokyo Tech, 2017), tātad rasēt skaisti un precīzi. Savienot estētiku un precizitāti. Šis ir priekšmets, kas apvieno cilvēcisko un tehnoloģisko. Nav jākonfliktē digitālajai un fiziskajai pasaulei, tām ir jāsadarbojas un jāpapildinās vienai no otras. Tāpat kā izglītības sistēmai jāapvieno labākais no abām apmācību formām – klātienes un attālinātajai apmācības formām. Uz to pasaule virzījās jau kādu laiku, negribīgi un fragmentāri, bet nu visi, gribot vai nē, varot vai nē, ir spiesti izvēlēties tehnoloģijas saviem kursiem (Marshall, 2018). Tāpēc, iespējams, vēlamais apmācības veids šādiem priekšmetiem nākotne būs klātiene vai jaukta tipa apmācība.

Šī raksta mērķis ir dalīties ar pieredzi, kas gūta Rīgas tehniskajā universitātē 2020. gada pavasara un rudens semestros priekšmetos "Tēlotāja ģeometrija un inženiergrafika" un "Būvgrafika", kā arī atlasīti tie rīki un metodes, kas tika atzīti par noderīgiem praktisko uzdevumu veikšanai grafiskajā apmācībā. Kā arī 45 studenti aizpildīja aptauju par attieksmi pret grupu darbu. Darba atziņas varētu būt izmantojamas grafisko priekšmetu pasniedzējiem dažādās mācību iestādēs.

Tēlotāja ģeometrija 1.kursa arhitektiem
Course of Descriptive Geometry for First Year Students-Architects

Tēlotājas ģeometrijas kursā galvenais kodols un arī darba rezultāts ir attēls. Ja man kādreiz cilvēks, kas nav nekad saskāries ar šo priekšmetu, jautā – "Kas ir tēlotāja ģeometrija? ", es atbildu, ka tas ir kaut kas starp zīmēšanu un matemātiku. Zīmēšana tādēļ, ka rezultāts ir attēls, bet matemātika tādēļ, ka katrs punkts un līnija atrodas konstruktīvā kopsakarībā ar visu pārējo. Nekas nav nejaušs. Varētu domāt, ka tieši CAD (Computer Aided Design) tehnoloģijas ir tas, kas šeit

nepieciešams. Tā tas arī ir, bet nākošajos semestros, nevis studiju procesa sākumā. To nemitīgi atkārto nozares speciālisti jau gadu desmitiem (Suzuki, 2014).

Grafiskie priekšmeti inženieru izglītībā sākas no pirmā semestra un turpinās vairākus kursus, atkarībā no specialitātes. Pirmā semestra tēlotājas ģeometrijas un inženiergrafikas pamatkursa darbi tiek izpildīti ar zīmuli, jo programmu direktori ir vienojušies, ka universitāte nevar atļauties izsniegt inženiera vai arhitekta diplomu personai, kas taisnu līniju nevar novilkt bez tehnoloģiju palīdzības. Nākošajos semestros darbs noris ar CAD vai BIM (Building Information Modelling) programmatūrām. Kursi, kuros pamatdarbs notiek ar datoru, ir relatīvi viegli pielāgojami attālinātai apmācībai. Prakse rāda un statistika to apliecina (Europeandataportal.eu, 2020), ka datoru nodrošinājums Latvijā mājsaimniecībās mācību mērķiem (95%) ir augstāks kā vidēji Eiropā (91%), tāpēc nav novērotas tehnikas trūkuma problēmas (izņemot printēšanu). Lielākais izaicinājums ir pārveidot klasiskos zīmuļa kursus. Jāsaprot, ka tajos netiek tikai rasēts. Šī daļa ir kritiski būtiska inženieru izglītībā, jo veido un attīsta telpiskās un konstruktīvās domāšanas un vizualizācijas spējas (Dobelis, Sroka-Bizon, & Branoff, 2019), kas ir pamatprasme arhitektiem un inženieriem. Šajā posmā ir svarīga studenta un pasniedzēja tieša komunikācija (Scherrer, Butler, & Burns. 2010).

Kopumā kurss sastāv no lekcijām, praktiskajiem darbiem, mājas darbiem un pārbaudes darbiem.

Lekciju materiāli iekļauj prezentācijas ar animācijām soli pa solim, video materiālus, kā arī tiešu rasējumu, ko pasniedzējs izpilda ar kādu no 2D (divdimensiju) rasēšanas programmām un studenti seko uz iepriekš sagatavotām darba lapām. Paralēli notiek arī 3D modeļu demonstrācija (fizisku vai digitālu). Šī darba daļa ir pielāgojama attālinātai apmācībai ļoti labi, taču samazina iespējas straujai improvizācijai lekcijas laikā.

Praktiskajos darbos tika lietots grupu darbs, darba lapas un kopīga uzdevumu risināšana un analīze. Šajā daļā bija visvairāk izaicinājuma.

Mājas darbi sastāvēja no rasējumiem, papīra modeļiem (tai skaitā arī grupā pa pāriem) un grupu darbs – prezentācija, kurā studenti meklēja saistību ar ģeometrijas objektiem un tēmām arhitektūrā un dizaina objektos, lai saprastu praktisko pielietojumu apgūtajai teorijai.

Pārbaudes darbi tiek izpildīti uz sagatavotām darba lapām ar zīmuli. Šeit galvenā problēma ir darbu loģistika.

Attālinātā darba apstākļos ir viens liels pluss. Neieguldot papildu pūles, var viegli ierakstīt lekcijas un citas nodarbības, pat konsultācijas. Studentiem ir iespēja atkārtoti noklausīties to vai citu nodarbību. Kā negatīva tendence jāmin studentu apmeklējuma samazināšanās tiešsaistes nodarbībās, ja viņi zin, ka nodarbību varēs noskatīties citreiz.

Darba slodzes pieauguma iemesli
Reasons for the Increase in Workload

Skolotāji un universitāšu pasniedzēji visā pasaulē ziņo par ievērojamu darba slodzes palielināšanos (Watermeyer, Crick, Knight, & Goodall, 2021). Grafiskajos priekšmetos tas ir saistīts ar to, ka darba priekšmets ir attēls. Šie priekšmeti studiju programmās atrodas pirmajos semestros un tādēļ studenti vēl nav apmācīti rasēt ar datorprogrammām. Tas nozīmē, ka divvirzienu komunikācijā no pasniedzēja uz studentu pasniedzējs var lietot dažādas tehnoloģijas, gan jaunas, gan jau ilgstoši lietotas, bet virzienā no studenta uz pasniedzēju nāk ļoti dažādas kvalitātes fotogrāfijas no telefona vai, labākajā gadījumā, noskenēti attēli. Abos gadījumos rasējuma precizitātes pārbaude ir aptuvena (A. Wojtowicz, B. Wojtowicz & Kopec, 2020).

Lielākais papildus darba apjoms pasniedzējam ir tieši uzdevumu sagatavošana. Uzdevumi ir rasējumi. Uzdevumus, ko klātienes variantā vienkārši nokopē un studentiem izdala katras parktiskās nodarbības sākumā, nākas noskenēt, ievietot Moodle vidē un studentiem tie ir pirms nodarbības jāizdrukā. Ja studentam nav piekļuves printēšanai, nākas izlīdzēties sekojoši – students palielina attēlu ekrānā līdz vajadzīgajam lielumam, uzliek uz ekrāna un ļoti viegli, lai nebojātu ekrānu, pārzīmē dotos lielumus. Tas nebūs tik precīzi, bet var lietot principiālu risinājumu meklēšanā praktiskajos darbos.

Cits variants ir pārzīmēt visus uzdevumus ar izmēriem un studentam tas jāuzzīmē pirms darba sākuma. Tas ļoti patērē laiku gan pasniedzējam, gan studentam un to var lietot tikai gadījumos, kad cita varianta nav un precizitāte ir ļoti svarīga. piemēram, pārbaudes darbā vai eksāmenā (tas jāierēķina, plānojot eksāmena ilgumu).

Vēl ir variants visus uzdevumus uzzīmēt uz rūtiņu tīkla. Studenti tad to pārzīmē uz rūtiņu papīra. Tas ir salīdzinoši viegli studentiem, taču pasniedzējam visi uzdevumi tik un tā jāpārzīmē, jo ne visi izmēri uzdevumos ir ar rūtiņas soli. Faktiski visos gadījumos pasniedzējiem jāiegulda ievērojami daudz darba un šis darbs ir tīri mehānisks, tas nav darbs uzdevuma uzlabošanai vai attīstīšanai, bet vienkārši uzdevuma pārzīmēšana tādā vai citādā veidā, lai to nogādātu studentam, maksimāli cenšoties saglabāt precizitāti

Uzdevumu loģistika pārbaudes darbos
Task Logistics in Tests

Uzdevumu loģistika pārbaudes darbos ietver to pašu, kas aprakstīts iepriekš, tikai tas jāizdara ierobežotā laika sprīdī. Mūsu priekšmetā katrs students saņem individuālu uzdevumu pārbaudes darbā. Students pārzīmē darbu, izpilda to, fotografē un iesniedz Moodle vidē. Tā patērētais laiks kopumā vienam darbam

jau pārsniedz nodarbības ilgumu. Printēšana ir pieejama tikai daļai no mūsu studentiem, tāpēc nevaram ar to rēķināties un vai nu jāpalielina atvēlētais laiks un jāpārsniedz nodarbības ilgums, vai jāvienkāršo un jāsamazina uzdevuma apjoms, no kā cietīs izglītības kvalitāte. Patērēto laiku vēl mēdz palielināt dažādas tehniskas problēmas, kas studentam vēl rada papildu stresu. Šeit pat nav ņemta vērā akadēmiskā godīguma problemātika, kas attālinātā režīmā saasinās.

Pārbaudes darbi testu veidā Moodle sistēmā ir un tiek pielietoti paralēli grafiskajiem pārbaudes darbiem, taču nevar tos aizstāt vairāku iemeslu dēļ. Nevar iemācīties rakstīt tikai lasot, tāpat nevar iemācīties rasēt tikai skatoties uz rasējumiem un tos analizējot. Rasējums ir jāizpilda ar savu roku (vecākajos kursos ar datoru). Taču online testi ir ļoti noderīgi teorijas pārbaudē un tie ir arī laiku ekonomējoši. Tāpēc attālinātā režīmā to pielietojums ir ievērojami palielinājies, īpaši īsos testos – piecu līdz piecpadsmit minūšu ilgumā.

Praktiskie darbi attālinātā režīmā
Training in Online Education

Praktiskajos darbos vajadzētu risināt piemērus un pārrunāt risinājumus. Attālinātā režīmā to visērtāk darīt izmantojot ZOOM animācijas rīkus. Šeit ir divas variācijas. Vienā pasniedzējs uzliek uz ekrāna uzdevumu, daļēji pats rasē datorprogrammā, analizē to un uzaicina studentus no savas puses ar animācijas rīkiem papildināt rasējumu. Tā visi kopīgi nonāk pie principiāla risinājuma.

Otrs veids ir lietot Breakout Rooms iespēju ZOOM'ā. Studenti tiek sadalīti pa trīs līdz četriem studentiem grupā un katrai grupai ir savs piemērs, kuru tie risina izmantojot animācijas rīkus. Pasniedzējs pārvietojas pa grupām un palīdz. Pēc tam katra grupa atrāda un izskaidro savu risinājumu visiem pārējiem. Ieguvums ir analīze un kopējā problēmas izpratne, kā arī daudzu piemēru apskats vienā nodarbībā. Trūkums – precizitāte, īpaši pie līknēm. 1.attēla piemēros redzam, ka var panākt arī samērā saprotamu konstrukciju. Pēc nodarbības, kuras piemēri parādīti 1.attēlā, sekoja pārbaudes darbs. Tā rezultāti ir sekojoši: no 45 studentiem (71%), kuri piedalījās Breakout Rooms nodarbībā, pārbaudes darbā 32 studenti saņēma atzīmi 7 vai vairāk. 2.attēlā redzam, ka pārbaudes darba rezultāti uzrāda vai nu ļoti augstas atzīmes, vai zemas. Vidējas – pieci ir tikai trijiem studentiem. Seši nav vispār. Tas liecina, ka izpratne par tēmu vai nu ir vai nav. Četrinieki bija par to, ka principiāli students tēmu saprot, bet nespēj to pienācīgi precīzi uzkonstruēt.
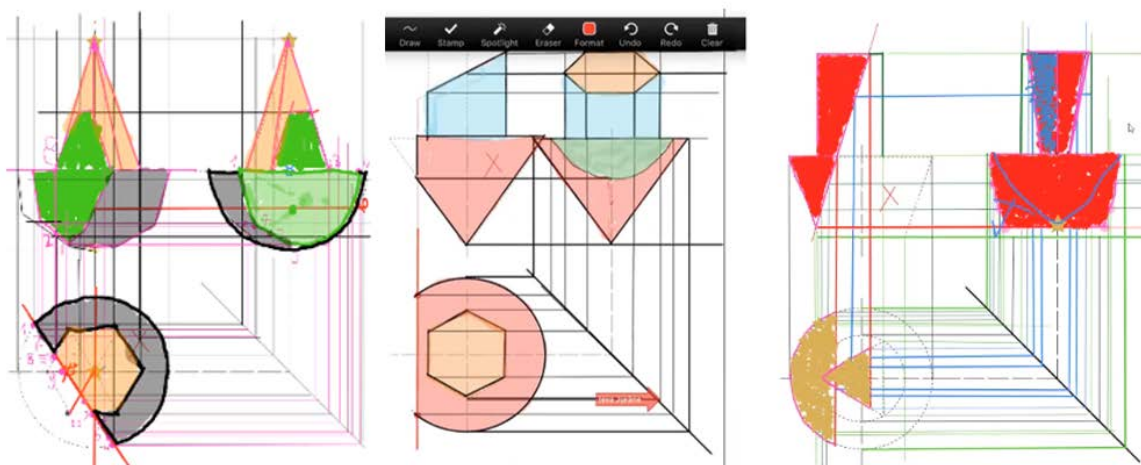
1.attēls. **Grupu darba piemēri, izpildīti Breakout Rooms**
Figure 1 **Examples of Teamwork in Breakout Rooms**
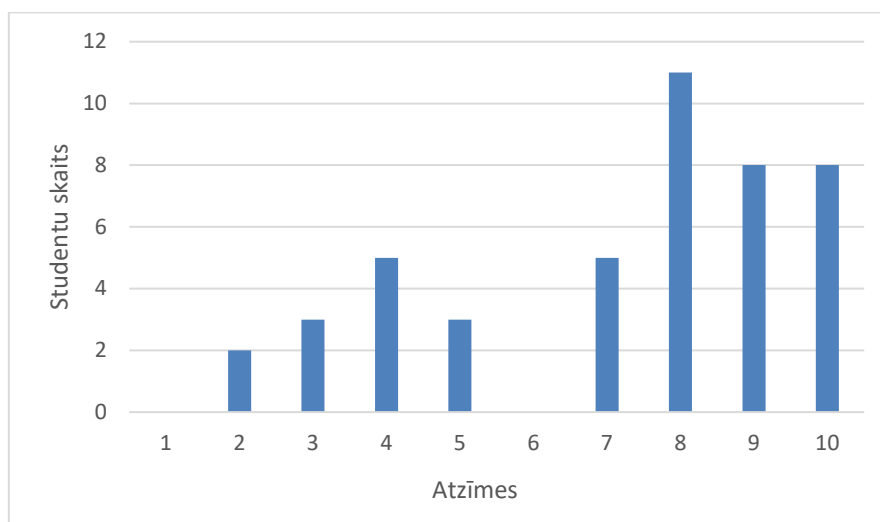
2.attēls. **Atzīmes pārbaudes darbā pēc Breakout room nodarbības**
Figure 2 **Marks in Test after Training in Breakout Rooms**

Aptaujas rezultāti
Survey Results

3.attēls rāda, ka sudentu attieksme pret grupu darbu ir ļoti pozitīva. Šajā jautājumā bija iespēja atzīmēt vairākas atbildes. Pieci studenti (11,1%) atbildēja, ka "labāk strādāju vienatnē" un vienam studentam (2,2%) vienkārši nepatika.

9. Jūsu vērtējums grupu darbam nodarbībā pirms KD2 (Breakout Rooms)
45 atbildes
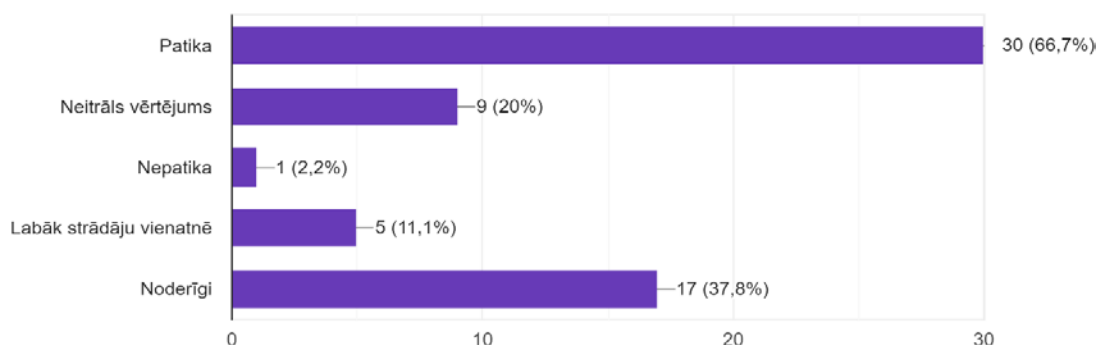
*3.attēls. **Studentu attieksme pret darbu grupās (Breakout Rooms)***
*Figure 3 **Students' Attitude towards Group Work in Breakout Rooms***

Tas sasaucas ar atbildēm uz citu aptaujas jautājumu "Vai Jūs gribētu vēl šāda veida grupu nodarbības?" Atbildes atspoguļotas 4. attēlā. Lielākā daļa (39 studenti, jeb 86,7%) gribētu, izņemot iepriekšminētos piecus.

10. Vai Jūs gribētu vēl šāda veida grupu darba (Breakout Rooms) nodarbības?
45 atbildes
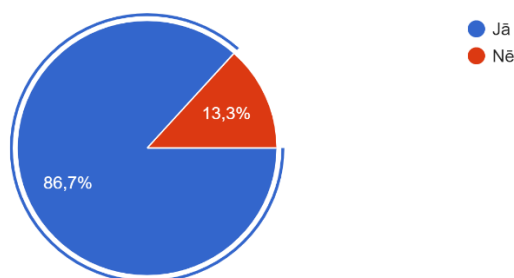
*4.attēls. **Vai Jūs gribētu vēl šāda veida grupu darba (Breakout Rooms) nodarbības?***
*Figure 4 **Would You Like More This Type of Group Work (Breakout Rooms)?***

Aptaujā tika uzdoti arī jautājums par grupu darbu vispār, jo semestra laikā tika izmantoti trīs veidi grupu darbam. Pārējie divi bija mājas darbi - prezentācija un modelēšana pa pāriem. Atbildes apkopotas 5.attēlā.

13. Jūsu attieksme pret grupu darbu vispār
45 atbildes
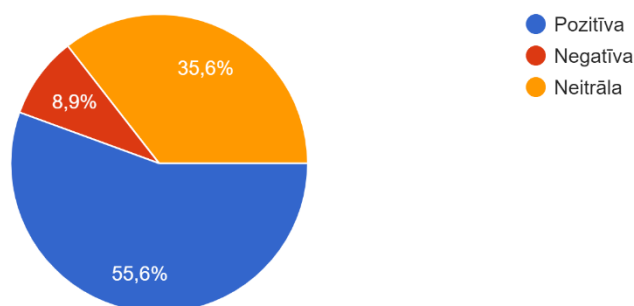
5.attēls. **Jūsu attieksme pret grupu darbu vispār**
Figure5 **Your Attitude towards Group Work in General**

Secinājumi
Conclusions

- Lekciju materiāla pielāgošana attālinātai apmācībai ir relatīvi viegla.
- Lekciju ierakstīšana notiek automātiski un ieraksti ir studentiem pieejami.
- Uzdevumu pielāgošana attālināto mācību režīmam prasa ieguldīt daudz mehāniska darba, kas nesatur nekādu virsvērtību. Tāpat arī darbu pārbaudīšana ir ilgāka un neprecīzāka nekā klātienē, jo studenti mēdz iesūtīt rasējumu foto perspektīvā.
- Praktiskās nodarbībās var sekmīgi izmantot ZOOM animācijas rīkus.
- Studenti atbalsta un viņiem patīk grupu darbs ar ZOOM "Breakout rooms" praktiskajās nodarbībās. Tas nes arī rezultātus un vienā nodarbībā var izskatīt vairāk uzdevumus nekā klātienē.
- Studentiem pārsvarā ir pozitīva attieksme pret grupu darbu.
- Moodle testi tiek izmantoti nekā vairāk iepriekš, jo tie ļoti ietaupa laiku, kaut arī nav ideāli grafiskajiem priekšmetiem.

Summary

The pandemic, which has covered the whole world and stopped many areas of life, has also had a significant impact on education, effectively turning it into distance learning. It can be said that a huge experiment is currently taking place in the world, which examines the possibilities of distance education from both a technological and a human aspect. The world has already developed a myriad of different technologies, platforms, applications, online courses (MOOC's), learning games and communication systems, which have suddenly got countless people looking for the best fit for their specifics. It is relatively easy for those participants whose courses already included a certain number of digital tools and prepared materials suitable for distance learning. But not everyone in the world is ready for it. Each industry has its own specifics and IT teachers are better prepared for these kinds of situations.

In teaching graphic subjects, the learning outcome is a picture - a drawing that requires precision. In the education of engineers and architects, graphic subjects, such as descriptive geometry and engineering graphics, which are traditionally executed in classical techniques by hand, play an important role.

There was no difficulty in putting the lectures online. In addition, the option to record them automatically appears.

Group work, worksheets and problem solving and analysis were used in the practical work. This part was the most challenging. This was solved by using Breakout rooms in ZOOM and ZOOM annotation tools to solve tasks in groups.

Teachers and university lecturers around the world report a significant increase in workload. The biggest amount of additional work for the teacher is the preparation of tasks.

In two-way communication from teacher to student, the teacher can use different technologies, both new and long-term, but in the direction of student to teacher comes very different quality photos from the phone or, at best, scanned images. In both cases, checking the accuracy of the drawing is approximate and labour-intensive.

Students are divided into three to four students in a group, and each group has its own task, which they solve using animation tools. The teacher goes in each group and helps. Each group then demonstrates and explains their solution to everyone else. The benefit is analysis and a common understanding of the problem, as well as a review of many examples in one lesson. Disadvantage - accuracy, especially at curves. The results are as follows: out of 45 students (71%) who participated in the Breakout Rooms class, 32 students received a grade of 7 or more in the test. Figure 2 shows that the test results show either very high marks or low marks. Figure 3 shows that the attitude of students towards group work is very positive.

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TEACHERS` SUPPORT SERVICE AS A PART OF FLEXIBLE EDUCATION CONCEPT: EXPERIENCE OF PR CHINA

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Abstract. *In 2020 China became the first country of the world that faced all the challenges of the COVID-19 pandemic, including the ones that dealt with education. They were the first ones to provide lock-down and distance education as the only education reality as well as the first ones to face all the positive and negative repercussions of the process mentioned. That's why the Chinese experience (both negative and positive) is worth presenting and exploring. There is one more peculiarity of the Chinese educational system that makes it unique and lets the country in a short period make a distance education system became competitive with the traditional off-line one. It is a teachers` support system that includes not only the teachers training system (vocational training activities), but also financial support for using different online-education tools, direct assistance of a group of specialists during preparing and lessoning, psychological support etc. The study aims to present the positive educational and organisation experience already approved in China. When writing the article, methods such as observation, study of normative and scientific literature were used for a comprehensive analysis of the new pedagogical reality - the teachers` support service.*
Keywords: knowledge; education; flexible education; teacher; teachers` support service; online education; regular (off-line) education.

Introduction

The idea of providing educational services in a distance form (not classroom one) is not new, but has been permanently developed and tested by practitioners of educational activities since the middle of the 19th century, when in 1840 Sir Issac Pitman (Great Britain) offered his students cursive and English courses by mailing. With the advent of computers, a new era has begun in the very concept

of education and its tasks, methods, principles, practical approaches, and the Corona-19 pandemic has intensified this process at times. There happened a ualitative breakthrough (not the evolutionary, but the revolutionary one) not only in the practice of providing educational services, the rapid development of related areas of activity (IT technologies to ensure the educational process, communication tools, appearing a huge amount of constructors for conducting classes, programs for monitoring the quality of educational and teaching activities, etc.), but also a revision of the education systems tasks, social and state requirements both to the process and to the result of education systems` activity, strengthening of motivational and self-regulatory components in obtaining knowledge, etc. (Baroutsis et al., 2020).

But, unfortunately, most of the theoretically positive innovations in online education face teachers` unreadiness and unwillingness to perceive and use them. To solve this problem, countries use methods and ways that are most consistent with their historical and pedagogical experience, pedagogical traditions, current level of IT technologies` development and financing in each particular country. The most popular method is self-education of teachers and / or the urgent creation of a system for improving the qualifications of teachers (especially as to IT technologies) through trainings, lectures, webinars, etc. (Joan, 2013). We want to emphasize that we are talking about working teachers (those who are engaged in educational practice now) and the problem of their IT qualifications and skills gained should be solved as soon as possible in order to continue the high-quality educational process online. We are not talking about teachers-to-be and about the issues of including / strengthening of IT training component in the standard educational programs of special and higher pedagogical educational institutions and vocational training programs for teachers.

The uniqueness of the Chinese approach to solving this problem lies in the fact that at the state level a system of support and consultation of working teachers was created. This system from the technical point of view should accompany the online teaching process, since most teachers who work in the education system of the PR China and are in the age period of 40+ are practically and psychologically not ready to use such an amount of IT and ICT technologies, that are involved in the modern process of online education, and their retraining will take a long time. The Chinese see Teachers` support service as a mandatory part of online and distance education process that is already reflected in the Flexible Education Concept adopted by the Chinese government in February 2020.

Literature Review

The basic source of information on the creation and functioning of the teacher support system during the COVID-19 period was the scientific development of such Chinese scientists as Zhonghuai Huang (professor of the Education Department at Beijing Normal University), Dejiang Liu (co-dean of the Institute of Smart Learning, Beijing Normal University), Changjie Chen (deputy Dean, Institute of Smart Learning, Beijing Normal University), Haijun Zeng (Head of the Administrative Department of the National Engineering Laboratory for Machine Learning and Digital Technologies of the People's Republic of China), Junfeng Yang (Professor of the College of Education, Hangzhou Pedagogical University), Rongxia Zhuang (Assistant Professor of the Education Department at Beijing Normal University), Tingwen Chan (Deputy Dean of the Smart Learning Institute of Beijing Normal University), etc. In February 2020, they developed a "Handbook on Facilitating Flexible Learning During Educational Disruption: The Chinese experience in Maintaining Undisrupted Learning in COVID-19 outbreak» (Beijing, 2020) which has received the approval of the state and since March 15, 2020 is considered the state strategy for building out the online education process in the crisis period for the PR China in particular. This publication received a recommendation from UNESCO International Research and Training Center for Rural Education Development and is presented in the international arena as the official position of the Chinese state on the problem indicated.

The publication reflects such issues as what is "flexible learning" in the context of the suspension of the educational process (including the very concept of "flexible education" taking into account the Chinese cultural, social and educational realities today, the characteristics of flexible education, the parameters of flexibility in education), the organization of online education to ensure flexible education (using IT technologies in education, the concept and features of online education during a social crisis, forms of providing online education), the development of the network infrastructure of online education in the context of "flexible education", the principles of assessing the target correspondence of digital educational resources to the tasks of the education system in a specific period of time, ways to ensure the effectiveness of online teaching and learning (including the systematic organization of education, social aspects of organizing educational activities, support and services for teachers and students), cooperation of government agencies`, private companies` and educational institutions` cooperation to maintain and develop the effectiveness of the educational process and others.

To analyse the problem of ICT and IT as a part of teachers` support service in China we used the works of the Chinese educators as well as of the abroad ones that reflect different issues of the problem mentioned starting from the general

prospects of the ICT development as an educational and practical method for the Chinese teachers (Ding Bo; Kuai Milan; Liu Xian) etc. and up to general prognosis of ICT development in China as a teaching and method and aim of the Educational Paradigm for the century coming (Wan Yi; Zhu Zhijing, Gu Xiaoqing, Collis Betty, Moonen Jef) and others. Some of the modern publications on the issue reflect main difficulties China faces in ICT development (Miao Fengchung, Trucano Michael).

Methodology

In the process of writing, the authors used methods and techniques typical for scientific research in the field of social pedagogy and theory of education:

- general scientific methods (analysis, generalization, comparison) for analysis and research work with encyclopedic, psychological, pedagogical and methodological literature on the subject of research. The designated reality (teachers` support as a practical system that is initiated by a state) today exists in the form of social and pedagogical practice only and requires reflection on the basis of the methods and approaches available in the pedagogical theory.;
- problem-targeted methods for the analysis of scientific and methodological literature, periodicals and normative documents related to educational process for teachers organization in both pedagogical and non-pedagogical education institutions of China. The use of this approach made it possible to identify the contradictions between the high level of the Chinese pedagogical practice development, the country's active participation in the implementation of pedagogical strategies and its quick reacting to the changing reality (in the educational sphere as well) and a rather low level of theoretical support of this process the Chinese and foreign scientists;
- comparative pedagogical methods for analyzing and research study in using and treating organization issues of filling gaps by teachers in the use of ICT and IT technologies in the process of practical online education (as well as the method of self-education of teachers and teachers-to-be) and one of aims of vocational training system for teachers and educators in China;
- hypothetical-deductive method was used to review the factual material aimed at analyzing the PR China`s government practice of organizing support for teachers' practical work through increasing the number of support staff (China's experience in this field is unique today), and also

let the authors predict the psychological and social consequences of this initiative on the basis of existing in modern pedagogy theories and laws;
- method of pedagogical observation (through informal communication with teachers from China, who work in the system of school and university education, and the implementation of the Project "1 teacher – 2 classrooms", which is implemented through online learning tools (ZOOM) between the Department of Oriental Languages H.S.Skovoroda Kharkiv National Pedagogical University (Kharkiv, Ukraine) and Zhejiang Shuzhen University (Hangzhou city, Zhejiang province, PR China)) to study the realities of teachers`everyday work in the education system of China during the flexible education period caused by the COVID-19 lockdown.

While working over the article, research methods related to conducting a pedagogical experiment or approbation of a pedagogical idea were not used, since the purpose of the article is a comprehensive presentation of a new pedagogical reality for its further consideration and study.

Results

Research into the possibilities of flexible teaching and learning has a long history. "Flexibility" in this case is defined as offering a choice of educational formats, as well as adapting a specific curriculum to the needs of individual students and teachers. These choices may include the number of classes, course content, educational resources, methods and location of classes, information and communication technologies used, requirements for course start / end dates, and communication tools. Flexible learning process eliminates obstacles to certain formats of the educational process (for example, classroom), which may be inaccessible to students for many reasons (for example, natural disaster, pandemic, military and environmental disasters). As technology advances further, flexibility of teaching becomes a critical factor that usually allows two-way exchange of information between teachers and students. Gradually, the concept of flexible learning has expanded and now applies not only to teaching, but also to flexible pedagogy (Gordon, 2014; Ryan & Tilbury, 2013). Gardon (2014) and Ryan & Tilbury (2013) note that flexibility includes not only student choice, but institutional choice of educational strategy.

With the development of information and communication technologies, new educational models have emerged that have expanded the possibilities of flexible learning.Today as to the vocational training system of teachers China is actively building the infrastructure of specialized educational ICTs and ITs (the network of digital resources and educational innovations for teachers) and the management

of education system supported by ICTs. Teachers` education in the field of ICT and IT and high demands on a teachers` ability to use them are seen as a solution to many of China's current educational needs and problems. Also, according to the Chinese leadership, ICTs have high potential for expanding access to education in general and to teachers` training and education system in particular. Ensuring fair and high-quality "electronic education" or using ICTs for teaching and learning in primary and secondary schools across the country is considered to be a national priority (Gu, Zhu & Guo, 2013). At the same time, the development of using ICTs and ITs teaching and self-educating methods can exacerbate the existing digital and technological imbalance between urban and rural areas. While in Chinese cities about 80% of students use Internet at home for homework and self-study, in rural areas only 2% of school-age youth have Internet at home, and only half of them use it to communicate with a teacher or search for information necessary for educational process, etc. (Trucano, 2012).

Recently, teacher education institutes have made efforts as to integrating IT education component into their teachers-to-be educational programs. There were presented several key strategies to introduce IT integration to teachers-to-be: delivering a single technology course; offering mini-workshops; integrating the technology in all courses; modeling how to use technology, etc.

In the case of China, the government has given big emphasis to the effect of ICT and IT education integration, and dedicates to make ICT and IT an important mean for teaching as well as a new type of tools for learning. Since China has huge differences in its geographic, economic and educational level in different regions, the way that ICT and IT is being integrated in the system of professional trainings of teachers is diversified. In developed areas, such as Shanghai and Beijing, many educational authorities make full use of their advantages, conducting various kinds of ICT and IT education innovation activities that cultivate teachers` and teachers`-to-be problem-solving abilities by integrating ICT and IT education into classrooms. One-to-one e-learning, mobile education, miniature learning and digital whiteboard-based interactive learning are all new approaches of using ICT application in pedagogical teaching and learning process (Zhang, 2002).

Rural and less economically developed areas (as well as the ones geographically located far from big cities and popular touristic areas) face the problem of poor network connection that definitely influences the usage of ICT and IT education as learning and teaching method both for students and teachers. Also the Chinese government speaking about challenges for ICT and IT education in these regions found at least two categories of barriers tightly related to teachers' behavior: the lack of specific knowledge and skills about technology integration and attitudes and prejudice towards technology as a teaching method. Even many

teachers have strong desires for integrating ICT and IT education into teaching, they encountered significant barriers, such as lacking confidence and competence, or having negative attitude and inherent resistance (mainly it concerns the teachers of the age over 40) (Wu, 2014).

Not only teachers' passive attitudes can cause barriers, but students can also pose challenges to ICT and IT education integration process. New generations, which are also called the Millennials, are much more skilled and adopted at using technology than their teachers. Under this circumstance, students have different patterns of thinking and communication, notions of learning, needs for control, and even personal and social values with their teachers. The same gab can be noticed in the educational institutions for teachers as well where about 68% of teaching staff is over 40 years old and especially in the retiree courses for teachers where about 80% of listeners and students obtain degrees and represent the generation of 45-55s (Hu & Mc Grave, 2011).

In a nutshell, according to F. Miao (Miao, 2007) and M. Trucano (Trucano, 2012) today China faces IT teachers` education problems mainly of two kinds:

- psychological and educational one: teachers (especially working ones whose age is over 40) are psychologically not ready for huge amount of ICT (Miao, 2007);

- financial and technical one: technical weakness of the rural area schools makes usage of ICT as a practical method of teaching quite difficult (Trucano, 2012).

Also the researchers note, that the Chinese teachers, in particular, expressed more doubts about the effectiveness of using ICT applications in collaboration, independent learning and self-education. Moreover, Chinese teachers regard themselves more of an authority role when compared to Western teachers. The authority figure hinders the interactive use of ICT and IT education, as this is not consistent with the formal traditional education (Fu, 2017).

Effective support system is the key to quality online education. Effective support system for online education is traditionally seen to be consist of two categories: one for online educators and one for online learners. In China effective support services (an effective support system) for both categories is provided in cooperation with government agencies, educational institutions, private companies, families, society, etc. Unlike other countries (USA, France, Canada, Israel, Great Britain etc.) (Naidu, 2017) China does not does not accept the option of creating a support system for teachers or students from non-formal or public organizations (including NGOs) that do not cooperate with the state (in the person of the Ministry of Education or local government departments of education). The support of teachers is a priority for the Chinese state, since the system of work of the state (as well as of the society in general) with teachers as a category of civil

servants is guided by the ancient postulate "everything starts with a teacher and any troubles of the state can be prevented if children get appropriate education» (Li, 2019).

Today, the teachers` support service in China works in several areas:

Technical education of working teachers. Both teachers themselves and at the state level it is noted that today it is necessary to make efforts to improve the qualifications of teachers in the field of online learning, since most teachers are unfamiliar with the tools of synchronous and asynchronous education. In particular, such trainings should include online learning and information technology applications, examples of epidemic prevention measures in educational institutions and local teacher training, as this will contribute to the early development of teaching skills in the field of computer learning.

Methodical training of working teachers. Assistance to educators in this area includes training on how to use computer software for synchronous learning, how to use computer based learning management software, how to plan virtual training events, how to use online constructors, etc.

Legal assistance to working teachers. Much attention is also paid to legal issues of how to properly format links to video and audio materials that teachers take from the general Internet space, as well as how to protect their own copyrights to intellectual material, to which the lesson belongs. In most public schools, the rule was implemented that the rights to all developments made by teachers for conducting lessons on a school schedule belong to the educational institution, with the obligatory indication of the name of the teacher who created this or that lesson. In this case, the IT department of the educational institution is fully responsible for observing copyright and other legal issues related to online education.

Financial support for the online education process. The state undertook financing not only the technical aspects of the online education process (increasing the number of computers, IT courses for teachers, etc.), but also opened free online access to libraries and constructors, museums, exhibitions, etc., provided free a number of downloads and online minutes of communication in groups (including group conferences) for educational institutions, based on the number of teaching staff constantly involved in the provision of educational services. The Chinese Ministry of Education today coordinates 22 online learning platforms that offer a total of 24,000 free open online courses nationwide. Provincial schools and education companies also offer a huge selection of their own open learning resources.

Psychological assistance to working teachers. The main leitmotif of the administration's conversations with teachers, teachers' meetings, forums, etc. at the first stages of the transition of the educational process to the online was: "we

will definitely cope and learn everything", "no one knows how to work ONLY online - this is normal, we will all learn everything all together" and the like. This position of the state and the administration made it possible not only to reduce, but practically to remove from teachers the feeling of anxiety, uncertainty and disappointment in their own abilities, etc. And the organization of practical support from the state and the educational institution (involving a large number of people to work over the lesson) significantly facilitated the daily routine of teaching classes and significantly reduced the level of fatigue and professional-emotional burnout of teachers in the country (Huang, Liu, Tlili, & et al., 2020).

The Chinese state platform "National Cloud Classroom" (www.eduyun.cn) provides free use of electronic textbooks for subject teachers, compiled by education departments of various provinces (to familiarize teachers with the experience of different regions of China). Such electronic textbooks are widely used in various fields for teaching in all grades of junior and upper secondary schools. The educational platform for these schools also has a built-in collective authorship option that allows flexible curriculum development using, creating new classes using materials of the platform, create joint educational projects with teachers from different regions etc. The platform's functionality also includes support for lectures and interactive lessons.

At the same time, the Public Education Publishing House released the «Touching and Reading of PEP» mobile application, which contains free digital educational resources. During the implementation of the «Interrupted Studies, Lifelong Learning» initiative, the Ministry of Education demanded that education departments and educational institutions at all levels of education establish joint activities. The Ministry also called on various civil society organizations to actively offer the society more diverse and better educational resources (pre-approved by specialized government agencies) (Huang, Liu, Tlili, & etc., 2020).

China is committed to the position that in order to meet today's needs for online learning and to further develop this type of learning, public administrations of education need to take on many roles, such as leadership of educational policy, overall coordination and effective control of activities, including coordination of actions of private companies, educational institutions, research institutes, families, society, etc. to create stable communication platforms, select appropriate educational resources, provide convenient learning tools, support a variety of teaching methods and flexible teaching methods. An effective teacher support system in China is the result of close multilateral cooperation between the state and many actors in the country's social and economic life.

Conclusions

Unlike other countries (especially the ones of the former Soviet territory) the quarantine restrictments and study-at-home form of education did not much China due to self-organization of the Chinese teachers and students, thanks to technological readiness of the education system and the introduction of the idea of teachers` support system (especially as to ICTs and ITs) and distance learning methods, which began long before COVID-19 pandemic. Also, own money at universities allowed them to sharply increase the number of technical personnel for organizing and maintaining the educational process in the new conditions. This allowed the entire education system in the PR China (from kindergartens to universities) quickly and entirely go into online space with minimal loss in the quality of educational services. Through the OUC system and other ICT sources were organized special training courses for teachers at rural areas to help them to adopt the new form of teaching. But as a result of the ICT revolution, which took place in the PR China's approaches to education in general back in the 2010s and the new paradigm of teacher training and support, compared with other countries, it did not lead to a boom in high technologies in the field of education in China. The main conclusion is can be noted: new education reality sets new requirements for the subject of the educational process (teacher), which cannot be satisfied by the teacher him/herself. To meet the needs of flexible education, a teacher starts to present the results of an integrated group's work, so called teachers` support service. This system of educational work organisation is rather expensive, but effective.

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CHALLENGES OF DISTANCE EDUCATION DURING THE SCHOOL LOCKDOWN: THE LITHUANIAN SCHOOL LEADERS' PERSPECTIVE

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Abstract. *The COVID19 pandemic has caused massive disruption in education practices worldwide and Lithuania was no exception. This article investigates how this period of uncertainties has been perceived by Lithuanian schools during school lockdown. The study aimed to explore the challenges that Lithuanian schools faced and how distance education practices has been reconsidered during school lockdown. The research was based on a survey of 406 sampled school leaders of public education institutions in Lithuania conducted two months into the first nationwide lockdown in spring 2020. This paper aims to discuss the challenges of distance education from the perspective of school leaders, and to link the findings of the study to recent studies related to schools' responses to the pandemic situation. The survey responses indicated that schools initially focused on the organisation of staff training and technological preparation to start distance education during the first two weeks of lockdown. Their focus two months into the process shifted towards tackling challenges on students' responsiveness and assessment of students' achievements during distance education. Challenges are perceived as opportunities for reflection and growth, re-examine current institution strengths and weaknesses, and reconsolidate with the school communities in prioritising what the utter function in education is.*
Keywords: *school leaderships, education in lockdown, distance education.*

Introduction

The nation-wide school lockdown due to COVID-19 complications was announced on March 16, 2020, in Lithuania. It was disruptive and unexpected, requiring swift switching onto distance education, a major restructuring of educational activities, and thorough reorganisation of internal management. Despite the governments' two-weeks extension of school holidays as a buffer time for schools to prepare and transition to distance education, challenges were still experienced by school community members and school leadership. The research was based on a survey of school leaders of public education institutions in Lithuania conducted after the lockdown in spring 2020. This paper aims to discuss

key challenges of distance education from the perspective of school leaders and links the findings of the study with recent studies related to schools' responses to the pandemic situation.

Literature Review

The impact of Covid-19 is currently disrupting educational institutions globally, with more than 1.6 billion students having been removed from their regular classrooms in the spring of 2020. Teaching and learning have been interrupted in every country, and many refer to this as an educational crisis. As 'crisis' carries the meaning of 'confronting, intrusive and painful experiences' (Smith and Riley 2012), it also often implies upcoming "turning point" moments, not necessarily toward the positive or the negative. This concept of 'turning point' can be used to understand the contemporary discourses around Covid-19 to be highly polarised and places schooling in a new definitional dilemma. Practical voices call for a rapid return to 'normal' and re-engagement from where the schools left off. Optimistic educators make waves for the co-creation of a post-pandemic 'new normal' with the potential to a re-modelled education globally. Nevertheless, while face-to-face schools still inevitably dominate both the idea and the function of schooling itself, global school lockdowns engine the incorporation of new tools to tackle previously unthinkable challenges. It has been suggested as an opportunity to revise conventional practices so that more long-term and permanent changes may be implemented in the post-crisis context, rather than looking for quick fixes to merely survive the pandemic turbulence (Zhao 2020).

During Covid-19, members of the school community rely on its leadership to provide certainty and redirect focus, nurturing enduring hope, building resilience, and ensuring flexible communication. It is important to balance reacting to immediate needs and proactively prepare for the future while achieving the best student learning outcomes. Kerrissey and Edmondson (2020) suggested four positive approaches during uncertainties: acting with urgency; communicating with transparency; taking responsibility and focusing on solving problems and engaging in constant updating. The openness of school leaders assimilates to how members of the school community react to crisis and disruptive times, while collectively maintaining higher organisation morale and motivation for teaching performance and learning outcomes.

Methodology

The questionnaire was developed in Slovenia by researchers from the University of Ljubljana (Kalin et al. 2020) and modified in Lithuania by researchers from Vytautas Magnus University. Several variables were single-choice nominal variables: gender, school type, school area (urban or rural), and the teaching approach used by most teachers in the school. There was one multiple choice question: How did your school organise distant education? There were a few quantitative questions: *Years of work experience, Years of being a principal, Number of students.*

There were four questions, which were multiple choice; however, the number of choices was fixed in advance: *Which three activities engaged you most as a principal during the first two weeks of the school lockdown? (3 possible answers), Which four activities engage you most at this moment? (4 answers), How do you monitor teachers' work? (3 answers), Which aspects of distant education do you find most challenging? (3 answers).* The last six questions were about collaboration, cooperation and communication of principals with the Ministry of Education, Science and Sports (and other similar institutions, like the National Education Agency), with principals from other schools, and with colleagues from the respondent's own school.

In this paper, we will focus only on the discussion on the research results related to distance education challenges in three perspectives: immediately after the lockdown, after two months in the lockdown and assessing challenges of distance education in a long-term perspective.

Researchers conducted the study in May 2020 on the management of educational institutions during pandemic challenges, in which 17 vocational school leaders and 388 general education school leaders were surveyed. Out of the 1127 schools at the beginning of the school year, the questionnaire received 406 useable responses. The distribution of participants by gender reflects a situation in the Lithuanian educational system, which is dominated by women. Average work experience was 30.8 years ranging from 3 to 47 years, and work experience as a school director was 14.9 years on average, from 0 to 38 years.

Research Results

The study participants agreed (97,8%) that the organisation of distance education was among the three main activities during the first two quarantine weeks. Two-thirds of the surveyed principals (64,2%) noted that they provided support to teachers during this period; around half of the principals (48,8%) focused on helping students who were unable to use information technologies;

about a third of participants (34,3%) noted prioritising interaction with parents and caregivers.

The situation slightly changed after two months in the lockdown. Still, a significant part of the school leaders (77,7%) indicated that the main challenge remained the implementation of distance education, 51.5% - communication with pupils' parents or caregivers, 48.8% noted that the provision of support to teachers remained among key challenges, 42.4% stressed increased problems with non-communicative and non-responsive pupils and 38.2% - assessment of achievements and personal progress of students.
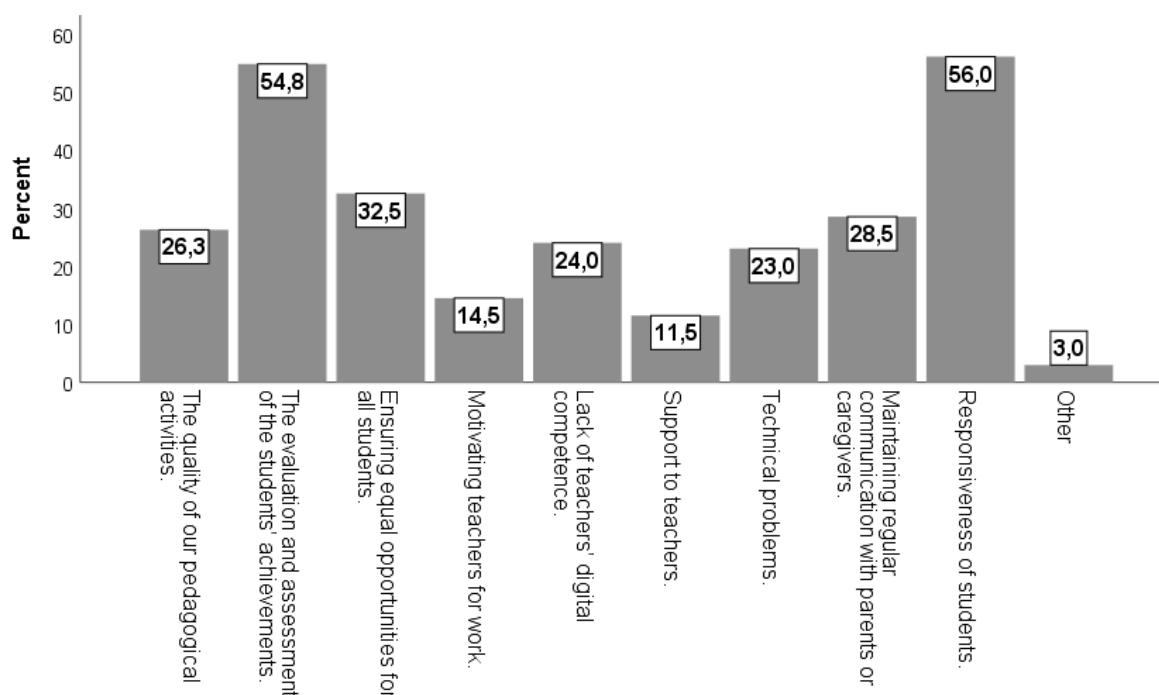
Figure 1 **Challenges of Distance Education**

Overall, evaluating the main challenges of distance education (Figure 1), school leaders remained systemic in their responses. Dealing with poor responsiveness of students (56%), evaluation and assessment of students' achievements (54,8%), ensuring equal opportunities for all students (32,5%), maintaining regular communication with parents and caregivers (28,5%) have been identified as the priority areas.

Discussion

The research revealed that Lithuanian schools addressed difficulties during the switch to distance education, similar to what Cabaj and Weaver (2016) referred to as a "collective impact" in approaching complex social circumstances. It is apparent that Lithuanian school members were empowered to rediscovering

new solutions that best serve the collective priorities (D'Auria and De Smet 2020). However, despite successful team effort, among the biggest challenges of distance education, respondents most often mentioned assessing students' achievements and communication with students.

Challenges on assessing student achievements that Lithuanian school reported during school closure is also highlighted by UNICEF educators: "some of the main implications of the COVID pandemic for assessment systems and practices in general surrounds challenges for pupils to maintain achievement and develop new skills" (UNICEF, 2020, p.1). As distance learning relies heavily on autonomy, younger learners and leaners who were not previously given the opportunity to take ownership of their self-learning may find it difficult to cope. According to UNICEF's 2020 recommendation to educators, uncertainties regarding students' learning level shifts will occur upon school reopening and face to face instruction resumed, and assessment is the central pillar in the 'back to school' process. Assessment during school-closure should thus be conducted with the following considerations: 1. *Monitor learning throughout the crisis*. Assessment during school closure should be used as individual learning journeys that allow teachers to prioritise support to pupils who have fallen furthest behind due to special needs, lack of support at home, or lack of access to technology or appropriate learning environments. 2. *Reduce expectations for what and how much children can learn during COVID crisis period*. The nature, content and stakes of assessment should reflect the crisis conditions that teachers and students are undertaking the assessments with expectations of the outcomes tempered to reflect the learning domains. 3. *Prioritise formative assessment*. Pupils should not be expected to progress across the intended curriculum through self-learning methods with few teachers' interactions. Distance learning programmes should utilise formative assessment components to incorporate teachers' direct feedback (also a channel of direct communication and keeping contact) regarding learning content and student error patterns. Expectations for formative assessment need to be clearly communicated with clear protocols in place when children are identified as not learning or not accessing distance programmes. 4. *Provide guidance for parents*: Pupils' learning level shifts may reflect the level of isolation and stress endeavoured, and assessment results can be used to indicate where parenting education is most needed. As sudden home-schooling load shifts from normal schooling into their households, counselling for parents is key during school closure for the well-being, preservation of learning motivation and maintenance of safety- for at times of crisis. Parents may find their children going beyond their necessary involvement in the learning and assessment culture of schools. Nevertheless, it is worth further investigation to follow-up on these school leaders' initiatives to explore the school's assessment process to obtain better insight into the pupils' learning conditions.

The second flagged challenge that Lithuanian schools pointed out was maintaining contact with pupils and maintaining pupils' engagement in the learning process. Verheijen (2020) suggests the following: Firstly, *increase the interactivity of work* by applying flipped-classroom tools which may extend pupils' attention spans (Tang et al., 2020). SecEd (2020) stated: "Evidence on distance learning highlights the importance of interactive learning, consolidating learning and supporting pupils to self-regulate their learning as effective strategies as part of a mixed diet of provision" (p. 1). Both creativity and application of a variety of technologies that foster conversation, collaboration and personalised experiences would see higher engagement across the board. The UNESCO Institute for Information Technologies in Education's 2020 initiative: 'COVID-19: Keep learning. Together we are on the move!' (Zhan, 2020) for instance, has constructed a global platform and collection of open-source education technologies (technical solutions, resources for distance learning, guidance, and training opportunities). Secondly, *make better use of the peer-to-peer network.* This gives pupils ownership to their learning, encourages interaction amongst peers, and increases understanding of tasks and expectations such as grading. Peer learning is also a much-needed approach for the potentially ongoing blended education, switching between online and offline. The interactive nature of group tasks and peer-to-peer feedback promotes online conversations and consolidates previous learning while having higher pupil engagement levels, particularly an increased probability of having highly engaged disadvantaged pupils" (Lucas et al., 2020). Peer-to-peer formats are also more flexible for blended learning, can be switched between online and offline, and is less disrupted by the location where learning is taking place. In problem-solving with peers' support, vital skills for learning how to learn are also being demonstrated as part of the tasks. In the long term, this leads to the third point: *emphasis self-guided learning*. It is crucial to shaping pupils' online schooling as their own learning journey by tacking pupils' perspectives into account. Where multiple and immediately feasible tactics are applied, seat time and student progress can be reconsidered to allow learners' progression at the best rate they can achieve. For instance, Best (2020) suggested eight online assessment strategies for distance schooling which may offer more effective ways of evaluating learning outcomes: peer assessment, independent projects, jigsaw projects, self-assessment, portfolios and learning journals (examples of variations include challenge journals, success journals, visual journals and question journals). Recent studies on this matter are worth considering in terms of probable solutions.

All the above hinder the application of effective online tools, and in turn, allow for more accurate differentiation between learning levels (Schueler, 2020), and free up teachers to focus more on struggling pupils. Hegarty (2020) pointed out that as remote teaching prevents teachers from being physically present to

notice students struggling, teachers need to be given a chance (both time and space) to apply digital platforms that offer easy-to-access data on the immediate progress of each student. Where data indicate student lagging - in both engagement and progress - instead of applying the problematic tracking approach, teachers may consider strategies that allow themselves to work directly with students most in need. It will be interesting to know more about the school leader's approaches toward pupil engagement during distance education as a way to ensure that no one is left behind.

Conclusions

The research discloses that the disruption of the normal teaching process by Covid-19 requires schools' collective efforts and enabling teachers' autonomy and expertise to deal with the methodical and organisational challenges of distance education transition. Current faced by Lithuanian schools, as any other distance education contexts on the assessment of students' achievements and engagement of students are not new ones. However, it is hopeful to see that schools can take these challenges as opportunities for reflection and growth, re-examine current institution strengths and weaknesses, and reconsolidate with the school communities in prioritising what the utter function in education is. For when schooling 'resumes to normal', the face of education will never be the same again.

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DIGITAL PEDAGOGICAL COMPETENCIES OF PHYSICAL EDUCATION TEACHERS

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Abstract. *The global COVID-19 pandemic has changed the education system. The use of modern information technologies in the educational process and the introduction of distance learning are becoming more and more relevant. These requirements began to apply to academic disciplines, which a priori are difficult to teach online, in a quarantine situation. Physical education is such a discipline. Requirements for teachers are increasing. The teacher must have digital pedagogical competencies in order to successfully teach this academic discipline in modern conditions.*

The purpose of this pilot study was to determine the level of formation of digital pedagogical competencies among physical education teachers working in institutions of higher and secondary vocational education. The research is based on the European model Digital Competence of Educators (DIGCOMPEDU). A questionnaire for identifying the formation of digital pedagogical competencies was developed on the basis of this model and tested in this study. Teachers were asked to assess, on a 5-point scale, the level of skills and experience in the application of information technologies in the educational process and in the organization of distance learning, as well as to provide specific resources with which they work.

44 teachers of physical education from Pskov State University, College of Pskov State University and Velikie Luki State Academy of Physical Culture and Sports took part in this study. It was found that most of all physical culture teachers have formed the ability to work with search engines and knowledge in the field of information security. The skills to produce and use video and graphics content are the least developed. Also an important problem is the lack of experience in the implementation of distance learning among physical education teachers.

Groups of teachers with different levels of formation of digital pedagogical competencies were identified using cluster analysis. Five such levels have been identified.

The conducted research determines the problem that physical education teachers lack competence in the field of information technologies and their implementation in the educational process even with a mixed form of education (full-time form with elements of distance learning).

Keywords: *Digital Competence of Educators (DIGCOMPEDU), digital pedagogical competencies, distance learning, pandemic, physical education, teaching.*

Introduction

Digitalization is the most important characteristic of the development of modern society. Digital technologies are entering all spheres of life rapidly. Education is a sphere that is also being transformed under the influence of modern information technologies. The COVID-19 pandemic is a critical moment in this process. All academic disciplines are taught distance or mixed during a pandemic. The need to conduct classes online has also affected physical education. The teachers faced a big problem of translating the lessons in the gym into lessons conducted through video conferencing and distance learning systems. The teacher must have digital pedagogical competencies in such a situation.

The aim of the study is to identify the level of formation of digital pedagogical competencies among physical education teachers working in institutions of higher and secondary vocational education.

The research aims to find answers to the following questions:

What is the level of formation of digital pedagogical competencies among modern teachers of physical education?

Are there significant differences in the level of formation of digital pedagogical competencies among teachers with different experience in teaching the discipline "Physical Education"?

The questionnaire method and methods of mathematical and statistical data processing (frequency, cluster, and factor analysis) were used to solve the tasks.

The obtained results are interesting, as they show the weakest spots in the development of digital pedagogical competencies among physical education teachers.

Literature Review

The problem of digital competence and, in particular, digital pedagogical competencies is relevant for modern psychological and pedagogical research, in connection with the transformation of the education system and the introduction of digital technologies into the educational process.

K.V.P. Pérez, O.M. Torelló point out that the analysis of the European Higher Education Area allows formulating a new educational paradigm. It reflects fundamental changes in the professional tasks of teachers of institutions of higher professional education. These changes are expressed in the fact that teachers need not only to master and implement modern information technologies in the educational process, but also to adapt their professional and personal profile, forming digital pedagogical competence (Pérez & Torelló, 2011).

J. From defines digital pedagogical competence as the ability to consistently apply the attitudes, knowledge and skills required for planning and behavior, as

well as for assessing and revising on an ongoing basis information and communication technology learning based on theory, ongoing research and proven experience with a view to support student learning in the best possible way (From, 2017). The author emphasizes that digital pedagogical competence is not limited to a simple set of knowledge and skills in the field of information and communication technologies. It also includes the ability to incorporate these technologies into the educational process without prejudice to its implementation.

According to research by I. Ryhtä et al., competencies in digital pedagogy include pedagogical, digital and ethical skills and awareness (Ryhtä et al., 2020).

S. Santoveña-Casal, M. Dolores Fernández Pérez emphasizes the importance of preserving the social component in the implementation of digital technologies in education, which is based on maintaining personal interaction between the teacher and students. Only a distance learning model, devoid of interpersonal contacts, can hinder the perception of students of current knowledge and the development of joint competencies, in contrast to a more interactive model (Santoveña-Casal & Pérez, 2020).

Studies show that modern teachers find it difficult to self-assess the level of formation of digital pedagogical competencies, although they have experience in implementing elements of distance learning (Tomczyk, 2020).

The European Digital Competence of Educators (DIGCOMPEDU) model is the basis for this study (Redecker & Punie, 2017). According to this model, digital pedagogical competences include the following skills and abilities:

- Skills in the field of digital resources (selection, creation, modification, management and protection of digital resources).
- Skills in the application of digital technologies in the teaching process (teaching, mentoring, reflective practices, independent learning management).
- Assessment skills in education (assessment strategies, evidence analysis, feedback, planning).
- Skill in student empowerment (accessibility, inclusiveness, personalization, engagement).

Thus, digital pedagogical competence requires from the teacher not only the possession of modern information technologies, but also the possession of strategies for their implementation in the teaching process, which would contribute to the effective assimilation of educational material and the all-round development of the student's personality and the teacher himself.

Methodology

The questionnaire was developed to diagnose the formation of digital pedagogical competencies among physical education teachers based on the DIGCOMPEDU model. The questionnaire includes two sections. The first section contains a list of various knowledge and skills in the field of digital technology applications in the educational process. Physical education teachers had to assess this knowledge and skills on a 5-point scale, depending on the level of their formation. The first section of the questionnaire contains 26 questions.

Teachers were asked to indicate specific digital resources that they use at various stages of the educational process in the second section of the questionnaire (stages of developing educational content, assessment and feedback, implementation of distance learning, including in the discipline "physical education"). The second section of the questionnaire contains 24 questions. The content analysis method was used to process the results for the second section of the questionnaire.

Several statistical reliability testing procedures were carried out during the development of the questionnaire:

Internal consistency check: Alpha-Cronbach coefficient is 0.760.

Reliability of the equivalent halves of the test: the correlation coefficient between the total scores on even and odd questions is 0.892 at a significance level of 0.000.

The substantive validity of the questionnaire was assessed by the method of an expert survey (experts: 2 employees of the chair of Psychology and Child Development Support, Pskov State University, PhD, with more than 250 hours of advanced training on the use of digital technologies in education). The experts made minor adjustments to the text of the questionnaire, which were taken into account in its further development.

Determination of the internal structure using factor analysis.

Mathematical and statistical data processing consisted of frequency analysis to determine the level of formation of individual knowledge and skills, as well as cluster analysis to identify groups of teachers with different levels of formation of digital pedagogical competence.

Physical education teachers of Pskov State University, College of Pskov State University and Velikie Luki State Academy of Physical Education and Sports took part in the study in the amount of 44 people. The respondents' pedagogical experience in teaching physical education ranges from 8 to 30 years (They are divided into two groups for comparison: 18 people with experience from 8 to 19 years; 26 people with experience of 20-30 years).

Research Results

Four factors were identified (factor analysis described 81% of the variance) based on the results of the first part of the questionnaire. These factors describe the digital pedagogical competencies that are most significant for physical education teachers:

Factor 1 (factor described 32% of the variance): "Competence in the use of digital technologies in organizing communication with students" includes the following indicators: "experience in using graphic material in the process of lectures and practical classes in an online environment" (.859), "experience in organizing an individual approach to students in a distance learning environment" (.855), "the ability to use graphic material in the development of classes in an online environment" (.848), "experience in the use of techniques and means of increasing the cognitive interest and activity of students in the process of distance learning" (.820), "experience in providing information safety in the process of distance learning "(.778)," knowledge about the possibilities of organizing an individual approach to students in a distance learning environment "(.770)," knowledge of techniques and means of increasing the cognitive interest and activity of students in the process of distance learning "(.762) , "knowledge in the field of information security" (.741), "knowledge of online resources, allowing to organize joint work of students in an online lesson "(.700)," experience in organizing joint work of students in a lesson through online resources "(.664)," knowledge in the field of opportunities for organizing feedback from students in a distance learning environment " (.620), "experience in organizing communication with learners in an online environment" (.619), "experience in organizing feedback from learners in a distance learning environment" (.497), "ability to organize communication with learners in an online environment" (.423).

Factor 2 (factor describes 24% of the variance): "Competence in the development and implementation of distance learning." The factor includes the following indicators: "experience in implementing online courses" (.833), "experience in the development and application of assessment systems in an online environment" (.801), "skills in the development of assessment systems in an online environment" (.793), "experience implementation of distance learning in its pure form "(.783)," ability to develop an online course "(.669)," knowledge in the field of platforms for the development and implementation of online courses" (.633).

Factor 3 (factor describes 18% of the variance): "Competence in the field of technically complex content creation". The factor includes the following indicators: "the ability to create video content for a lecture or practical lesson"

(.903), "experience in developing and using video content for lectures or practical classes" (.878), "the ability to develop a knowledge control test in an online environment" (.659), "experience of testing students in an online environment" (.614).

Factor 4 (factor describes 7% of variance): "Competence in the field of information retrieval." The factor includes the following variables: "knowledge of online resources for information retrieval" (.921), "ability to use information resources to find information" (.917).

Table 1 shows the percentage distribution of physical education teachers by the levels of formation of these competencies.

Table 1 **Percentage Distribution of Physical Education Teachers by Levels of Formation of Digital Pedagogical Competencies**

№	Indicators of digital pedagogical competence	High level	Above average level	Average level	Below average level	Low level
1	Competence in the use of digital technologies in organizing communication with students	23	5	36	22	14
2	Competence in the development and implementation of distance learning	2	8	63	18	9
3	Competence in creating technically complex content	30	4	35	17	14
4	Information retrieval competencies	14	18	41	13	14

n=44

The average level of severity of all competencies prevails among teachers of physical education. But it should be noted that 22% of teachers have a below average level and 14% have a low level of severity of competence in the use of digital technologies in the field of organizing communication with students. Such teachers have difficulties in creating the social side of distance learning, namely: in providing feedback, implementing an individual approach, increasing the activity and cognitive interest of students, as well as conducting seminars that require discussion.

31% of teachers (17% - below average of severity of the variable and 14% - low level of severity of the variable) have insufficiently formed competence in the field of technically complex content creation. This means that they do not know how to create video materials and tests. Although it should be noted that 30% of respondents have a high level of development of this competence.

Consequently, they have the knowledge and skills in the technical ability to record of instructional videos and also have experience in developing video lectures.

Ability to use information resources to search for information (27.3% of teachers have a high level of severity of a variable), knowledge of online resources to search for information (18.2% - high level of severity of the variable) and knowledge in the field of information security (18.2% - high level of severity of the variable) are the most developed among individual knowledge and skills within the framework of these competencies among teachers of physical education. The knowledge and skills that teachers are not sufficiently developed are experience in implementing online courses (31.8% - below average level of severity of the variable, 22.7% - low level of severity of the variable), experience in developing video content (36.4% - below average level of severity of the variable, 22, 7% - low level of severity of the variable); knowledge of teamwork resources (31.8% - below average of severity of the variable, 22.7% - low of severity of the variable), experience in organizing collaboration (36.4% - low of severity of the variable), experience in organizing feedback (27.3% - below average of severity of the variable, 22.7% - low level of severity of the variable), experience of using graphic material (45.5% - below average of severity of the variable, 27.3% - low level of severity of the variable). Based on the analysis of the results, it can be concluded that teachers have insufficient experience in using modern digital technologies in the educational process, although their knowledge and skills in this area are moderately formed.

The following results were obtained by analyzing specific digital resources that teachers use in the educational process:

- LMS Moodle and Stepik are the leading educational platforms where physical educators deliver distance learning.
- Zoom, Skype, Discord are the leading platforms for video lectures and webinars.
- The greatest difficulties for teachers arise in the situation of the need to organize an inclusive approach and adaptive physical education in a distance form. 54% of teachers do not know what technologies they can be used in this case.

Groups of teachers with different levels of formation of digital pedagogical competencies were identified using cluster analysis. There are 5 groups of teachers:

The first group of teachers (14% of the total sample size) is teachers with a low level of severity of digital pedagogical competence formation. This group has a low and below average level of severity in almost all knowledge and skills. They have the least development of such skills as the ability to organize communication with students in an online environment (-1.48), knowledge in the field of

opportunities for organizing feedback from students in a distance learning environment (-1.34) and experience in organizing feedback from students in a distance learning environment (-1.33). Therefore, the weakest side of these teachers is the preservation of the social side of the educational process when using digital technologies.

The second group of teachers (8% of the total sample size) is teachers have moderately developed digital pedagogical competencies, but lack distance learning experience. These teachers know how to design distance learning courses, have the skills to create video content (1.33) and develop tests (.95), have knowledge of search engines (1.08), but do not have real experience in implementing distance learning ("knowledge of platforms for the development and implementation of online courses "(-1.34)," experience in the implementation of distance learning in its pure form "(-1.38)," the experience of organizing the joint work of students in the classroom through online resources "(-1.35)," the experience of organizing individual approach to students in a distance learning environment "(-1.38)," the ability to develop an online course "(-.97)). Consequently, the weak side of these teachers is the lack of experience in the use of digital technologies in the educational process.

The third group of teachers (50% of the total sample size) is teachers with an average level of severity of digital pedagogical competencies. These teachers have an average level of severity of all knowledge and skills. Test design skills are at a slightly below average level (-.52). Such teachers in general can apply digital technologies in education successfully.

The fourth group of teachers (14% of the total sample size) is teachers with a higher than average level of formation of digital pedagogical competencies. These teachers are best at organizing communication with students in an online environment (1.09), experience in testing students in an online environment (1.03), and experience in implementing online courses (1.24). Other knowledge and skills are expressed at the level above the average and average level. The weak side of these teachers is the lack of knowledge in the field of information security (-.25).

Fifth group of teachers (14% of the total sample size) is teachers with a high level of formation of digital pedagogical competencies. Almost all knowledge and skills are formed at a high level. Experience in using graphic material in the process of lectures and practical classes in an online environment (1.98), experience in using techniques and means of increasing the cognitive interest and activity of students in the process of distance learning (1.86), knowledge of the possibilities of organizing an individual approach to students in a distance learning environment (1.84) are the skills that are best formed. These teachers successfully use digital technologies in the educational process.

Significant differences were highlighted in the formation of competence in the field of experience in the development and implementation of distance learning between physical education teachers with different teaching experience (U=444; p=.000). It was found that teachers with work experience from 20 to 30 years (average rank is 30.58) have a higher level of formation of this competence, in contrast to teachers with work experience from 8 to 19 years (average rank is 10.83Perhaps this is due to the fact that the introduction of distance learning in the teaching of physical education began only in February 2020 with the onset of the COVID-19 pandemic. Teachers who have more experience were more motivated in this situation. Conducting a small clarifying survey with these teachers allowed us to identify options for explaining the following results: "fear of losing a job", "ashamed to lag behind young people", "habit of working continuously and responsibly". Thus, the main motives for more experienced teachers to master and use digital technologies are competition with younger employees and the desire to keep jobs.

Thus, as a result of this study, four types of digital pedagogical competencies were identified that are significant for physical education teachers; identified five groups of teachers with different levels of formation of these competencies; a comparative analysis of the formation of knowledge and skills in the field of digital technologies among teachers with different work experience was carried out.

Conclusions

It was found that four types of digital pedagogical competencies are characteristic of physical education teachers: competence in the use of digital technologies in organizing communication with students, competence in the development and implementation of distance learning, competence in the creation of technically complex content, competence in the field of information retrieval. There are teachers with a low and below average level of formation of these competencies, despite the prevalence of the middle level. So a significant part of teachers have difficulties in the situation of the need to develop technically complex content (videos, tests), as well as the organization of communication with students in a distance learning environment. The ability to using of information resources to search for information and knowledge in the field of information security are the best formed.

Five groups of teachers with different levels of formation of digital pedagogical competencies were identified: 1 - teachers with a low level of formation of digital pedagogical competencies; 2 - teachers who do not have distance learning experience, but have moderately developed competencies;

3 - teachers with an average level of digital pedagogical competence formation; 4 - teachers with a higher than average level of formation of digital pedagogical competencies; 5 - teachers with a high level of digital pedagogical competence formation.

It was revealed that teachers with work experience from 20 to 30 years have more experience in the development and implementation of distance learning compared to teachers with work experience from 8 to 19 years.

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UNIVERSITY LECTURERS' VIEWS ON DISTANCE EDUCATION DURING THE COVID-19 PANDEMIC: UKRAINIAN-LATVIAN COMPARATIVE STUDIES

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Abstract. *The main purpose of the study was to compare and contrast Ukrainian and Latvian university lecturers' views on distance education (teaching and learning) caused by the sudden interruption of the face-to face instruction due to the COVID-19 pandemic. The study was also targeted at investigating university lecturers' readiness to respond to the educational challenges during the pandemic. The international team of researchers set up a web-based questionnaire aimed at self-assessing Ukrainian and Latvian university lecturers' digital literacy knowledge and skills and finding out their attitudes towards current educational changes. Having absolutely identical content the web-based questionnaire was presented in the Ukrainian, Latvian and English languages. The research sample which was selected with the use of a voluntary response sampling technique consisted of 60 university lecturers from Kyiv National University of Technologies and Design (Kyiv, Ukraine), Taras Shevchenko National University of Kyiv (Kyiv, Ukraine), National Aviation University (Kyiv, Ukraine), Rezekne Academy of Technologies (Rezekne, Latvia). Qualitative data analysis covered a conscientious summing-up of the information received, displaying the processed data in the form of tables and pie charts, comparing and generalizing the data received in Ukraine and Latvia, discussing the obtained findings and making logical conclusions how to cope with educational challenges.*
Keywords: *distance teaching and learning, educational challenges caused by the COVID-19 pandemic, face-to-face instruction, higher education institutions, Latvia, Ukraine, university lecturers, university lecturers' digital literacy.*

Introduction

Conditions of life in today's globalized society distinguished by rapid development of science and technology make high demands on professional training of future specialists of different spheres who will serve their country

and the worldwide community as a whole. Around the globe, higher education is aimed at fulfilling the educational needs of new entrants into the labour market and providing them with professional skills and expertise and developing key competences for lifelong learning. To achieve these goals higher education institutions along with degree programs that require traditional face-to-face instruction offer a great variety of distance degree programs that enable students to study online at a pace that can fit their lifestyle. With the rise of information technologies, more and more scholars and practitioners are considering distance education as an effective means that brings about new teaching and learning opportunities for both university lecturers and students (Bozkurt et al., 2015; Leontyeva, 2018; Malykhin, Aristova & Dybkova, 2019; Malykhin et al., 2020; Malykhin, Aristova & Kovalchuk, 2019; Saba, 2000). Thus, V. Arkorful and N. Abaidoo believe that one of the key advantages of distance education is that "it makes use of technological tools to enable learners study anytime and anywhere" (2015, p. 403). According to M. Sadeghi, distance education "might not be the best choice for every student seeking to pursue a college degree or university program but the list of advantages seems to outweigh the list of disadvantages" (Sadeghi, 2019, p. 83). The similar idea can be seen very clearly in the works by M. Bušelić (2012), M. Farajollahi et al. (2010), E. Murphy & M. Rodríguez-Manzanares (2012). M. Bušelić believes that being used for a variety of purposes, distance education "offers a myriad of advantages which can be evaluated by technical, social and economic criteria" (Bušelić, 2012, p. 25). Moreover, regarding distance education as "a contributing force to social and economic development" (Bušelić, 2012, p. 25), M. Bušelić thinks that it is "an essential part of the mainstream of educational systems in both developed and developing countries" (Bušelić, 2012, p. 25). The researcher also associates distance education with "a field of education that focuses on teaching methods and technology with the aim of delivering teaching, often on an individual basis, to students who are not physically present in a traditional educational setting such as a classroom" (Bušelić, 2012, p. 24).

The COVID-19 pandemic has dramatically altered the accustomed assumption about provision of educational services and organization of educational process in higher education institutions worldwide. After the introduction of physical-distancing measures, including closing academic institutions, universities had to respond quickly and the full transition to distance teaching and learning seemed to be the only solution at that time. But as time went on, distance education, such as it was, proved incapable of replacing face-to-face instruction completely and, what is more, of equipping future entrants into the labour market with a full range of key competences for lifelong learning, professional skills and expertise they need to adapt quickly to new working environment and to impact their performance in the workplace.

It should be also noted that despite the fact that distance education has its indisputable advantages in comparison with other ways of innovative teaching and learning, much remains to be reevaluated and taken into account to bring the training in higher education institutions into line with new realities of life caused by the COVID-19 pandemic. In this respect, international collaborative studies can be of invaluable assistance in this process (Blayone et al., 2020; Mykhailenko et al., 2020; Žogla, Ušča, & Mykhailenko, 2020). This reflects the fact that despite the general trend towards implementing distance education for training students of different specialties, each country can offer its own positive initiatives since it faces diverse challenges and finds its own solutions, corresponding to its economic development. The analysis, comparison and generalization of educational experience in dealing with educational consequences of the COVID-19 pandemic already gained by Ukrainian and Latvian university lecturers could become invaluable for overcoming existing problems and emphasizing the directions necessary for further improvement of educational process in higher education institutions, enhancement of educational services delivery and, what is more important, formation of completely new skills connected with distant teaching and learning among university lecturers, development of their professional, pedagogical and digital culture and competence. In this regard, the main purpose of the study was to compare and contrast Ukrainian and Latvian university lecturers' views on distance teaching and learning caused by the sudden interruption of the face-to face instruction and the closure of higher education institutions due to the COVID-19 pandemic, on the one hand, and on their readiness to respond to the educational challenges during the pandemic, on the other.

Research Methodology
Research Sample

Subjects of the study were Ukrainian and Latvian university lecturers. The research sample was selected with the use of a voluntary response sampling technique and contained 60 university lecturers from Ukrainian and Latvian higher education institutions. The Ukrainian study sample consisted of 34 university lecturers from Kyiv National University of Technologies and Design (Kyiv, Ukraine), Taras Shevchenko National University of Kyiv (Kyiv, Ukraine) and National Aviation University (Kyiv, Ukraine). The Latvian study sample contained 26 university lecturers from Rezekne Academy of Technologies (Rezekne, Latvia). The survey was carried out in September-November 2020.

Instrument and Procedure

Data collection instrument included a web-based questionnaire developed by the international team of researchers from Ukraine and Latvia using Google Forms. The main purpose of developing the web-based questionnaire was to collect and compare information concerning main educational challenges university lecturers face in two countries, namely Ukraine and Latvia. The web-based questionnaire containing five obligatory questions was developed in three languages, namely Ukrainian, Latvian and English. Five obligatory questions were aimed at finding out Ukrainian and Latvian university lecturers' attitudes towards educational changes occurred as a result of the transition of the face-to-face learning in the distance learning format as well as assessing their digital knowledge and skills. For the main purpose of our study we considered the following questions:

1. *Can you list what has changed for worse with the sudden and unpredicted interruption of the face-to face instruction and the closure of universities due to the COVID-19 pandemic?*
2. *Can you offer your own hierarchy of problems and difficulties caused by the COVID-19 pandemic that are hard to overcome now and in the nearest future (from the most serious to less serious)?*
3. *Can you list what has changed for better with the sudden and unpredicted interruption of the face-to face instruction and the closure of universities due to the COVID-19 pandemic?*
4. *Can you hierarchize positive changes connected with transition of the face-to-face instruction in the distance learning format that have already happened in your life?*
5. *What is your attitude towards distance teaching and learning caused by unpredicted global changes including the COVID-19 pandemic?*

Moreover, since we were interested in reaching objective and reliable conclusions we included four questions concerning demographic information of Ukrainian and Latvian lecturers. The demographic distribution of Ukrainian and Latvian research samples is presented in Table 1.

*Table 1 **Ukrainian and Latvian Samples Demographics***

Variable			Ukrainian sample demographics (N=34)		Latvian sample demographics (N=26)	
			N	%	N	%
Gender		Male	7	20.59	3	11.54
		Female	27	79.41	23	88.46
Position		Lecturer	6	17.65	20	76.92
		Senior lecturer	4	11.76	0	0.00
		Associate professor	20	58.82	3	11.54
		Professor	3	8.82	3	11.54
		Department head	1	2.94	0	0.00
Working Experience		<3	4	11.76	0	0.00
		from 3 to 10	5	14.71	7	26.92
		from 10 to 20	16	47.06	15	57.69
		>20	9	26.47	4	15.38
Scientific Degree		Master of Arts (Master of Science)	8	23.53	6	23.08
		Ph.D (Candidate of Sciences)	21	61.76	20	76.92
		Doctor of Sciences	5	14.71	0	0.00

Source: own study
N=60

Data Analysis

Qualitative data analysis covered a conscientious summing-up of the information received, displaying the processed data in the form of pie charts, comparing and generalizing the data received in Ukraine and Latvia, discussing and sharing findings with academic community.

Results and Discussion

The main aim of the first question was to find out what, in university lecturers' opinion, changed for worse with the sudden and unpredicted interruption of the face-to face instruction and the closure of universities due to the COVID-19 pandemic. The obtained findings showed that despite a large body of theory and practice regarding distance teaching and learning (Arkorful, & Abaidoo, 2015; Bozkurt et al., 2015; Farajollahi, 2010; Leontyeva, 2018; Murphy & Rodríguez-Manzanares, 2012; Saba, 2000; Sadeghi, 2019), in real circumstances of transition to distance education many negative educational changes occurred. We allege from the results obtained that all the negative educational challenges which cause a serious concern for Ukrainian and Latvian university lecturers were almost identical. The main difference was the extent of

their influence over their professional responsibilities. Table 2 demonstrates major negative educational changes caused by the COVID-19 pandemic in Latvian university lecturers' opinion.

Table 2 **Major Negative Educational Changes Caused by the COVID-19 Pandemic in Latvian University Lecturers' Opinion**

A list of things that changed for worse	N	%
The increase in workload	24	92.31
Students' inability to fully acquire practical skills	21	80.77
The increase of various bureaucratic online-meetings and in the number of documents	20	76.92
The reduced quality of educational process	17	65.38
Irregular working hours	15	57.69
The lack of emotional contact with students	12	16.15
The decrease in face-to-face interaction	11	42.31
Lack of students' confidence to reach the expected outcomes	8	30.77
Difficulties in using individual approach, especially in creative/research work	4	15.38
Difficulties in using complex programs typically unavailable on students' personal computers	3	11.54

Source: own study (N=26)

Table 3 shows the Ukrainian university lecturers' opinion on negative educational changes caused by the COVID-19 pandemic.

Table 3 **Negative Educational Changes Caused by the COVID-19 Pandemic in Ukrainian University Lecturers' Opinion**

A list of things that changed for worse	N	%
University lecturers' and students' inadequate technical capabilities (the lack of high-speed Internet and poor quality of free software)	27	79.41
The lack of proper digital knowledge and skills to work remotely	25	73.53
The increase in workload	24	70.59
The low level of digital competence (among both students and university teachers)	22	64.71
Overwhelming emotional and/or psychological pressure	21	61.76
Students' inability to work independently	20	58.82
The lack of emotional contact with students (it is difficult to understand what students understand from the content and what not)	19	55.88
The reduced quality of educational process	16	47.06
The decrease in face-to-face interaction	14	41.18
Poor technical, organizational and content support of university's digital teaching and learning environment	12	35.29

Source: own study (N=34)

Table 4 indicates the Ukrainian and Latvian university lecturers' responses concerning the hierarchy of problems and difficulties that were hard to overcome rapidly (from the most serious to less serious) after the introduction of physical-distancing measures.

Table 4 **The Hierarchy of Problems and Difficulties Caused by the COVID-19 Pandemic According to Ukrainian and Latvian University Lecturers**

Latvian university lecturers' responses			Ukrainian university lecturers' responses		
Identified problems and difficulties	**N**	**%**	**Identified problems and difficulties**	**N**	**%**
Delivery of educational content to students remotely	22	84.62	Internet connection problems	27	79.41
Low level of digital competence	19	73.08	Increase in workload (Much time spent on making online lectures and training courses)	24	70.59
Organization of active learning	14	53.85	Insufficient level of own digital competence	23	67.65
Inability to apply appropriate teaching methods digitally	14	53.85	Lack of previous experience to deliver educational content to students in distance-learning format	22	64.71
Lack of a single platform (Team, Moodle, Luis are used)	13	50.00	Absence of standard requirements to regulate working hours	20	58.82
Internet connection problems	12	46.15	Inability to organize effective interaction between students in distance format	17	50.00
Insufficient level of students' digital competence	11	42.31	A wide range of telecommunications applications to work with	14	41.18
Failure to use licensed programs intended for the study process (SPSS, COREL, etc.) at home	10	38.46	High rates of procrastination among students	13	38.24
Copyright issues	9	34.62	Lack of social interaction between colleagues	12	35.29
Technical support of students	9	34.62	Insufficient level of students' digital competence	11	32.35

Source: own study (N=60)

As we can see main problems and difficulties Ukrainian and Latvian university had to face after the transition of face-to-face instruction into the distance learning format were rather identical. Thus, according to 79.41% of

Ukrainian respondents, the main problem caused by the COVID-19 pandemic, was the poor Internet connection which made it almost impossible to deliver learning material effectively. 70.59% of Ukrainian respondents and 46.15% of Latvian respondents considered the increase in workload as one of the main challenges caused by the COVID-19 pandemic. Naming this problem, some Ukrainian respondents (58.82%) explained that they associated the increase in workload with the lack of standards, rules and legal documentations that regulate their working hours both at the national and institutional levels. That affected the time they spent on making online lectures and training courses, grading papers, checking homework etc. It should be also noted that for 67.65% of Ukrainian respondents and 73.08% of Latvian respondents the main problem in delivering learning material was the insufficient level of their digital competence. What is more, 64.71% of Ukrainian respondents and 53.85% of Latvian respondents noted that the lack of previous experience to deliver educational content to students in distance-learning format made it almost impossible to apply appropriate teaching methods digitally and it took time to develop the necessary digital skills. 41.18% of Ukrainian respondents noted that the main problem they faced was a wide range of telecommunications applications to work with and that they had to use several telecommunications apps working with different groups of students while the necessity to use various platforms to deliver educational material was of a major concern for many Latvian university lecturers (50.00%). The main difficulty of working in the distance learning format for 38.24% of Ukrainian respondents was high rates of procrastination among students which negatively affect their performance level. 35.29% of Ukrainian respondents indicated that the main difficulty was connected with the lack of social interaction between colleagues. 32.25% of Ukrainian respondents and 42.31% of Latvian respondents found the insufficient level of students' digital competence the worst problem they faced.

Tables 5 presents the Ukrainian university lecturers' responses concerning positive changes connected with the transition of the face-to-face instruction in the distance learning format due to the COVID-19 pandemic.

*Table 5 **Ukrainian University Lecturers' Responses Concerning Positive Changes Amid Covid-19 Pandemic***

Ukrainian respondents' responses	N
Opportunity to gain completely new experience	22
Opportunity to improve digital skills	19
Saving money	16
No commuting	15
No positive changes	8

Source: own study (N=34)

Tables 6 presents the Latvian university lecturers' responses concerning positive changes connected with the transition of the face-to-face instruction in the distance learning format due to the COVID-19 pandemic.

Table 6 **Latvian University Lecturers' Responses Concerning Positive Changes Amid Covid-19 Pandemic**

Latvian respondents' responses	N
Improved digital skills	25
The pandemic made it possible to see more clearly the strengths and weaknesses of education	16
Opportunity not to spend time for changing places in order to participate in various events immediately switching from one to another	14
Encouragement to improve personal professional activity, learn new teaching and learning methods	13
Beginning of technological revolution	12
Interesting experience for both lecturers and students	11

Source: own study (N=26)

According to the obtained results, among the positive changes caused by the introduction of physical-distancing measures, Ukrainian respondents noted the opportunity to gain completely new experience (64.71%), to improve digital skills (55.88%), to save money (47.06%) and not to commute to work (44.12%). 23.53% of Ukrainian respondents did not see any positive changes from imposing measures, including closing higher education institutions. As for Latvian respondents, the most important positive change was connected with the opportunity to improve their digital skills (96.15%). For 61.54% of Latvian respondents the transition of face-to-face instruction to distance teaching and learning made it possible to see more clearly the strengths and weaknesses of education. 53.85% of Latvian respondents regarded compulsory measures connected the implementation of distance education and the provision of various meetings, seminars and workshops online with the opportunity not to spend time for changing places in order to participate in various events and 50.00% of them regarded these measures as a kind of encouragement to improve personal professional activity and to learn new teaching and learning methods. 46.15% of Latvian respondents believed that the full transition to distance education marked the beginning of a technological revolution that had been planned for a long time but could not be started for many objective reasons. 42.31% of Latvian respondents replied that the replacement of face-to-face instruction by online one became interesting experience for both lecturers and students.

The last question was aimed at figuring out university lecturers' attitude towards distance teaching and learning caused by unpredicted global changes

including the COVID-19 pandemic. The survey results indicate that the number of Ukrainian university lecturers who showed either a positive or a negative attitude towards distance teaching and learning caused by unpredicted global changes including the COVID-19 pandemic was equally divided whereas the Latvian respondents' responses were slightly different. Thus, the positive attitude was shown by eleven Ukrainian university lecturers (32.35%). The same number of Ukrainian university lecturers (32.35%) expressed the negative attitude towards distance learning and teaching. Twelve Ukrainian university lecturers (35.30%) found it difficult to answer the question (Fig.1).
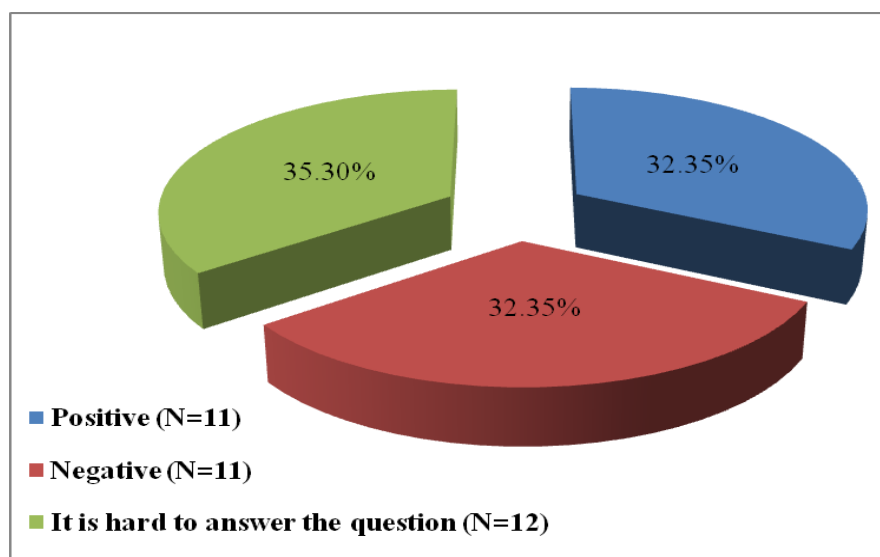
Figure 1 **Ukrainian University Lecturers' Attitude towards Distance Education Caused by the Covid-19 Pandemic**
Source: own elaboration on the basis of data obtained during research

As for Latvian university lecturers, five of them (19.23%) demonstrated a positive attitude towards distance teaching and learning while negative attitude was expressed by four university lecturers (15.38%). What was quite unexpected was that seventeen Latvian university lecturers (65.39%) found it difficult to answer this question (Fig.2). Thus, basing on the results obtained we can assume that the Ukrainian university lecturers were more categorical in their judgments concerning the full transition to distance education. According to responses to the Web-questionnaire, we attribute it mainly to technical and material ability of higher education institutions to provide efficient and uninterrupted educational services to students during the COVID-19 pandemic, the level of university teachers' and students' digital competence, their material well-being and a significant increase in the workload.
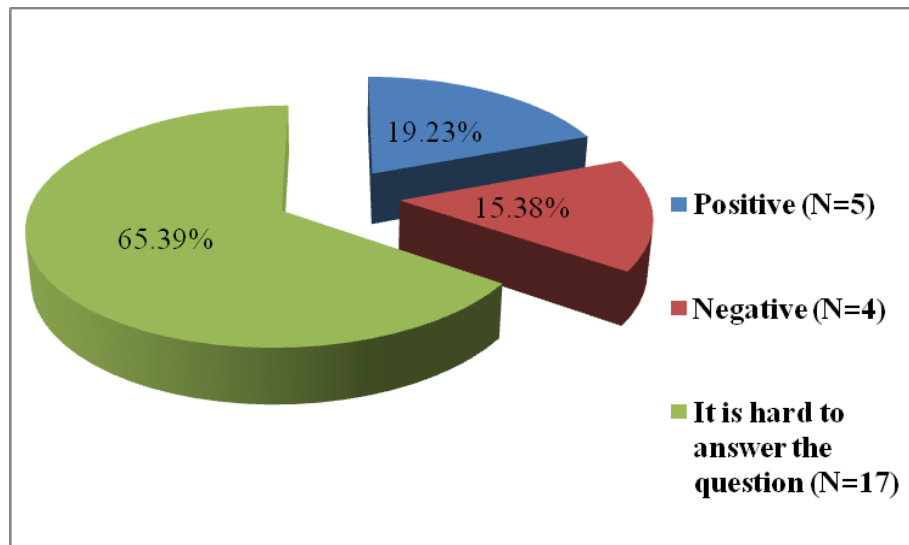
Figure 2 **Latvian University Lecturers' Attitude towards Distance Education Caused by the Covid-19 Pandemic**
Source: own elaboration on the basis of data obtained during research

Conclusions

In conclusion, we should note that despite the considerable experience already gained in the field of using open educational resources and telecommunications applications for online and offline educational content delivery, world community first confronted the closures of higher education institutions and the replacement of face-to-face instruction with distance education. The conducted Ukrainian-Latvian studies have revealed many problems and difficulties in relation to distance teaching and learning caused by the COVID-19 pandemic. We can assume that the problems and difficulties Ukrainian and Latvian university lecturers faced could be divided into two groups, namely, internal and external. The group of internal problems and difficulties included the insufficient level of digital competence of both students and lecturers; the inability to apply appropriate teaching methods digitally, to organize active learning online effectively and to work using different online platforms, lack of social interaction between colleagues, high rates of procrastination among students etc. Taking into account the obtained results, we can conclude that once the internal problems and difficulties were understood, both Ukrainian and Latvian university lecturers took all steps to solve them independently. Unlike internal problems and difficulties, external ones could not be solved by university lecturers or students alone. Special actions were required (and are still required) at the international, national and institutional levels to help university lecturers deal with the identified problems effectively. This

group included the problems connected with the poor Internet connectivity, absence of standard requirements to regulate working hours at the international and national levels, comprehensive technical support of both teachers and students, failure to use licensed programs intended for the study process (SPSS, COREL, etc.) at home, copyright issues etc. But, to sum up, we should note that having to adapt quickly to entirely new online modes of delivery of educational material by means of the Internet and different telecommunications applications and taking all steps to improve the level of their digital competence university lecturers in Ukraine and Latvia demonstrated full readiness and willingness to fight the identified negative educational challenges caused by the Covid-19 pandemic and to improve their professional skills and expertise.

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TEACHER – STUDENT COMMUNICATION FROM PARENTS' PERSPECTIVE DURING ONLINE TEACHING IN THE TIME OF CORONA CRISIS

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Abstract. COVID-19 virus, still relatively unknown to the general public, has taken over the world. The period of the coronavirus epidemic has affected all segments of life, including the education system. The traditional way of teaching (face to face) has been replaced by online teaching and a virtual environment through the mediation of information and communication technologies. The aim of this research is to gain insight into parents 'perceptions of teacher-student communication during online teaching in the time of corona crisis. Fifteen parents of lower primary school students participated in the research. A semi-structured interview was used for data collection purposes. Participants' statements indicate that during online teaching students most often communicated with their teachers via e-mail, WhatsApp, Zoom, Google Classroom, and Teams. As one of the biggest advantages of communication during online teaching, participants stated the improvement of their children's digital competencies and introduction to various communication tools, while they said that the biggest disadvantage were technical difficulties. In order to improve communication between teachers and students during online classes, participants suggested that teachers use videoconferencing more often in their teaching and organize various discussions in virtual classrooms and online forums.
Keywords: communication, corona crisis, online teaching, parents, students.

Introduction

The pandemic caused by the COVID-19 virus has affected all aspects of life, including the education system. In order to control the spread of the pandemic, the Ministry of Science and Education of the Republic of Croatia issued a decision to close schools and the lives of adults and children have undergone significant changes. Teachers abandoned the usual methodological patterns of teaching and "moved" into a virtual environment while students followed classes online in their new virtual classrooms. The online form of teaching is a complex metacognitive and methodological - pedagogical process which, with its form and organization, clearly directs students towards achieving educational outcomes. Because of this specific virtual environment, it is especially important to establish two-way, productive and quality communication between the participants in the educational process, because such communication is a prerequisite for achieving educational

outcomes. In the theoretical framework of this paper, communication features of online teaching will be presented and the pedagogical-methodical model of istance learning will be explained. The empirical research is focused on parents' experiences of communication between teachers and students during online teaching in the time of corona crisis.

Distance Learning

Distance learning is often identified with e-learning and computers, but it is important to note that distance learning appeared even before the first computers. The United States Distance Learning Association defines distance learning as the process of acquiring knowledge, skills and abilities through the provided instructions and information using various technological devices, i.e. the system and process of connecting students with distributed educational resources. Correspondence learning was initially associated with the postal system (1728) and was primarily intended for those who could not systematically follow classes and other courses (Sherry, 1996). Correspondence education is considered to be the first original form of distance learning. The beginnings of distance learning were characterised by sending books and other learning materials (audiocassettes, videotapes, CD-ROMs) with detailed instructions for self-study (Mayer, 2003). In distance learning educational outcomes can also be achieved through courses in which lectures are live-streamed via radio or television or through recorded materials (Savić, 2006). At the end of the 20th century distance learning has been enriched with computers that have greatly facilitated the evaluation of students' work and enabled faster feedback (Matijević & Radovanović, 2011). Such technological advances in distance learning have enabled learning through teleconferencing, i.e. video conferencing that creates the illusion of a real class by participating in discussions and sharing learning materials between students (Radosav, 2005). Although the advent of computers has greatly facilitated online teaching and enabled two-way communication, today we are facing other problems during its implementation. Authors Jokić and Ristić-Dedić (2020) conducted a research on the experiences and satisfaction with online teaching of 7th grade students. The research conducted by the Institute for Social Research in Zagreb included 23 (randomly selected) primary schools in the City of Zagreb, i.e. 923 students. The research results indicate that the average grade for online teaching is 3.14 (on a scale from 1 to 5), with the dominant attitude being that students are "neither satisfied nor dissatisfied" with online teaching. As many as 71% of students believe that they are overwhelmed with this form of teaching, but the research finds that 88% of students agree with the statement that they use digital devices with ease, of which 61.5% completely agree. Online teaching takes place in a more complex environment than the classic form of teaching. In order

for a student to be productive and successfully respond to the demands of online teaching, it is important to manage three main (perception, emotions, self-regulation) and nine specific personal and practical skills and abilities: self-awareness, internet skills, motivation, beliefs, anxiety, self-perception, concentration and time management (Meng Jung, 2009). We can conclude that these skills and abilities are developmental and are developed through experience, so teachers should certainly adjust their expectations and be more flexible during online classes. It is extremely important to keep in mind that students are in a developmental phase in which it is necessary to encourage the development of these skills and accordingly adjust some educational requirements of online teaching (Monavar Yazdi & Zandkarimi, 2013).

Terminological Definition of E – learning

Electronic learning during the teaching process presupposes the implementation of information and communication technology, i.e. learning contents are supported by strategically designed computer applications (Kovačević, 2016). The challenges of modern society and technological development have encouraged the use of digital platforms in the education system. Relying on the Recommendations of the European Parliament for lifelong learning (2006), the learning competence as one of the basic competences is inseparable from the digital competence. In modern society, digital media have an equally important role in the learning process as once had the only medium, except for teachers, and that is a textbook in the book form (Matijević & Topolovčan, 2017). The two basic types of e-learning are a computer-assisted learning process and web-based learning. Computer-assisted learning implies an individual form of learning in which an individual uses certain learning programs with the help of the media and computers. Web-based learning refers to various online ways of learning such as forums, webinars, virtual lectures and the like. This form of learning involves learning in a virtual learning environment (VLE) and relies on interactive information systems and other users (Piskurich, 2003). If we look at the process of e-learning development throughout history, we notice that analogue media such as television, radio, gramophone and film projector prevailed, while today we are seeing digital devices such as computers and mobile devices. It is important to note that new technologies complement the old ones, put them in a new form and new format and they do not contradict, but complement each other (Macdonald, 2008). By analysing the recent literature, we can conclude that there are numerous controversies about the advantages and disadvantages of e-learning. Some authors state that the biggest advantage of e-learning is the independence of the place and time of teaching as well as personalization when creating teaching content and its availability. Furthermore,

they mention efficiency as an advantage because the teaching contents can be reproduced several times and also the dynamism of the teaching process. On the other hand, a significant disadvantage of e-learning is the need to have equipment and access to Internet websites as well as social isolation that can lead to a lack of motivation to learn. Furthermore, the successful implementation of e-learning significantly depends on the motivation and knowledge of teachers regarding the didactic design of media teaching content (Jukić, 2017).

Synchronous and Asynchronous E-learning

Depending on the time and place of the e-learning process, it can be synchronous and asynchronous. Synchronous learning takes place in real time with the possibility of simultaneous interaction between students and teachers. In synchronous learning, students sign in using the learning program or the website at a specific time in which classes are scheduled to begin. Thanks to computer programs and network connection, synchronous learning is characterized by two-way communication in which students can ask questions to their teacher, but they can also participate in discussions. Asynchronous learning involves using content when it suits users most. It is not controlled by time, place, or cooperation (Macdonald, 2008). Considering the possibilities and limitations of e-learning, we can conclude that e-learning takes part in building a culture of critical thinking and research and opens the way for creativity in the teaching process. Also, knowing the methodological and didactic possibilities of information and communication technology in the teaching process, it is important to emphasize that they must not endanger the originality of teaching and interaction between its participants (Mušanović, 2000).

Communication during Online Teaching

Communication as the key to education is the foundation of successful teaching and all interpersonal relationships. Due to its complexity, it is impossible to unambiguously define communication. Authors Jukić and Nadrljanski (2015) define communication as a complex human activity that is the basis of human action and involves the exchange of messages between one or more persons as a basic human need. If we look at modern teaching as an interactive process, we conclude that communication skills are key to achieving the desired educational outcomes. The National Framework Curriculum (2011) emphasizes social competence as a prerequisite for lifelong learning to which modern education aspires. Communication during online teaching is especially challenging for both

teachers and students. The authors Smith, Ferguson and Caris (2002) conducted a study examining communication features of online teaching and traditional teaching from the perspective of teachers (N=21). All interviewed teachers worked in both teaching models, so it was easier to compare specificities. The results showed that online teaching required more work from teachers regarding the preparation of lessons, but also the way they taught those lessons. The authors explain these results by the fact that all teaching content must be prepared and available in writing form, and the teacher is required to systematically check students' work, evaluate it and be constantly present in order to answer questions and resolve ambiguities. Also, teachers pointed out that it was especially difficult for them to communicate with students because they had to try hard to work effectively without the possibility of control the class with direct eye contact. On the other hand, they saw many advantages of this form of teaching. Teachers noticed that students were more active in organized written discussions than in the classical form of teaching because they were not limited by time or space. The authors point out that this form of communication and work gives students a sense of freedom from authority and pressure from teachers. Scientists point out that face-to-face communication is easier and much more rewarding for teachers than communication during online teaching. In the classroom, the teacher is an inexhaustible source of information while in a virtual environment such communication is often limited (Woods, 2002). The authors emphasize that it is crucial that teachers find the communication channel that best suits their students during online lessons in order to create a comfortable and motivating atmosphere in which each student will succeed (Coppola, Hiltz & Rotter, 2002). Furthermore, the virtual environment requires teachers to step out of their comfort zone of communication and learn new communication tools to make students in the virtual classroom feel welcomed, safe and successful (Grant & Thornton, 2007). During the teaching in a virtual environment, it is especially important that the teacher is the initiator and organizer of various discussions in educational forums in order to further connect students. The authors point out that it is important to create a communication network in order to achieve the best possible learning goals (Palloff and Pratt, 2005). Twenty years ago, the authors Matijević, Rijavec and Drandić (1997) pointed out that research that dealt with communication during distance education often indicates the problem of "personal isolation" of participants during autodidactic activities. The authors Buza and Hysa (2020) investigated what communication tools high school teachers used to enhance school-family collaboration during the corona crisis. Research has shown that teachers have used different forms of indirect communication using Viber, Zoom and the phone. Research by Bhamani et al. (2020) conducted a survey on a sample of 19 parents about online teaching experiences during corona crisis. Research has shown that some Pakistani schools have skillfully communicated with parents

via Viber, WhatsApp and other platforms while some mothers have created Facebook pages to make it easier to communicate with other parents. Teachers organized classes using the Zoom platform or Google Classroom, and students were very successful in taking notes during online classes.

Research Methodology

The aim of this research is to gain insight into parents' perceptions of teacher-student communication during online teaching in the time of corona crisis. In line with that objective, the following research questions were asked:

1. Which communication channels did teachers most often use in communicating with their students during online classes?
2. What advantages and disadvantages do parents notice regarding communication between teachers and students during online classes?
3. What are parents' suggestions for improving communication between teachers and students during online classes?

Fifteen parents of lower primary school children from the city of Zagreb participated in the research. Each of the mentioned families has at least one personal computer at home. A non-probability snowball sampling technique was used. Three randomly selected primary schools were included in the research. Each school is equipped with an ICT classroom and has a single computer in all other classrooms. The research was conducted in November 2020 and March 2021. The research referred to the implementation of online classes in the period from March 16, 2020 to April 25, 2020. For the purpose of data collection, a semi-structured interview method was used, which consisted of ten open-ended questions. An individual interview with each of the fifteen participants was conducted and they were recorded with a Dictaphone with the prior mentioned participants' written consent. Each interview required preparing the interviewer and informing the participants about the aim and purpose of the research, their anonymity, and the possibility of giving up at any time. The qualitative data analysis was performed by coding in the *NVivo* program, and the results were presented by descriptive method.

Results and Discussion

After the author had coded the data, they were classified into the following topics: Communication channels in communication between teachers and students during online teaching, Advantages and disadvantages of communication in a virtual environment, Parents' suggestions for improvement of communication during online teaching.

Topic: Communication channels in communication between teachers and students during online teaching.

Participants cite email, WhatsApp, Zoom, Google Classroom and Teams as the most common communication channels used by teachers to communicate with their students. These statements are confirmed by the NCVVO – National Centre for External Evaluation of Education (2020) survey on a sample of (N = 13,099) Croatian high school graduates which showed that they communicated most with teachers using e-mail, WhatsApp, Zoom and Teams.

One participant pointed out that his son communicated with the teacher exclusively via e-mail and expressed dissatisfaction with this form of communication, emphasizing that the teacher seemed distant and indifferent. This is his statement:

"In such a difficult situation, especially for children, I expected more understanding from the teacher. It would help my son a lot. I often had the impression that the teacher was cold and distant, as if she was not particularly interested in this form of teaching."

Such a statement should not be surprising. Teachers who communicate with their students via e-mail during online classes should have good communication skills, but they should also be cautious. A short e-mail, with very few instructions on how to do assignments, can be interpreted by the student as a teacher's lack of interest for his or her work (Coppola, Hiltz & Rotter, 2002).

Participants especially praised the teachers who organized virtual classroom meetings on the Zoom platform. Here are some of the statements:

"My daughter was jumping with joy around the apartment hearing that she was going to have a virtual homeroom class. That really helped her. I will never forget the look of her face when she saw her classmates."

"A homeroom Zoom class is the best thing the teacher could think of. Everyone was excited, and the teacher listened to them patiently and dedicated his time to each child. They really needed it."

"A homeroom Zoom class was a real pleasure for the whole family."

One participant pointed out that his daughter was particularly enthusiastic when the teacher explained the new curriculum content via videoconference, but that happened very rarely.

"I was particularly impressed by this communication channel because I could see my daughter actively participating during online lessons, but also developing her digital competence."

This statement is related to Doggett's research (2008) which examined the satisfaction of students with online teaching via videoconference. It was found that 90% of the students were satisfied with the way the teacher gave the lecture, they felt as part of the teaching process and asked questions and participated as if they were physically present.

Topic: Advantages and disadvantages of communication in a virtual environment

Advantages:

Thirteen out of fifteen participants pointed out that the biggest advantage of communication during online teaching was that children had the opportunity to improve their digital competence and adopt rules of decent behavior in a virtual environment, but they could also become familiar with new communication tools. Here are some of the statements:

"I am glad that my daughter has learned the rules of polite communication in a virtual environment."

"My son was introduced to new teaching methods and communication tools, but also developed his digital competence."

These statements on how their children improved their digital competence while communicating with teachers during online classes are confirmed by the research of Jokić and Ristić-Dedić (2020) with seventh grade students (N = 923). 88% of them said that they considered themselves competent to use digital devices.

Disadvantages:

All participants stated that the biggest disadvantage of communication during online classes was the inability to read nonverbal cues of the participants and the lack of face-to-face communication.

"My son often pointed out that he lacked direct communication with his teacher, especially his body language which has a calming and motivating effect on him."

This statement can be based on the knowledge that it is through non-verbal communication that teachers draw attention to themselves and their subject of teaching, they motivate and direct students and thus they positively affect students' educational achievements (Najafi & Rahmanzade, 2013).

"Many times I have heard my daughter complain because she did not understand the new teaching contents due to the lack of direct communication with the teacher."

These statements are confirmed by the NCVVO (2020) survey on a sample (N = 13,099) of Croatian high school graduates. It was found that 90% of students had difficulty mastering the curriculum due to lack of direct communication with the teacher.

Six participants pointed out that their child had technical difficulties with the Internet connection during online classes. Here are some of the statements:

"My son would be very upset when the Internet connection broke."

"I remember my daughter crying because her Internet connection broke during the exam."

The NCVVO survey (2020) also indicated the occurrence of technical difficulties during online teaching. It was found that 60% of students, to a greater or lesser extent, had difficulties with the Internet. They also found that 35% of students do not have their own computer.

Topic: Parents' suggestions for improvement of communication during online teaching

Seven participants pointed out that, in order to improve communication during online lessons, it would be useful for teachers to use videoconferencing more often when teaching new content.

"I think that videoconferencing would be extremely useful in presenting new teaching content."

"I believe that videoconferencing could stimulate class discussion and thus make online teaching more interactive and dynamic."

The statements of how teachers rarely used videoconferencing during online classes are also confirmed by the NCVVO (2020) survey conducted on a sample (N = 25,000) of parents of fifth and seventh grade students. The results indicate that as many as 70% of students communicated with teachers only via smartphone apps and e-mail, while only 20% of parents claimed that teachers communicated directly with their children, for example by videoconference or via Skype.

Eight participants pointed out that communication between teachers and students could be improved if teachers organized various discussions in virtual classrooms and forums. They pointed out that they are aware that the forum is intended for older primary school students and that this form of asynchronous communication could suit students who express themselves better in writing.

"Forum discussions would also encourage shy and reserved students, like my daughters, to participate in the teaching process"

"If teachers used educational forum discussions, students could help each other with learning and homework difficulties."

These statements really deserve to be considered closely. Research by Ellis (2001) shows us that a forum is an excellent form of asynchronous communication during online teaching. It is suitable regarding the place and time of lessons and it is more appropriate for reserved students who can express themselves better this way. Furthermore, published messages remain stored and users can re-read them at any time. This communication tool gives students some time to think and compose a post. The teacher takes on the role of moderator and students are actively encouraged to research independently.

Conclusion

In scientific terms, the results presented here will contribute to a better understanding of the specific communication features of the virtual environment, but also of information and communication technologies in the teaching process. In terms of methodological limitations of this research, in the Republic of Croatia there is a very small number of previous online learning research, statistics and experiences of all those who share responsibility for the upbringing and education of children and youth. Furthermore, this research included only three primary schools and parents from urban areas, but the inclusion of primary schools and parents from rural areas would provide more relevant data and a broader picture regarding the advantages and limitations of online teaching. The specificity of urban and rural environment in terms of the employment rate of parents and the technical equipment of households would certainly affect the results of the research. This research will certainly serve as a basis for further research on the opportunities, challenges and shortcomings of the communication between teachers and students during online lessons. From the parents 'perspective, teachers most often communicated with students via email, WhatsApp, Zoom, Google Classroom and Teams, while only some teachers, but very rarely, used videoconferencing. As the biggest advantage of communication during online teaching, participants pointed out the opportunity that the children had to improve their digital competencies, to adopt rules of decent behavior in a virtual environment, but also to become familiar with new communication tools. As a key shortcoming, they stated the inability to read nonverbal cues, a lack of face-to-face communication, and technical difficulties with the Internet. Seven participants thought that communication between students and teachers would be more successful if teachers used videoconferencing more often in their teaching, while eight participants pointed out that communication between teachers and students could be improved if teachers organized various discussions in virtual classrooms and forums.

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TRANSITION TO ONLINE EDUCATION: RESEARCH OF VIDEO TEACHING CHALLENGES DURING COVID 19 PANDEMIC

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Abstract. *Since 2020 middle of March many universities transposed the study process to online environment. Kaunas University of Technology within two weeks completely transferred the study process to the online space also. The following tools Zoom, Big Blue Button, Adobe Connect, MS Teams, Loom, Web Meetings have been offered for working remotely.*
To reveal the learners' experience and evaluate the above-mentioned video conferencing technologies in the education process, the authors of this article conducted a case study involving 354 second-year students of the Faculty of Informatics. The case study was accomplished in June 2020, after the end of quarantine in our country.
The aim of the work was to reveal the learners' experience and summarize the results using different types of video conferencing systems.
The case study showed that the rapid transition to online form of education has been quite successful and that lessons learned can be used in the future in circumstances like COVID 19.
Keywords: *COVID 19, online education, video conferencing systems.*

Introduction

The COVID-19 pandemic has rapidly moved the educational process from traditional audiences to online. Such organization of education was the major change for the most students and educators. Although there should seem to have been no technology problems in the 21st century, as universities have been organizing distance learning for many years and were prepared for a variety of challenges, such abrupt changes made the situation much more difficult. It was difficult for educational institutions to move the whole study process to the online environment in a short time and start studies remotely.

The authors of the articles share their experiences of how their educational institutions have had to overcome these challenges. The authors of the article

(Lameski, P., Bidikov, V., Kjiroski, K., Jakimovski, B., Zdravevski, E., Chorbev, I., & Trajkovik, V., 2020) conducted a study based on a survey of students and teachers to find out the attitude towards online learning in classrooms and to learn good practices and solve the problems that have arisen. An article (Jayalath, C., Wickramasinghe, U., Kottage, H., & Somaratna, G., 2020)conducted a case study to identify the challenges of online education in a pandemic. The article (Basilaia, G., & Kvavadze, D., 2020) examines the ability of a country and its population to continue the educational process in the form of distance learning, reviews various available platforms that can be used for online education and face-to-face communication, and provides examples of their use. The authors of the article (Edelhauser, E., & Lupu-Dima, L., 2020) focused on distance learning hardware and software and attempted to review the impact of distance education on students. The article (Mulenga, E. M., & Marbán, J. M., 2020) seeks to answer the question of the impact that online learning has had on mathematics education. In the article. (Jena, 2020) describe distance learning tools and techniques that can ensure continuity of learning during a pandemic.

Since mid-March 2020, quarantine has been introduced in Lithuania. Measures have been taken to stop the outbreak of the virus, and many universities in the country have also moved the study process to the online space. Teaching and learning have shifted to distance learning. A study conducted in Lithuania (LMTP, 2020), already a few months after the start of the pandemic, showed that almost a third of educators had no experience working remotely before the pandemic, and work on organizing the teaching process remotely increased to 40 percent. The above study revealed that the following tools best met expectations in the distance learning process during quarantine: Moodle, Zoom, MS Teams, Google Aps.

Kaunas University of Technology within two weeks completely transferred the educational process to the online space also. The following tools *Zoom*, *Big Blue Butto*n, *Adobe Connect*, *MS Teams*, *Loom*, *Web Meetings* have been proposed for working remotely (KTU, 2020). As the live broadcasts of lectures (with or without recording) streaming tools *Zoom, Big Blue Button*, *MS Teams*, *Adobe Connect* and Loom were offered. *Zoom* and *Big Blue Button* platforms are integrated into Moodle. For direct counselling of individual students or groups and assessment of student works *Moodle chats* and *Web Meetings* tools were offered additionally.

The aim of the research was to reveal the learners' experience and to evaluate the above-mentioned video conferencing technologies in the learning process. The authors of this article conducted a case study involving about 350 second-year students of the Faculty of Informatics. The case study was accomplished in June 2020, after the end of quarantine in the country.

The next section present Gartner firm research of online videoconferencing platforms which enable virtual meeting scenarios according. The third section presents case study Kaunas University of Technology students experiences working with video conferencing technologies *Zoom, Big Blue Button, MS Teams*, outlines advantages and shortcomings that platforms. The findings of the case study are presented at the end.

Analysis of Online Videoconferencing Platforms

In the future, remote meeting IT solutions will grow as organizations increasingly adopt flexible working styles and cloud computing based services that allow the flexibilities.

Until 2024 teleworking and the changing demographics of the workforce will affect business meetings, with 74 per cent of companies planning to switch to videoconferencing permanently because of their experience through the forced isolation caused by COVID-19. All video conferencing systems will be based on Android or Windows devices, not traditional video devices (Fasciani, M., Eagle, T., Preset A., Doherty, B., 2020).

Gartner, the world's leading information technology research and advisory firm, rated information technologies sellers into 2020 Magic Quadrant for Meeting Solutions (Fasciani, M., Eagle, T., Preset A., Doherty, B., 2020). The survey helped uncover the vendors that best meet their needs for digital workplace platforms.

Gartner firm divided all sellers into four parts: *Leaders*, *Challengers*, *Visionaries* and *Niche Players*. The firm evaluated the software developers or companies based on criteria: the formation of a clear vision and the ability to implement it. These skills determine in which square the company occupies its position.

Leaders make a big impact in the market by being able to respond to customer needs. Leaders offer solutions for meetings with a wide variety of functions to ensure a variety of meeting scenarios, offer a large database, flexible financial solutions, and good supply. Leaders work great and they are promising.

Challengers are described by good reputation and prompt decisions in the meeting market. When compared to Leaders and Visionaries, their decisions may lack the same pace of innovation and collaborative functions to meet the full potential of meetings. They may lack an appropriate licensing model to meet market requirements.

Visionaries can deliver innovative software products that solve customer problems, but they have not yet developed a large installed base or large enough finances, so they are at risk of financial difficulties, problems selling or supporting developed products.

*Figure 1 **Magic Quadrant for Meeting Solutions**.*
(Source: (Fasciani, M., Eagle, T., Preset A., Doherty, B., 2020))

Niche Players can be targeted to a specific market or region by geography. However, they are limited by their size, the competitive pressure of more influential suppliers, their geographical coverage, and their financial situation. Companies may have implemented a wide range of software functionality, but with limited support capabilities and drastically low popularity among customers.

As it can be seen in Figure 1 the Gartner firm characterizes *Zoom*, *MS Team* and *Cisco* companies as Leaders of the 2020 Magic Quadrant.

Education institutions adopt flexible learning styles and cloud computing based services. The mentioned videoconferencing technologies allow teachers and students to collaborate with each other, sharing video and audio documents in real time as the teaching process takes place remotely. Participants can quickly access the learning sessions using mobile phones, video conferencing terminals for online meetings. Such conferences allow multiple participants not only to talk but also to transfer files like slides, static images, or text.

In the next section we analyze Kaunas University students experiences of the video conferencing technologies.

Case Study Findings

To uncover learners 'experiences and evaluate the aforementioned video conferencing technologies to assess satisfaction criteria and potential problems we conducted a case study involving about 350 second-year students of the Faculty of Informatics. The case study was conducted in June 2020 after the end of quarantine in the country. The students needed to answer the questions: "How much and what video conferencing technology did you use to communicate with teachers this semester? List them and rate them on 10-point scale. What do you consider using the system advantages and disadvantages, and which you prefer in the future?

Most of the students and teachers for teaching and learning preferred using *Zoom* technology; the second platform was *MS teams* as the third system was *Big Blue Button* (Figure 2). Students also mentioned other platforms like *Google Hangouts*, *Slack* and *Discord* video conferencing.
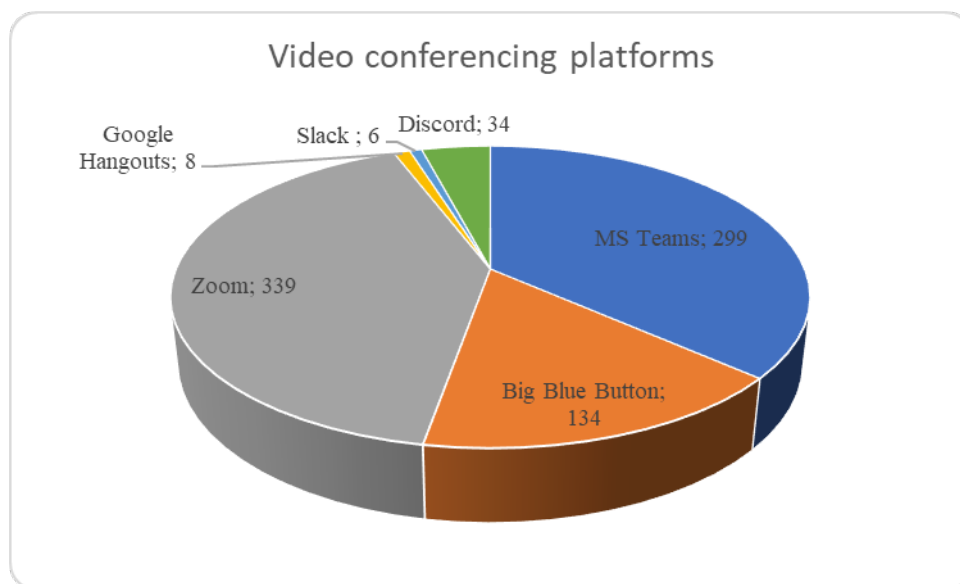
*Figure 2 **Video Conferencing Platforms Mentioned by Students in the Case Study***

In the case study students rated *Zoom* video conferencing capabilities. Almost one third of the students rated the system between 7 and 9 on a ten-point scale (Figure 3).
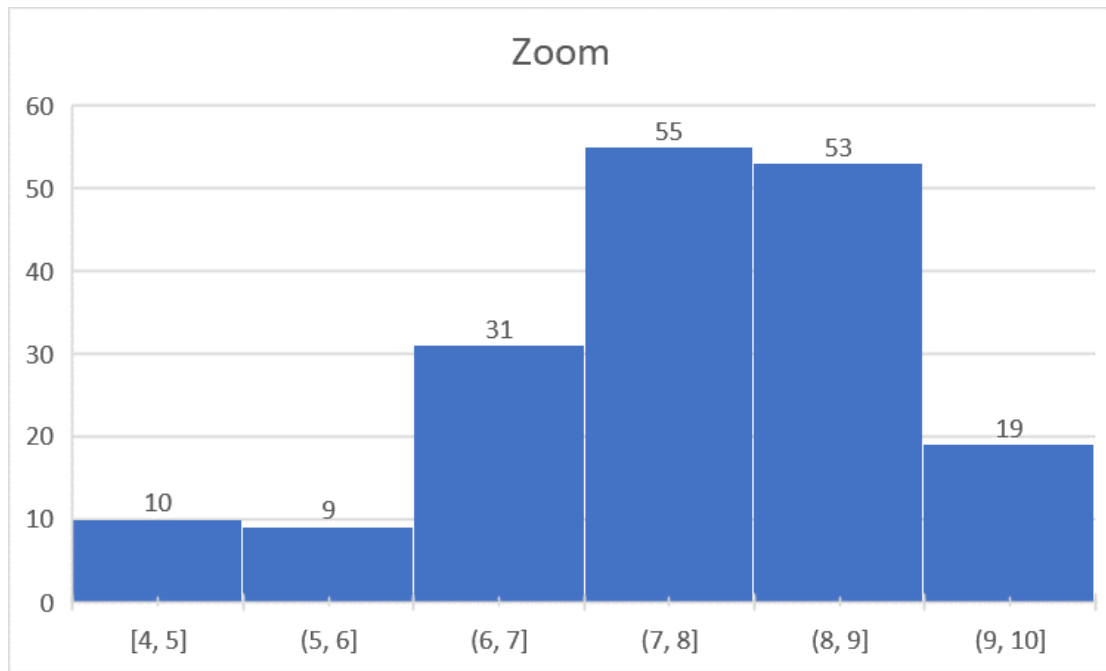
*Figure 3 **Zoom Platform Evaluation***

Describing the work on this platform, the students mentioned that the platform is easy to use, can be connected directly from the browser, relatively good video and audio quality, simple user interface, convenient login, and applications management. One of advantages was mentioned that an application on the phone can be used when no way is to connect from computers, such as when moving further from home. Students also mentioned that the system is integrated with Moodle. The most convenient advantages are the screen share or moving the students to a separate break out rooms where the students can report the work individually or the teacher individually can show how to solve a specific task. Students mentioned that is also convenient to communicate and comment in the comments section. The "raise your hand" function is very useful.

The students also mentioned the shortcomings of the system. The problem was that work session had a time limit of 45 minutes if used without a license. Students mentioned that the system works great for theoretical lectures, but when it is necessary to share something with a student, the system has problems with the speed of the Internet and servers, very often the system crashes, sometimes cracked image, sound and there were problems with the microphone.

MS Teams platform was rated slightly more favorably. Figure 4 shows that this platform was rated between 9 and 10 points.
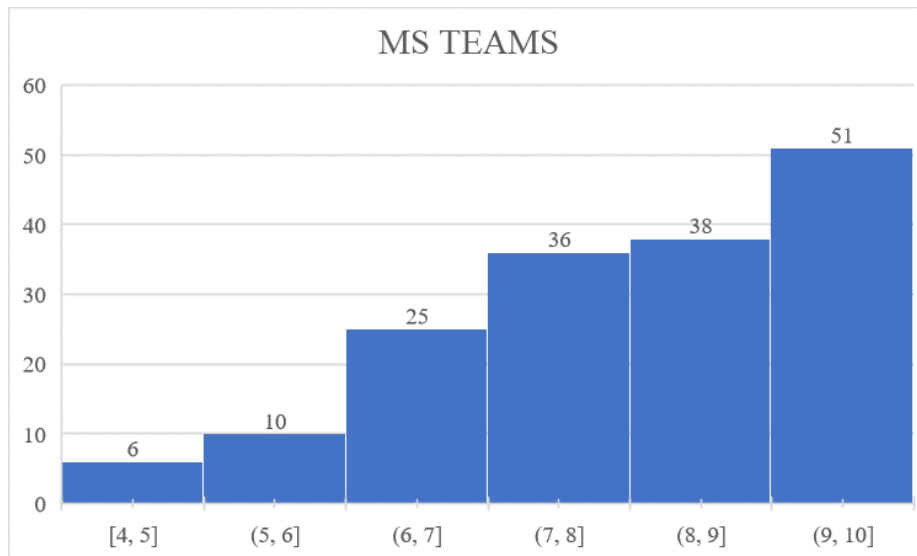
*Figure 4 **MS Teams Platform Evaluation***

Because KTU licensed Microsoft services, the work is synchronized with the university e-mail, so all messages are sent to the e-mail before the lecture starts. The *MS Teams* system was easy to use, both on the phone and on the computer. This platform makes it easy to communicate both privately and in lectures (or groups). The system calendar shows when the lectures take place, there is no need to search for lectures through Moodle. The system is also convenient to use for communication with fellow students (for example, when working on one project), it is possible to add and store various documents, the whole history is clearly visible. Good enough personal messaging system, good video, and audio quality. Supports large numbers of people and is realistically designed to do large-scale conferences and lectures.

Not all students rated the system's capabilities so well. Some respondents mentioned that the interface of the platform is very confusing, the UI is difficult to understand, making it more difficult to understand how the platform works, it is not easy to catch which is exactly the intended activity. Students indicated that the system uses a lot of computer resources. Some respondents mentioned problems with screen transmission.

About a third of the respondents mentioned the third video conferencing platform *Big Blue Button* (Figure 5).

The platform received evaluations between 7-8 points. Students indicated that the system is quite convenient to use because no additional software is required, it is possible to log in via a browser. The platform is very suitable for theoretical lectures or those where the listeners do not need to speak, it is possible to vote by going directly to the lecture. In addition, teachers can comment as well in a general chat system. It is easy to understand how the platform works. Convenient for high flow, theory lectures.
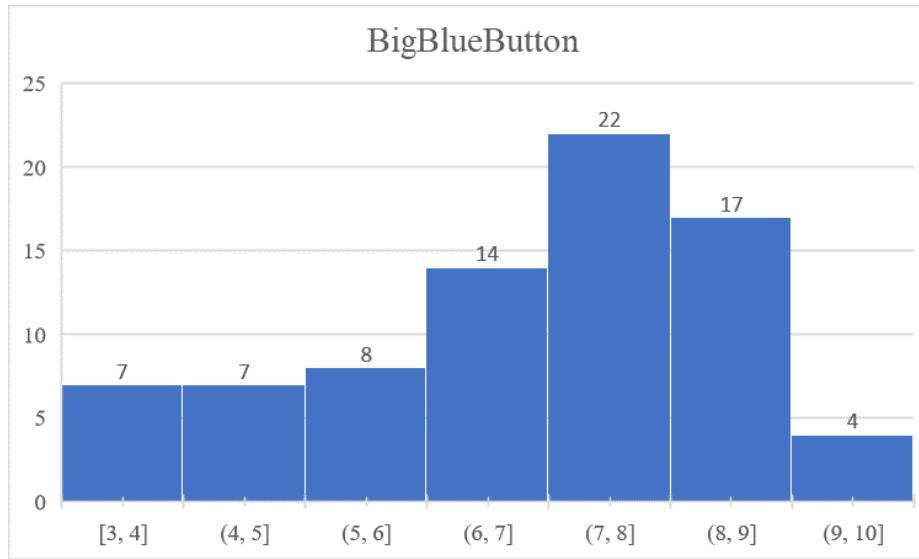
Figure 5 **Big Blue Button Evaluation**

Students also mentioned problems. Occasionally there were problems with sound or connection stability. Although the system is adapted for communication in larger audiences, with more than 100 students joining, there were problems with sound, communication interruptions occurred. Some respondents mentioned that it is difficult to communicate in private.

Among other video conferencing technologies, there was mentioned *Discord* platform, which was used by only a tenth of the students. In their responses, respondents mentioned that the platform has a very user-friendly design and structure, a role system, and administrative capabilities. Among the positive options, students mentioned that it is convenient to display a screenshot, easy to connect and disconnect from conversations, and the information that is written or sent to files does not disappear and can be seen at any time. The platform is free. The students mentioned that the *Discord* platform is more for game users but is great for adapting it to work and other purposes as well.

Conclusions

The case study showed that the rapid transition to online form of education has been quite successful. All mentioned video conferencing platforms provide ample opportunities for working remotely. The students also mentioned the shortcomings of the systems. Although students used the *Zoom* platform mostly, they rated best *MS Teams* technology.

The mentioned advantages and disadvantages of the systems allow University administration better to understand problems of learners. Lessons learned can be used in the future in circumstances like COVID 19.

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РАЗВИТИЕ ИНДИВИДУАЛЬНОСТИ СТУДЕНТОВ ВО ВРЕМЯ ПАНДЕМИИ COVID-19: ВЛИЯНИЕ ДИСТАНЦИОННОГО И ONLINE ОБУЧЕНИЯ

Development of Students' Individuality during COVID-19 Pandemic: the Impact of Distant and Online Education

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Abstracts. *This article focuses on the problem of students' individuality developing as an important part of human individuality in the process of distance and online education during Covid-19 Pandemic. The theoretical basis is O. Grebenyuk's individuality concept. In it, the individuality is defined as the unity of seven spheres, including intellectual, motivational, emotional, volitional, practical and subject-oriented, self-regulative and existential ones which are characterized the originality and uniqueness of a person. Positive students' individuality developing affects success of higher education and professional activity in medicine. This study adresses three key issues. First, it looks at the problem of students' individuality developing in the process of distance and online education during Covid-19 Pandemic. Second, it turns to examine dynamics of students' individuality spheres and components during one semester of professional training at the university. Finally, the paper considers gender differences in dynamics of students' individuality. The data for this study were collected using the questionnaire "The Technique of Student's Individuality" by T. Grebenyuk. Eighty-five students were recruited for this research. The participants study at Immanuel Kant Baltic Federal University, they are future health professionals. The results suggest that in the process of distance and on-line education during Covid-19 Pandemic, positive dynamics in the development of all individuality spheres of medical students is revealed, especially in the motivational and intellectual spheres. The dynamics of all individuality spheres have differences in the male group of medical students except the existential sphere. But this problem needs deeper research.*
Keywords: *individuality, individuality spheres, higher education, medical students.*

Введение
Introduction

Новая коронавирусная инфекция оказала существенное влияние на жизнь нашего общества: вынужденная приостановка производств, снижение деловой и инвестиционной активности, невозможность реального общения в привычном социальном сообществе определили «новую

реальность» и «новую социальность», в которых мы живем. Пандемия COVID-19 оказала серьезное воздействие и на высшее образование. Ускоренное пандемией вынужденное тотальное дистанционное обучение потребовало решения ряда задач не только инструментально-технического, но и методического, а также психологического характера (Shtykhno, Konstantinova & Gadiev, 2020). В настоящее время происходит осмысление опыта дистанционного обучения университетами многих стран (Sudarshan, Tarak & Nabanita, 2020; Bin & Cheng, 2021; Simone, 2021; Harold & Petra, 2020; Almazova, Krylova, Rubtsova & Odinokaya, 2020). Выявлены факторы успешного дистанционного обучения с точки зрения студентов (Van Wart et al., 2020), факторы удовлетворенности онлайн-обучением (Blundell, Castaneda, & Lee 2020). Предметом особого интереса становятся и различные аспекты дистанционного медицинского образования: разрабатываются рекомендации по организации дистанционного обучения студентов-медиков (Zhehan et al., 2021), изучаются особенности профессионального стиля преподавателей, работающих со студентами на медицинских программах (Dash, Guraya, Al, & Mohammad, 2020), апробируются новые технологии в подготовке будущих врачей (Stephenson et al., 2020).

Исследования дистанционного обучения ведутся по разным тематическим областям (Martin, Sun, & Westine, 2020), в том числе изучаются и особенности саморегуляции (Glazer & Murphy, 2015; Broadbent, 2017), мотивации (Li & Tsai, 2017), эмоциональные (Kim, Park & Cozart, 2014) и когнитивные характеристики обучающихся (Chen & Wu, 2012). В современных психолого-педагогических исследованиях довольно часто предметом изучения являются глобальные личностных черты студентов университетов (Big Five) или отдельные параметры индивидуальности (Richardson, Abraham, & Bond, 2012; Köseoglu, 2016; Bahcekapili & Karaman, 2020), в том числе в контексте дистанционного обучения (Leon, Morales & Vertiz, 2017). В исследованиях выявлено, что к числу важных атрибутов эффективного дистанционного и онлайн-обучения относится индивидуализация (Amaka & Goeman, 2017), более того, студенты ожидают развитие и рост индивидуальности в процессе дистанционного обучения в университете (Henry, 2020).

Представленное исследование ориентировано на изучение целостной индивидуальности студентов. В основе нашего исследования - концепция индивидуальности О.С. Гребенюка, разработанная в рамках научной школы Педагогики индивидуальности. Индивидуальность понимается как интегральная психологическая характеристика человека, отражающая семь сфер психики: интеллектуальную, мотивационную, эмоциональную, волевую, предметно-практическую, экзистенциальную и сферу саморегуляции. В концепции педагогики индивидуальности О.С. Гребенюка

индивидуальность является педагогической категорией и выступает в качестве важной педагогической задачи (цели) (Grebenuyk & Grebenuyk, 2019). Индивидуальность студента представляет собой сплав, единство психических сфер с присущими возрастными особенностями (Grebenuyk, 2017). Цель данного исследования – провести изучение динамики сфер индивидуальности студентов в течение семестра в процессе дистанционного обучения в период пандемии COVID-19(на примере студентов медицинского института).

Методы исследования
Methodology

В исследовании приняли участие 85 студентов первого курса Медицинского института Балтийского федерального университета им. И. Канта: 21 юноша и 64 девушки. Исследование проводилось в конце декабря 2020 года на итоговом занятии по дисциплине «Психология и педагогика». Участие в исследовании было добровольным. Для сбора эмпирического материала использовалась «Карта индивидуальности студента» Т.Б. Гребенюк, позволяющая провести самооценку развития компонентов семи сфер индивидуальности: интеллектуальной, мотивационной, эмоциональной, волевой, саморегуляции, предметно-практической и экзистенциальной. В методике каждая сфера включает перечень компонентов, которые оцениваются участниками путем приписывания баллов (от одного до семи) в зависимости от уровня развития. В нашем исследовании участники оценивали себя дважды: первая оценка относилась к уровню развития компонентов сфер в начале семестра (в сентябре) и проводилась ретроспективно; вторая оценка касалась развития компонентов сфер в конце семестра (в конце декабря). Заполнение карт индивидуальности проводилось в LMS (Learning Management System). Важно отметить, что студенты в течение семестра проходили обучение в дистанционной форме: лекции и практические занятия проходили on-line в системе Cisco Webex Meetings, самостоятельная работа была организована через Learning Management System и Spektr. В исследовании проводилось сравнение результатов диагностики сфер индивидуальности студентов (в начале семестра и в конце семестра). В обработке данных применялась программа SPSS Statistic 20.

Результаты
Results

Выявлены положительные сдвиги суммарных показателей по всем сферам индивидуальности студентов, как в группе юношей, так и в группе девушек (p≤0.01) (Tab. 1).

Table 1 **Dynamics of Individuality Spheres Rated by Male and Female Respondents**

N	Individuality Sphere	Mean (September – December) and Wilcoxon Signed Ranks Test (Z)					
		Male (n=21)			Female (n=64)		
		Mean		Z	Mean		Z
		September	December		September	December	
1	Intellectual	4.45	5.26	-3.911 *	4.09	5.29	-6.862 *
2	Motivational	4.43	5.29	-4.019 *	4.23	5.41	-6.557 *
3	Emotional	4.45	5.23	-3.303 *	4.03	4.90	-5.672 *
4	Volitional	4.61	5.26	-3.101 *	4.42	5.35	-5.902 *
5	Practical and subject-oriented	4.57	5.21	-3.524 *	4.02	4.98	-6.246 *
6	Self-regulative	4.91	5.48	-3.624 *	4.50	5.41	-6.276 *
7	Existential	4.83	5.52	-3.489 *	4.80	5.61	-5.583 *

* - p≤0.01

Анализ сдвигов показателей компонентов сфер позволил обнаружить такую же закономерность в группе девушек: оценки всех 60 компонентов сфер индивидуальности также имеют положительные сдвиги показателей: сдвиг 92% показателей имеет достоверность p≤0.01; у 8% показателей - p≤0.05 (Wilcoxon Signed Ranks Test).

В группе юношей значимость положительных сдвигов обнаружена по 85% компонентов: 53% - p≤0.05; 32% - p≤0.01. Значимые сдвиги не выявлены по 15% компонентов:

- – в интеллектуальной сфере: «устойчивость внимания», «сопротивление стереотипам мышления»;
- – в эмоциональной сфере: «умение контролировать свое эмоциональное состояние»;
- – в мотивационной сфере: «потребность в деловых конфликтах», «потребность в самообразовании»;
- – в сфере саморегуляции: «навыки физического самоконтроля»;

−   в предметно-практической сфере: «наличие работоспособности»;
−   в волевой сфере: «способность к длительному волевому усилию», «умение тормозить свои побуждения».

Сопоставление результатов в группах юношей и девушек с использованием Chi-square ($\chi 2$) и критерия ϕ^* (угловое преобразование Фишера) позволило выявить следующее. Юноши достоверно выше оценили развития целого ряда компонентов сфер индивидуальности.

По итогам первого оценивания (в начале семестра – в сентябре) обнаружены достоверные различия в оценке следующих компонентов:

−   в интеллектуальной сфере: «оперативность мышления» ($\chi 2$=6.75 р≤0.05), «абстрактность мышления» ($\chi 2$=4.947 р≤0.05), «гибкость ума» ($\chi 2$=4.073 р≤0.05), «принятие нестандартных решений» ($\chi 2$=4.718 р≤0.05), «сопротивление стереотипам мышления» ($\chi 2$=3.927 р≤0.05);
−   в эмоциональной сфере: «умение давать себе адекватную самооценку» ($\chi 2$=10.006 р≤0.01);
−   в мотивационной сфере: «потребность в сотрудничестве» (ϕ^*=4.32 р≤0.01), «потребность в саморазвитии» (ϕ^*=2.06 р≤0.05), «потребность в самопознании» (ϕ^*=2.50 р≤0.01), «потребность в получении дополнительных знаний по профилю будущей специальности» (ϕ^*=2.36 р≤0.01);
−   в сфере саморегуляции: «навыки анализа жизненных ситуаций» ($\chi 2$=6.949 р≤0.01), «свобода в выборе целей и средств жизнедеятельности» (ϕ^*=2.15 р≤0.05);
−   в волевой сфере: «самостоятельность в достижении цели» ($\chi 2$=3.928 р≤0.05).

По итогам второго оценивания (в конце семестра – в декабре) выявлено, что юноши также достоверно выше оценили развития целого ряда компонентов сфер индивидуальности. Так, обнаружены следующие различия при сопоставлении результатов в группах юношей и девушек:

−   интеллектуальная сфера: «креативность мышления» (ϕ^*=1.98 р≤0.05), «управление физическими процессами» (ϕ^*=4.83 р≤0.05), «сопротивление стереотипам мышления» (ϕ^*=1.84 р≤0.05);
−   эмоциональная сфера: «умение справляться со стрессом» (ϕ^*=2.04 р≤0.05), «умение преодолевать тревожность» (ϕ^*=2.87 р≤0.01);
−   мотивационная сфера: «потребность в самопознании» (ϕ^*=1.75 р≤0.05), «потребность в сотрудничестве» ($\chi 2$=6.756 р≤0.01), «потребность в деловых конфликтах» ($\chi 2$=3.843 р≤0.05);

- сфера саморегуляции: «навыки осознания своего поведения» ($\chi 2=3.898$ p$\leq$0.05), «навыки физического самоконтроля» ($\varphi^*=1.75$ p$\leq$0.05).

Дискуссия
Discussion

Полученные результаты свидетельствуют, что студенты первого курса наиболее высоко оценивают развитие экзистенциальной сферы и сферы саморегуляции, как в начале, так и в конце семестра. Экзистенциальная сфера довольно высоко оценивается студентами-первокурсниками не только медицинского института, но и будущими педагогами (Nesyna, 2020), и это может рассматриваться как возрастная особенность. Обращают на себя внимание высокие показатели самооценки сферы саморегуляции, что может быть связано именно с опытом тотального дистанционного обучения в период пандемии на этапе завершения школьного образования весной 2020 года. Это согласуется с результатами исследований компонентов саморегуляции в процессе дистанционного и on-line обучения других авторов (Glazer & Murphy, 2015; Broadbent, 2017; Martin, Sun, & Westine, 2020).

Анализ динамики сфер позволяет установить, что в течение семестра дистанционного и online обучения произошло значимое увеличение суммарных показателей всех сфер индивидуальности, особенно мотивационной и интеллектуальной сферы. В исследованиях также отмечается влияние дистанционного обучения на характеристики мотивационной сферы (Li & Tsai, 2017) и на особенности когнитивных характеристик (внимание, память, когнитивный стиль) (Martin, Sun & Westine, 2020).

Полученные результаты позволили выявить специфику в динамике отдельных компонентов шести сфер (за исключением экзистенциальной сферы). Так, в группе девушек выявлены положительные сдвиги по всем компонентам сфер индивидуальности. В группе юношей отдельные компоненты шести сфер индивидуальности значимо не изменились: устойчивость внимания, умение контролировать свое эмоциональное состояние, работоспособность, способность к длительному волевому усилию и т.д. При этом, некоторые из этих компонентов юноши оценили достоверно выше, чем девушки: сопротивление стереотипам мышления в интеллектуальной сфере (по итогам как первого, так и второго оценивания); потребность в деловых конфликтах, в самообразовании и сотрудничестве в мотивационной сфере; навыки физического самоконтроля в сфере саморегуляции (в конце семестра).

В начале семестра юноши достоверно выше оценили развитие целого ряда компонентов интеллектуальной, мотивационной, эмоциональной, волевой сферы и саморегуляции (индивидуальные характеристики мышления, способность принимать нестандартные решения и сопротивляться стереотипам, анализировать себя и жизненные ситуации, выбирать цели и средства жизнедеятельности, самостоятельность и целый ряд потребностей (в саморазвитии, в получении дополнительных знаний и т.д.). Не обнаружено различий в оценивании компонентов экзистенциальной и предметно-практической сферы.

В конце семестра количество компонентов, по которым выявлены гендерные различия, уменьшается. Различия обнаружены в интеллектуальной, мотивационной, эмоциональной сфере и саморегуляции. Студенты-юноши выше оценили развития креативности, метакогнитивные процессы, способность регулировать эмоциональные и физические состояния (в том числе в ситуации стресса). Не обнаружено достоверных различий в оценивании развития компонентов экзистенциальной, предметно-практической и волевой сферы.

Полученные в исследовании результаты позволяют предполагать, что развитие компонентов сфер индивидуальности имеет гендерную специфику. При этом, важно отметить, что в исследовании принимали участие естественные группы студентов на добровольной основе: выборка включала гораздо большее количество девушек, чем юношей, что могло оказать влияние на результаты. Этот аспект требует дальнейшего изучения.

Важно отметить, что заполняя «Карту индивидуальности» и проводя сопоставление оценок в начале и в конце семестра, студенты были приятно удивлены и удовлетворены проделанной в семестре учебной работой. К концу семестра накопилась усталость от дистанционного обучения и итоговая работа по изучению сфер индивидуальности на занятии по «Психологии и педагогике» внесла оживление и позволила сделать процесс обучения более «ощутимым». На завершающем этапе работы студенты положительно отнеслись к выстраиванию перспектив по развитию сфер индивидуальности во втором семестре.

Выводы
Conclusion

Полученные в исследовании результаты позволили сформулировать следующие выводы.

Выявлена положительная динамика в развитии всех сфер индивидуальности студентов-медиков в процессе дистанционного и on-line обучения в период пандемии COVID-19, особенно – в мотивационной и

интеллектуальной сфере. Экзистенциальная сфера и сфера саморегуляции являются наиболее развитыми в структуре индивидуальности студентов.

В динамике экзистенциальной сферы отсутствуют гендерные различия, но можно предполагать наличие особенностей в динамике компонентов других сфер индивидуальности (интеллектуальной, мотивационной, эмоциональной, волевой, предметно-практической и саморегуляции) в группе юношей. Этот вопрос требует дальнейшего изучения.

Summary

The conducted study leads us to draw the following conclusions. In the process of distance and on-line education, positive dynamics in the development of all individuality spheres of medical students was revealed (was discovered), especially in the motivational and intellectual spheres. The existentialand self-regulative spheres are pivotal to the students' individuality structure. There are no gender differences in the dynamics of the existential sphere. The dynamics of other spheres of individuality components has differences in the male group of medical students in the intellectual, the motivational, the emotional, the volutional, practical and subject-oriented and self-regulative spheres. But this problem needs deeper research.

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FACTORS THAT IMPACT PARENTAL SUCCESS IN SUPPORTING CHILDERN'S DISTANCE LEARNING

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Abstract. *Distance learning unexpectedly arrived to Russian schools in March 2020, schools and teachers were not ready for this training type. The aim of present paper is to collect and evaluate parents' view on family preparedness to distance education and on parents' and children' coping with school assignments during the lockdown. 304 parents were interviewed. The data provide evidence that the higher level of parental education is a factor in the efficient distance learning of their children. The higher level of parental education correlates with fewer children in the family, with the time spent by children on home assignments and the number of devices per family member. It was demonstrated that mothers lived through this period more easily than fathers. We found that the parents with a PhD degree provided the most effective support. It could be assumed, that studies at higher education institutions require time management. Having learned this skill, parents with higher education know how to self-organize and teach their children the same. Then, if our schools switch to remote teaching even partially, special guidelines with step-by-step explanations of the material shall be developed for parents. Furthermore, online counselling can be arranged for parents to present the course structure and the sequence of educational activities.*
Keywords: distance learning, parental support, children, coronavirus, self isolation.

Introduction

An e-library search for key words "distance learning" brought up 3,834 publications just for 2019 and early 2020 alone. However, with a difference. Publications of 2019 are mostly theoretical in nature and semi-academic in style, while 2020 texts are introduced by alarmist titles like Sudden Distance Learning: the First Month of The Big Rush (Blinov et al., 2020); or Challenges, Problems and Possibilities of University Internationalization under a Force-Major Transfer to Distance Learning (Korolev & Koroleva, 2020).

Similarly to many other things, distance learning arrived unexpectedly, even though way back in May 1995 the State Committee for Science and Education

approved The Concept for Establishment and Development of the Single Distance Learning System in Russia (Kvanina, 2005).

Surprisingly, papers on distance learning at primary and secondary school levels are extremely rear (both before and after the coronavirus pandemic) with most of countless publications focused on tertiary education.

Literature Review

This means that distance learning at schools was never consciously expected and, therefore, its functionality was never set up. The lack of planning resulted in a poorly organized distance learning that schools found themselves in between March and May where all participants were dissatisfied with the process and its outcomes. Things happening at some schools during the recent self-isolation months showed little correspondence to the distance learning concept. Most schools were not equipped for this training type (Terekhova, 2019). However, it was students' parents who turned out the least prepared to deal with the new situation. No one explained to them - prior to, during or, apparently, after the distance learning – what parental support they should provide based on their child's school age.

Well in advance to the pandemic the world was actively discussing new, related but yet different notions: e-learning, web-based learning, online learning, and distance learning. We must differentiate these terms. Mixing them up has led to a hybrid education recently observed at schools. This confusion, perhaps, could be a reason for a failed school year end in the context of teacher/student separation.

Distance learning is an earlier concept. It does not require computers or networks. It is about teacher-student interaction across distances where teacher can guide student's performance. Distance education is usually associated with instructional television broadcasting and courses by correspondence. Now it may also include some educational e-applications. On the internet remote educational interaction is primarily required between teacher and students or among students. A classical distance learning in this context offers direct instructional broadcasting on the internet, videoconferences, chats and scheduled online conferences plus courses or discussions via e-mail (Tsai, Machado, 2002).

Whichever is the case, things happening at national schools March through May are now conventionally called distance learning. It must be highlighted that under The Education Law this learning is not a mode of studies but just a tool and technology to deliver education. And that brings more ambiguity in understanding steps to take and training methods to employ these days.

The Ministry of Education web-site published the following news on the hot-line methodological support for distance home schooling: "Over the initial 3

weeks of school start we have received 8,255 enquiries from educators and parents. 35% of the enquiries were related to curriculum and duration of on-line classes, the scope of home assignments, and ways to arrange for education without a computer or internet access.

Most phone calls – 80% - were from parents. They worried that the school shifts onto them some responsibilities for children's education and achievements. They enquired about the maximum scope and timeframes of home assignment. They also asked about the time ratio between explaining new material and unsupervised studies. Many questions were raised by large families where parents struggled with on-line studies for multiple children. Around 40% of all enquires concerned e-platforms and whether school recommendations for choosing a paid connection to such platforms were legitimate."

All publishers produce special teacher's manuals for the best use of their textbooks. This time we had a precedent where parents were left without any guidelines on how to support their children who failed to understand teacher's explanations over the internet.

Our review of academic literature has not spotted a survey of parents' attitude towards this training modality and their involvement in children's schooling during the lockdown. It has motivated us to interview patents, to research how they participated in the process and to understand factors promoting a more successful support to children at distance learning.

Methodology

A google-form was posted with questions about parents' view on family preparedness to distance education and on children's coping with home assignments. The completed questionnaires were submitted from different locations across Russia by 304 parents who volunteered to answer our questions.

*Table 1 **Distribution of Parents by Age (%)***

Age	aged 8 to 25 y.o.	up to 30 y.o.	aged 31 to 40 y.o.	aged 41 to 50 y.o.	aged 51 to 60 y.o.	older than 60 y.o.
Number of respondents	1	11	164	120	9	1
%	0.3	3.6	53.4	39.1	2.9	0.3

Table 1 demonstrates that the majority of parents are between 30 and 50 years. This group has children across different school grades and, therefore, is active in educational support.

62.8% of respondents live in major urban centers, 28.9% in big cities and the rest in small towns and rural areas.

*Table 2 **Number of Children in the Family***

number of children	1	2	3	4	5
number of responses	106	132	45	16	8
%	34.5	43.0	14.7	5.2	2.6

Table 2 demonstrates that families predominately have 1 or 2 children (though 4 families had 5 or more children).

*Table 3 **Age of Children***

Age of the children	0 to 3 y.o.	3 to 7 y.o.	7 to 11 y.o.	11 to 14 y.o	older than14 y.o	Total
The number of children	3	22	155	87	40	307
%	1	7.2	50.5	28.3	13.0	100

In our survey most parents had children at primary and middle schools (Table 3). 36 children of the respondents were 14 to 17 years while 4 children were 17+ years.

Among parents 76.6% had a university degree, 2.9% held an academic title, 14.5 % graduated from vocational colleges while the rest were secondary school graduates.

Results and Dissuasion

Gadgets available in families are demostrated in Table 4.

*Table 4 **Gadgets Available in Families***

The number of gadgets	1	2	3	4	5	Total
Total	40	62	72	40	93	307
%	13.0	20.2	23.5	13.0	30.3	100

Obviously over half of respondents (174 persons) reported three or fewer electronic devices in their families. It meant a possibly challenged device availability for parents working from home and 2 children at school. At the same time 93 families owned 5 or more gadgets (most often that number has mandatorily included 1 desktop computer and 1 laptop). Table 5 demonstrates the ratio between the number of gadgets and family members.

Table 5 **Distribution of Gadgets in Families**

The number of gadgets per person	1	2	3	4	Total
Total	195	73	24	15	307
%	63.5	23.8	7.8	4.9	100

Table 5 clearly shows that most respondents were able to provide their children with a gadget. In 73 families (23.8%) one device was shared by 2 siblings, in 24 families (7.8%) by 3 family members, and in 15 families (4.9 %) by 4 persons.

55.9% of families had a desktop computer while 44.1% did not. At the same time 78.3% of families had a laptop.

It is worth mentioning that 17 out of 304 respondents reported having neither desktop computer, nor laptop, nor tablet (5.6%). All of these people lived in small towns or rural areas and had tertiary education (46.7%) or secondary/vocational secondary education (the rest). One third among these 17 respondents had no internet connection at their domicile. Only 6 respondents received tablets from school for education. This immediately brings to mind an article titled *Contemporary Informational Technologies at Russian Schools* (Ivanko et al., 2019) whose optimism goes beyond the reported figures.

In the survey 64.2% of all families reported receiving an extra tablet for education. However, these were predominately families in metropolitan areas.

In 12 families (or 3.9 %) a single tablet was shared by all family members. These families were from the Small Town/Rural Areas Group. Among them 4 families also had no internet access. At the same time 9 parents reported receiving extra device from the school. In this respect a statement by E. V. Scherbakova and T. N. Scherbakova (2019) - that rural schools must join into the global educational network rather than being outcasts – seems strongly relevant.

19.7% of families stated that their children have no dedicated space for studies at computer. It is worth mentioning that 63.8% of parents also worked fulltime.

91.8% of surveyed parents think that distance learning is temporary. They fail to understand that the entire world switches to complex education wherein distance learning is an integral component. This said, 36.2% think that the recently experienced teaching modality is a rehearsal for a wider practice of distance learning.

Next we enquired about the scope of adult support children needed with their home assignments. Parents were asked to review their time use and evaluate how much of it was spent on children's questions and requests to help with studies (Table 6).

*Table 6 **Child's Dependence on Parental Assistance During Education (parent's evaluation of resource % spent by him/her on a child)***

parent's evaluation of resource	from 0 to 10%	from 11 to 30%	from 31 to 50%	from 51 to 100%	Total
Number of responses	46	36	63	162	307
%	15	11.7	20.5	52.8	100

Table 6 demonstrates that a large portion of parents actively participate in assisting their children with homework. This is new in comparison to regular school days where many parents would only check the outomes rather than continously coach their children during the process.Table 7 pictures parental assessment of how much time their child spent on homework.

*Table 7 **Time Spent by Children on Home Assignments as Estimated by Parents***

Time (in ours)	1	2	3	4	5	All the day	Total
Number of responses	22	42	48	44	48	103	307
%	7.2	13.7	15.6	14.3	15.6	33.6	100

As seen in Table 7 most of the "enitier day" assessments given by parents may indicate their frustration and, therefore, diverge from reality. It rather shows their tiredness of nonstop involment into children education. Futhermore, we wanted to determine factors that could facilitate an efficient distance learning and effective parental support.

We assumed that parents' own education could be among decisive factors. Any studies require structured time management and limitated freedom in one's time use. Moreover, the higher level of one's education is, the more structured his/her day should be to perform increased tasks. It is conceivable that parents who mastered time management may teach this skill to their children.

The Assessment Based on Education Level

In this surveay parents with secondary education predominately were under 30 years (10 out of 18). Most of these 18 parents lived in small towns or villages. 3 families had no gadgets at all. Only 33.3% lived in big cities. On average, a family had 2.6 children though 33.3% of families had 4+ children. Half of the respondents in this group (9 parents) could not work from home under the lockdown. The group had 3.3 gadgets per family. 7 families shared 1 device per

2 children while 2 families had just 1 gadget per 4 kids. However, parents reported that almost all of them received tablets provided by schools.

Only 4 parents (22.2%) claimed that children managed school homework independently and required almost zero adult assistance. Half of all respondents reported that children needed an active parental involvement and that it took between 50% to 100% of parents' time. Practically all parents thought that distance learning was a temporary measure rather than a rehearsal of a future education modality. Parents insisted that children spent 4 to 5 hours to do homework (3 parents wrote that it took an entire day). Already 5 respondents believed that children sat all day long in front of their computers. "Sleep" and "TV" were named a key recovery and leisure method.

Here is a typical exapmle. A single parent household where mother of 34 years has two children (daugter, 7 y.o., 1st grader and son, 12 y.o., 5th grader). The mother has not been working since the lockdown onset. The family owns 1 laptop. Therefore, children cannot attend on-line classes simultaneously. Enquires were made to classmate parents asking for details of homework given and topics explained. The mother was panic-stricken and suffered from headaches; her temperature rose. When family's broken tablet got repaired, her condition improved.

40 parents had vocational secondary education. 40% of this subset was aged 40+. On average, a family had 2.6 children, similarly to the previous group, and owned 3.2 devices. 5 families out of 40 had no gadgets at all, and 1 family had only a single tablet. In 13 families out of 40 two family members shared 1 gadget, while 4 families had 1 gadget per 4 persons. Only 3 children had no dedicated personal work space.

In this group 20% of parents claimed their children's capability to do homework on their own while 80% responded that children constantly asked for help. Only 18 parents out of 40 worked during the lockdown which meant that more than half of parents were always at home. 35% of parents responded that children worked on home assignments all day long. One mother - who insisted that her children spent all days on homework - describes her time-off: "I go to our kitchen and close the door for privacy, make myself a cup of strong tea and enjoy half an hour of quietness and rest". Other mom whose children similarly spent a full day on homework wrote: "Having helped my kids with all home assignments and after my remote work done I have time left for sleep only." A mom whose children complete their school assignments in 2 hours wrote: "Great, I left my job and stay at home to supervise my kids! They will not perform without my supervision." (sic)

Finally, the third subset of 232 persons had higher tertiary education. An average family raised 1.8 children (that is fewer compared to groups with less education). Predominantly they live in big urban centers. With regard to the age

breakdown: in 51 families parents were under 30 y.o.; 125 families between 31 and 40 years; 55 families up to 50 years; 4 families older than 50 years; and 1 family older than 60 years.

7 families out of 232 had no gadgets at all (3%). 4 families owned 1 tablet. On the whole, in comparison to parents without higher education this group was significantly better equipped with gadgets, primarily with desktop computers and laptops (3.2 devices per family and most families had 1 child only). In 22.8% of families one device was shared by 2 persons, 8.6% - by 3 persons, and 4.3% (10 families) – by 4 persons. In the rest of families every member had a personal gadget.

Due to the group's big size we identified 3 subgroups based on parents' age: under 30 years (51 persons), 30 to 40 years (121 persons) and over 41 years (59 persons). Families without any gadgets were equally represented across all subgroups. In the youngest subgroup 33.3% of parents did not work; in the mid-aged subgroup - 37.2%, while 20.3% of parents did not work among 41+ years parents.

23.5% of young parents (under 30 y.o.) with higher education claimed that their children do everything independently, though evidently they raised primary schoolers.

The 30 to 40 year group of parents with higher education viewed distance learning of their children basically the same way and claimed that 23.9% of children studied without supervision. Parents older than 40 y.o. proved to be more prepared to the situation plus they had older children. They responded (43.1% of parents) that children did not require much of their attention. This parameter is significantly different under Wilcoxon's test and distinguishes this subgroup from others. Parents in this subgroup more frequently demonstrated creative ways of recovery: they practiced sports and listened to music. Younger age parents in this group responded that they danced and exercised. The 30 to 40 year subset insisted on sleep as a general recovery method.

One answer was especially emotional and claimed that the child studied all day long. In fact, no child can sustain such lengthy studies. Probably, this response indicates parental tiredness and irritation. This response resonated with younger parents in 27.5% of cases, with 37.2% of parents in the 30 to 40 year subgroup and with 38.9% of more senior parents. The two latter age subgroups demonstrated a significant difference versus the youngest subgroup ($p \leq 0,05$, Wilcoxon's test).

Thus the, highest level of parental frustration is in the higher education parental group of 30 to 40 years (their children require more time for home assignments which felt as if they studied all day long). It could be due to the school age most challenging for distance learning. If younger parents presumably raise preschoolers and more senior parents (50+ years) have high schoolers (who can

regulate the time they spent at computer), the 30 to 40 year subgroup is more likely to support middle school students with a minimal motivation for studies (Nikolaeva et al., 2017). Younger parents rarely claim that their children study full days while older parents complain less about children's need for their constant attention.

11 of survey respondents had an academic title. Among title holders one father had 5 children. Though during the lockdown he did not work from home, his entire day was spent on helping his children study. In this family every child had a personal gadget but no dedicated work spot. Emotionally, this dad felt that his kids worked on home assignments and looked at their screens an entire day. He had no doubts that distance learning was temporary. To a question about his ways of regaining energy he provided a short answer: I drink beer.

The most optimistic outlook onto the situation was registered in 10 mothers who had academic titles, mostly aged between 31 and 40 years. 40% of them claimed that children operated on their own. An average family had 1 or 2 children and owned 4.2 gadgets. Only in one family a child had no dedicated work space (10%). 8 mothers in this subset worked full time as school or university educators. However, only 4 responded that their children required continuous assistance. Most moms believed that children coped on their own. They estimated that children completed home assignments within 1 to 3 hours and sat in front of their computers relatively the same time. They were also sure that distance learning is by no way temporary (9 out of 10) and will be extended for a longer period.

Factor Analysis of the Data

Factor One includes with greater weights children's age and their need for parental assistance with homework (with a negative sign). It means that the older children are, the less assistance they need from parents. Factor Two featured with greater weights parental education and number of children in the family (with a negative sign). Thus, the higher level of parent education correlates with fewer children in the family. Factor Three embraced the age of parents and place of domicile. This can be expressed as: the older parents are, the higher the probability is of them living in a major city. Lastly, Factor Four included time spent by children on home assignments and number of devices per family member. The outcome is very predictable as fewer gadgets meant more time spent by children on homework.

Table 8 features factor analysis of the data. Kaiser-Meyer-Olkin Measure of Sampling Adequacy is 0.540 and testifies to the data fitness for use. A 4-factor solution is obtained. Explained variance is 65.3%.

Table 8 **Rotated Component Matrix**[a]

	Component			
	1	2	3	4
Age of children	.853	.120	.019	.179
How would you assess your child's need for parental assistance during homework?	-.698	-.012	.038	.464
Your own education level	-.030	.771	.137	.043
Number of children in the family	-.174	-.770	.108	.125
Your age	.185	-.154	.814	-.025
Where do you live?	-.192	.213	.746	-.034
How much time did your children spend on doing home assignments?	.187	.085	.038	.840
How many devices does your family have per person?	.225	.179	.110	-.524

Extraction Method: Principal Component Analysis; Rotation Method: Varimax with Kaiser Normalization;
a. Rotation converged in 5 iterations.

Conclusions

In summary, our data provide evidence that the higher level of parental education is a factor in efficient distance learning of children. It could be assumed, that studies at higher education institutions require time management. Having learned this skill, parents with higher education know h ow to self-organize and teach their children the same. They have more gadgets in the family and almost always own a computer. All of the above enable their children to complete assignments faster and more efficiently. These parents raise fewer kids and, therefore, are more available to their children. Finally, they can better understand school assignments and provide competent answers to child's questions.

To conclude, if our schools switch to remote teaching even partially, special guidelines with step-by-step explanations of the material shall be developed for parents. Furthermore, online counselling can be arranged for parents to present the course structure and the sequence of educational activities.

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THE DIMENSIONS OF PSYCHOLOGICAL WELL-BEING OF CUSTOM EMPLOYEES DURING THE PANDEMIC

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Abstract. *There has been a significant increase in interest about a psychological well-being among the researchers, politicians, media and general public. This study focuses on a measurement on a psychological well-being of the custom employees. For the purpose of measurement of a psychological well-being of custom employees, the authors have used Ruff's scale that includes such components as positive relationships with others, autonomy, competence, personal growth, a purpose in life, and self-acceptance. According to Ryff (2014), well-being has been investigated in relation to one's career pursuits. The purpose in life and personal growth were found to contribute to career commitments. In the case of the Latvian custom employees, among the essential elements of a psychological well-being are economic factors, favourable work environment and career opportunities in the organization. The study focuses in a psychological well-being of custom employees during the pandemic that leads to conclude that custom employees were in the forefront alongside with the doctors in stabilizing the situation in the county and have experienced a burn out, therefore they need a psychological support and a recognition of their efforts at work.*
Keywords: custom employees, pandemic, psychological well-being, satisfaction with work.

Introduction

The COVID-19 pandemic presents a serious challenge for all people around the globe. In this unprecedent times, this is particularly important to pay attention to a well-being of those professionals who work in a forefront of pandemic. The focus of this study is a psychological well-being of the custom employees who

undergo anxiety and stress during their service. The authors have studied six aspects of a psychological well suggested by Carol Ryff (1995) among the custom employees.

The aim of the article is to carry out a subjective evaluation of a psychological well-being of custom employers by exploring how they maintain positive relations with others, how they exercise autonomy, competence, how pandemic influences their personal growth, the purposein life and a self-acceptance in relation to several factors, such as age, duration of service and education.

Psychological Well-being Defined

Despite of the increased focus on a well-being in the research, there is still no universal definition of a term. The concept of a well-being is related to the quality of human life. The term extends beyond simply feeling good and being satisfied. The term was related to one's happiness, the absence of negative feeling and the presence of positive feelings in one's life. Well-being is a multidimensional and ambiguous concept based on both hedonic (subjective well-being) and *eudaimonic* (psychological well-being) elements. The results gained from the *eudaimonic* scales of a well-being have been reflected in more than 150 scientific journals. Psychological well-being was at the centre of attention of researchers since the time of Aristotele (Seligman, 2011) but still remains unexplored due its overly broad definition and blurred nature. Aristotele introduced the notion of "eudaimonia" to reflect one's virtues and an ability to develop one's full potential. The notion of a wellbeing was reflected in Aristotele's "*Nichomachean Ethics*," and has impacted the understanding of well-being in psychology. Similar concepts were reflected in Maslow's self-actualization theory. Later Carol Ryff has actualized the term in a broader way. *Eudaimonia* most often is discussed as opposite to *hedonic* well-being, that involves affective and pleasure component. A large portion of research has been devoted to a meaning of life as a part of *eudaimonic* well-being that was is also included in Ryff's model of a psychological well-being. As Heintzelman (2018) argues, there is a strong evidence that *eudaimonic* and hedonic aspects of well-being are strongly related. Chen et al. (2012) utilized a bifactor model to study the connectedness between *eudaimonic* and *hedonic* well-being. The eudemonic perspective includes the notions of happiness as well relates to self-determination, meaning in life, and self-realization (Ryan &Huta, 2009).

Dodge et al. (2012) provides an overview on research on a well-being from Aristotle until nowadays. They see the concept as multidimensional and extremely complex notion for measuring. Carol Ryff (1989) perceived psychological well-being from the *eudaimonic* perspective that includes personal

development and commitment to existential challenges of life. Ryffs (1989) defined the major aspects of the concepts, such as autonomy, environmental mastery, positive relationships with others, purpose in life, realization of one's potential and self-acceptance. Thus, both objective and subjective elements are being measured so far. Psychological well-being is related to both demographic factors (Lee et al., 2016), certain personality qualities (Dangi & Nagle, 2015), and socioeconomic conditions (Boyce et al., 2010). Wright & Hobfoll (2004) explore how employers' psychological well-being influences their performance at work. This is particularly topical during the pandemic and in times of crises. In their study, the authors Wright &Hobfoll (2004) established a bivariate relation among psychological well-being, organizational commitment, and job burnout. Some researchers choose to focus mainly on one aspect of a well-being, such as satisfaction with life, omitting other aspects of well-being. Shah and Marks (2004) chose to focus only on happiness by omitting other important aspect as well. Besides of hedonic and *eudaimonic* aspects of well-being, added resilience, one's ability to come with the situation, and adopting health problem solving strategies.

Carol Ryff's six categories of well-being included the following: self-acceptance as evaluated in high level means positive attitude towards oneself, personal growth as openness to new experiences, improvement of oneself over time, a purpose in life that signifies one's belief that life has a meaning, positive relationships with others, one's ability to build strong empathic ties with others, to build strong human relationships with others, mastery, one's ability to resist social pressures, and self-acceptance.

Well-Being in Times of Pandemic

In a number of national contexts wellbeing is considered as a significant aspect of individuals' life. Individuals with higher level of resilience can cope better with the anxiety and difficulties at work and stressful situation at work. COVID-19 has left immense psychological impact on the community at large. There are a great number of studies that have been carried out with the aim to explore the relations between a mental wellbeing and distress during the pandemic (e.g. Gray et al., 2020). Socioeconomic disparities increased health issues and anxiety among the population therefore the situation at the customs created stressful working conditions at the customs as well. Custom employees were among many frontline workers who had to work in the midst of uncertainty and upheaval. The anxiety of working in such an environment indirectly increased employees' anxiety and risks to be infected. Employees demonstrated their resiliency in the face of disease outbreaks. They carried out their duties at the customs at great personal risk conditions. Additional stressors for the employees were loss of the relatives and family members due to pandemic, economic anxiety

from losing one's job and financial instability – these constituted clear dangers for the employees. Among the feelings experienced during the pandemic were social isolation, financial insecurity, and uncertainty about the future that elevated depression and feeling of politeness. Therefore, employees should be trained to identify early signs of stress/burnout at work that need to be tackled accordingly. Other practical measures include easing tensions within the workplace. Regular testing for anxiety and health issues might be useful for custom workers (The World Health Organization, 2020).

Measurements of a Psychological Well Being

Nearly 25 years ago the model of psychological well-being that was designed by Carol Ryff addressed omissions in formulations of positive human functioning defined in the 1980s (Ryff, 2014). Ryff (2014) has examined how well being changes across adults' lifespan, how well-being is related to work and community activities, and how it influences one's health. She sees adults as proactive meaning makers how can face various challenge at their work environment in building a resilience in the face of adversity.

This methodology was repeatedly subjected to a validation process. The best-known and most common version contains eighty-four statements. The methodology was adapted by Shevelenkova and Fesenko in 2005, and even later in 2007 by Lepešinskis. According to Shevelenkova and Fesenko (2005), psychological well-being manifests itself as a subjective feeling of happiness, satisfaction with oneself and one's life, and experiences related to one's basic values and needs. Shevelenkova and Fesenko (2005) consider psychological well-being as a subjective phenomenon and experiences that are closely related to the internal evaluation system of these experiences. Psychological well-being is based on a subjective assessment of oneself and one's life, as well as on the aspects of the individual's positive well-being.

Research Methodology

The main methodology employed in this research was an adopted version of Ryff's questionnaire (Ryff& Keyes, 1995) for the custom employees by Shevelenkova & Fesenko (2005) with the aim to examine their psychological well-being (*The Scale of Psychological Well-Being* (SPWB)). Riff's six-factor model can be applied as a sound theoretical framework for investigating customs employee's psychological well-being. The questionnaire consists of a series of statements reflecting the six areas of psychological well-being: autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance. The main advantage of the questionnaire is that it

allows to measure and evaluate the objective and subjective aspects of a psychological well-being. The experience is characterized by a comparison of certain experiences with a norm, standard, and the ideal (Shevelenkova & Fesenko, 2005). Respondents were asked to rate statements on a scale of 1 to 6, with 1 indicating strong disagreement and 6 indicating strong agreement with the suggested statement. To prove the reliability and coherence of the survey questions, the authors used the Cronbach's Alpha criterion or scale coherence factor. In this sample, the Cronbach's Alpha coefficient was $\alpha = 0.645-0.788$ in 6 subscales, which indicates to a good internal coherence of a scale. The Cronbach's Alpha coefficient of the psychological well-being scale is $\alpha = 0.909$. The data was processed by the SPSS statistical package. Among the limitations to be mentioned are the self-reported assessments of a psychological well-being. Since the employees may provide desirable answers as competed to actual reality, the data was gathered and interpreted by the researchers who work directly in this organization and are familiar with the work conditions in the organization.

Research Finding

In total 82 employees took part in this study on a voluntarily bases. The data includes information about the age and work experience of employees who work in the customs. The average age of employees who took part in this research was forty-six. The average experience of employees who work in Customs is fifteen years.

The authors have calculated Mean and SD of all six indicators of a well-being, such as positive relationships with others, autonomy, competence, personal growth, the purposeof life and self-acceptance. As this is reflected in Table 2, education influences several indicators of well-being. Employees with Master level has higher level of autonomy, competence, and self-acceptance and a personal growth as compared with those with the Bachelor degree. Education serves as a motivating factor for one's personal growth and professional development.

There are some differences among the employees in relation to gender criteria. Female participants see higher purpose in life even in the conditions of pandemic and are able to develops higher resilience. They pay more attention to personal growth in comparison with the male colleagues. Female participants see a potential in themselves for growth and they are more open to new experiences. They choose the strategy to growth in their personal and professional life over the time more as compared to their male colleagues. There are more and more females with each year who choose to work at the customs.
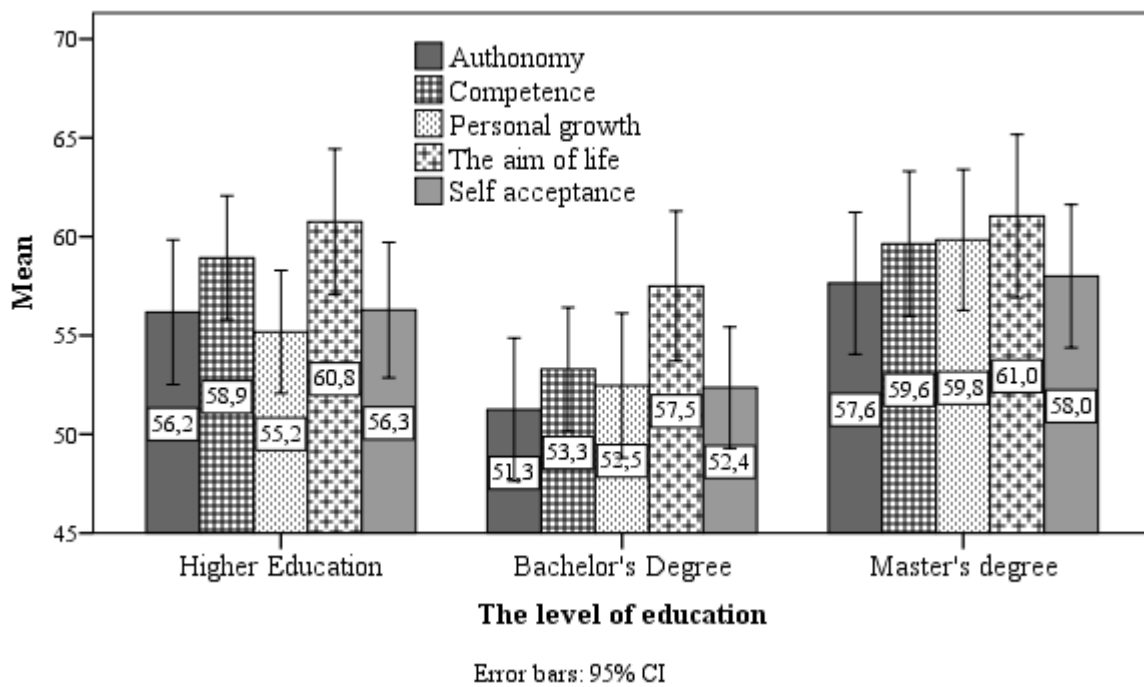
Figure 1 **Indicators of Psychological Well-being and the Level of Education of Custom Employees**
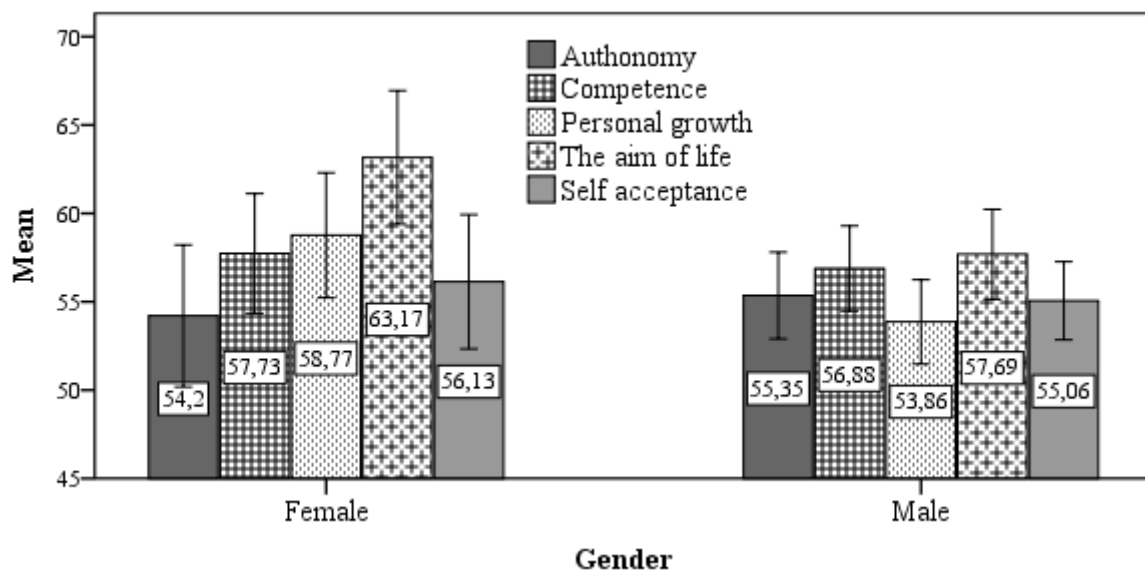
Figure 2 **Indicators of Psychological Well-being and Gender of Custom Employees**

The age and the duration of service in the customs of employee's was evaluated by the use of linear pair correlation coefficient or Pearson correlation coefficient. The correlation among the age and competence is significant, while in other cases correlation is not significant. Consequently, the age and the duration

of service are not among the determining factors for a psychological well-being at the customs.

Table 1 **Dimensions of psychological well-being of custom employees**

	F	Sig.
Positive ralations with others	1,310	0,276
Authonomy	3,597	0,032
Competence	4,761	0,011
Self acceptance	4,794	0,011
The prpose in life	1,111	0,335
Personal growth	3,101	0,050
Psychological well-being	4,606	0,013

The results gained as a result of independent sample T- test, indicates the importance and significance of the purpose in one's life and a self-acceptance among the custom employees that is particularly significant during the pandemic in turbulent times.

Table 2 **Psychological Well-being According to the Results of a T-test**

	t-test for Equality of Means		
	t	df	Sig. (2-tailed)
Positive ralations with others	,718	79	0,475
Authonomy	-,526	79	0,600
Competence	,422	79	0,674
Self acceptance	2,404	79	0,019
The purposein one's life	2,519	79	0,014
Personal growth	,532	79	0,596
Psychological well-being	1,310	79	0,194

Self-acceptance that has gained the highest evaluation among the employees, includes positive attitude towards oneself and the acknowledgment of multiple aspects of oneself. Having a purpose in one's life, means sensing meaning in one's life by holding beliefs that life has a purpose and that this is worth living even during pandemic.

Conclusions

Psychological well-being is a complex construct and includes *hedonic* (pleasure, enjoyment), *eudaimonic* (meaning, fulfilment) and *resilience* (coping, healthy problem solving) dimensions. The absence of theoretically sound bases for explaining psychological well-being gave raise to overly broad definitions of the term and encourages researchers to define and measure well-being in various contexts. This study focuses on examination of well-being of custom employees. Psychological well-being is particularly important for the individuals in the situation of crises and pandemic.

For the purpose of this study, the authors chose a variation of Ryff's scale of psychological well-being methodology adapted by Shevelenkova and Fesenko in 2005 that focuses on *eudaimonic* dimensions of custom employee's psychological well-being. The sub-scale (authonomy) of a psychological well-being represents the lowest level among the other five sub-scales (autonomy, positive relationships with others, competence, existence of a purpose in life and self-acceptance). This might be explained by strictly normative nature of work at the customs. The average indicator of a psychological well-being was Mean = 341.94

As it was discovered in this study, education is an important factor among the custom employees. Employees holding Master's degree have higher level of autonomy, competence, and self-acceptance and personal growth as compared with those with the Bachelor degree. Female participants see higher purpose in life even in the conditions of pandemic and are able to develop higher resilience. They pay more attention to a self-development as compared with the male colleagues.

Employees experienced the pandemic in their own unique way and a timeline. Some were dealing with illness or death in their immediate family, some have suffered from job insecurity and fear to get infected. Employees have to build resilience - the ability to handle situation, to maintain their energy in the face of changing demands, stressors and opportunities by being able to reflect, renew and realize their potential under pressure. Improvements in participants' ability to reduce their anxiety, depression and improve their sense of emotional control. This may be reached by regular testing of health issues and anxiety, by early identifying the signs of burnout at work and tackling them accordingly. Focusing on participant's sense of purpose, providing a support system, and building their resilience are among the tasks of the custom management.

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IMPACT OF COVID-19 ON BORDER GUARDS TRAINING IN LATVIA, LITHUANIA, ESTONIA AND FINLAND

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Abstract. *Due to Covid-19 the use of educational technologies, efficient and meaningful implementation of digital learning possibilities have become particularly important topics in order to develop border guards training. Issues related to training online, communication via several platforms, possibilities do develop interactive training content, need to use the potential of e-learning opportunities have become routine topics of discussion and ongoing research. Trainers of border guard training institutions have to tackle unexpected, unexplored, challenges and tasks related to border guards training due to Covid-19. Digital competence is particularly important to implement efficient online communication environment. To find out training and learning outcomes and define further necessities of e-learning development during emergency situations the authors of this research explore the scientific literature on the current research results, methodologies, approaches and best practices on developing e-learning systems in educational contexts during Covid-19. Survey results on attitudes, experiences and suggestions of border guards' trainers in Latvia, Lithuania, Estonia and Finland have been analysed to put forward suggestions for further border guard training development particularly in e-learning context during emergency situations.*
Keywords: collaboration, development of digital competence, share of best practices.

Introduction

Spring of 2020 triggered new focus on transforming education and increasing educators' digital competence development both at civil and militarised training institutions since rapid shift from traditional face-to-face to online learning became inevitable process, essentially needed to continue the training process for border guards despite several restrictions. Efficient training of law enforcement officers, namely border guards, is the guarantee of our borders' safety and security. One of the key factors to reach successful outcome of border guards training is the integration of theory and practice to match daily job needs. Border guards as such and the training of border guards is in specific military training environment, hence particular attention to practical demonstration of skills demonstration is absolute requirement for carrying out

future service duties. Due to specific training subjects such as weapon and shooting training, patrol tactics, document and vehicle examination it is not fully possible to reach learning outcomes and master the skills without face-to-face lessons.

Although there is a huge potential of using online communication platforms and learning management systems as Moodle, it has been concluded in several research findings and empirical observations that not all trainers are fully aware of online learning opportunities and are eager to develop interactive training content by using modern digital tools. Lack of practical experience in working with digital resources and conducting online lessons decrease efficiency of students' learning experiences and learning outcomes. The goal of this research is to identify the factors which facilitate or restrain the development of educator's digital competence and effective use of education technologies in border guards training process. To reach the goal of this research authors analyse scientific literature concerning education and technologies, summarize the success factors and drawbacks concerning border guards training during pandemic caused by Covid-19, based on scientific research findings and questionnaire results develop suggestions for improving the border guards training process.

General Impact of Covid-19 on Education

Covid-19 has restarted research trends concerning education and technologies interrelation, much effort has been put into analytical researches, collaboration projects to set future education strategies. Research carried out by UNESCO in 2020 identifies and outlines the problems due to the COVID-19 pandemic, it has been noted that many education systems responded by rapidly setting up remote learning systems to provide learning continuity, however they faced numerous challenges as students not having have access to the internet or certain devices, concerns related to safety and privacy online, teachers being unfamiliar with remote-learning solutions and finding difficulties in adjusting learning content to remote learning formats. Furthermore, the report outlines several drawbacks as uneven education-system decision making across administrative levels, budgetary issues, digital maturity, and operational capacities of education institutions (UNESCO, 2020).

The European Commission has developed the Digital Education Action Plan for 2021-2027 to promote digital education, transform Europe's education and training systems in a lifelong learning, share knowledge, good practices and experience and other important aspects concerning our daily activities in digital age. This plan includes deep analysis of the COVID-19 crisis on the quality of education concerning the access, infrastructure and educators' competences with regard to remote training processes. According to this plan an effective

relationship between the use of digital technologies and learning outcomes depends on the following contextual and process-related variables:

1. Educators play a key role in adopting and using digital technologies for teaching, learning and student assessment in an effective way, fully online, remotely, or in a blended format thus educators need to have an appropriate level of digital competence and be able to recognise their potential for educational purposes.
2. The effectiveness of digital technologies for teaching and learning hinges on teacher practice and on how they integrate these tools into their teaching process.
3. Educators' perception of technologies as a learning tool are influenced by the organisational culture, which allows for different levels of autonomy or agency and shapes the way digital technologies are implemented and used for teaching and learning in a specific context.
4. The extent to which technology is deployed in purposeful and targeted ways.

Among other conclusions of Digital Education Action Plan it has highlighted the way we use computers and interact with our students. It has been concluded that, while using computers to look for information positively affects student achievement, the opposite occurs when computers replace face-to-face instruction time to practice skills. Researchers conclude that embedding digital technologies in teaching and learning processes is not only a simple replication or transposing face-to-face practices or traditional approaches online but instead it is a complex process requiring robust digital capacity, including planning for organisational change, ongoing monitoring and adaptation, and a strong focus on learning driven pedagogy, leadership, professional development, and a shared understanding and approach to using technology to support and enhance teaching and learning (European Commission, 2020). Digital Education Action Plan as well as several researchers (Ilomäki & Lakkal, 2018) highlight the concept of digital capacity of educational institutions as progressively important success factor. This concept is interrelated to similar ones defined by literature. Researchers (Killen, Bentham, & Knight, 2017) define organisational digital capability as the extent to which the culture, policies and infrastructure of an organisation enable and support digital practices.

Several research findings highlight the importance of meaningful integration of modern digital technologies in the educational process that will improve the quality and efficiency of learning and teaching in higher education, motivating students for learning and enabling them to acquire higher levels of competences. Researchers urge higher education teachers to continuously improve their digital competences for planning, delivering and assessing the educational process and communicating and interacting with students and peers (Čižmešija, Diković,

Domović et al., 2018). According to conclusions of Daniela (2019) there is a need to prevent a centrifugal effect in technology enhance learning environment that can contribute to the fragmentation of the educational process, and further encourages to develop the principles of Smart Pedagogy to become the driving force for the technology enhance learning by setting priority to supplement teacher competence with predictive analytical competence. In the context of technology-led pedagogical transformations, Daniela defines SMART pedagogy as:

S – smart (in the sense of intellectual smartness), social

M – meta-cognitively developed and motivated

A – anywhere, anytime (in the sense of a learning process that is flowing across the temporal and spatial borders)

R – rapidly changing

T – technology enhanced, which considers the peculiarities of human development, the taxonomy of the educational process where the next generations are using the benefits of technology, and *Smart Pedagogy* bringing the students of the next generations in front of progress to serve as developers for new levels of innovation (Daniela, 2019).

According to Falloon (2020) technology-enhanced learning can be used for a variety of purposes to radically change the learning environment; however, educators are not always ready for these challenges. Similar conclusions can be found on a daily basis across all education sectors as well as in several research conclusions. Researchers suggest to increase the technological skills of all involved in education process to plan adequate pedagogical course related to remote teaching. In order to improve teachers' and learners' technological skills in relation to new emerging models and approaches encouraging the effective use of online learning systematic training and professional development activities should be provided. As the results of this challenges related to gaps in digital literacy in education among teachers, students and parents in various countries have been revealed. Researchers conclude that a precise plan should be developed, providing structured and planned educational material (content, methodologies and common goals) and more adequate e-learning platforms by using interactive suitable digital learning resources (Ferri, Grifoni&Guzzo, 2020).

To tackle drawbacks of remote learning during Covid-19 there have been suggestions provided by UNESCO for structuring teacher schedules in order to reach better learning outcomes:

1. Teachers are advised to limit length of individual lessons and combine synchronous sessions with asynchronous activities (e.g., independent work followed max 30-45-minute live lesson) to avoid fatigue,

2. Teachers are encouraged to offer various learning experiences, and free up teachers' time to spend on other tasks, dedicate some time to

teaching students how to use learning tools and platforms and explaining why they have been selected,

3. Flexibility in designing synchronous learning schedules (e.g., provide options to organize synchronous sessions outside of typical school hours if preferred for teacher and student population) are highly advisable.

4. Regular synchronous group activities focused on community building e.g., virtual clubs and social activities should be held, including regular face-to-face connection with students in order to assess well-being and barriers to engagement.

5. Finally, teachers are encouraged to participate in ongoing, frequent professional development that includes formal trainings (e.g., content delivery, training on tools) as well as informal opportunities to learn from peers as well as reserve blocks of time for lesson planning and curriculum development (UNESCO, 2020).

Impact of Covid-19 on Border Guards Training

State Border Guard College of the Republic of Latvia is the only education establishment for border guards in Latvia. Main goal of the College is to provide efficient formal and nonformal training for highly qualified border guards to ensure the inviolability of national and the EU external borders. To develop border guards e-learning systems the State Border Guard College of to the Republic of Latvia in collaboration with State Border Guard Service under the Ministry of the Interior of the Republic of Lithuania, Border and Coast Guard Academy of Finland and Estonian Academy of Security Sciences take part in Erasmus+ project "Strategic partnership for the improvement of e-learning systems in border guard training institutions 2018-1-LV01-KA202-047003". In order to improve the e-learning systems in border guards' education institutions and increase teachers' theoretical knowledge and practical skills in using modern e-learning tools the Partners explore, compare, analyse and summarize the best practices in planning and implementing e-learning systems for border guards training. Partners have carried out surveys on national needs analysis in e-learning context, results have been summarized in order to meet the actual needs of border guard training institutions with expected Project outcomes. The results of the needs analysis indicate common drawbacks as the lack of strategic approach to e-learning development and lack of teacher digital competence to develop interactive training content.

On the basis of Project goals, results of national needs and in order to successfully carry out Project development dissemination and sustainability

activities Partners' e-learning systems SWOT analysis indicate the following concerns:

- There is a constant demand and common tendency to introduce e-learning systems, transform traditional study forms in e-learning environment, courses in border guard training institutions, however there is no strategic approach with regard to teachers' in-service training;
- Lecturers lack in-depth knowledge and motivation to develop e-study courses. The lecturers' view on design and implementation of e-learning in the learning process is different within the partner countries;
- Partner countries use the Moodle platform, but their versions vary, for example, interactivity elements need to be added to existing e-learning systems to have compatibility whilst sharing learning resources with one another;
- Teachers' responses in survey results indicate disbelief in e-learning advantages, more attention should be paid to analytical thinking development by showing best practice results from other countries
- IT professionals have a heavy workload in administering e-courses, therefore, in-service training in pedagogical field is needed, particularly to newcomers in border guard training institutions;
- The implementation of the project will enable the improvement of existing e-learning systems and make them more interactive, and the development of lecturers' qualifications will enable the development of e-learning processes in partner countries.

In order to develop e-learning systems for border guards partners have developed e-learning handbook containing guidelines in e-learning content development for border guards. The handbook includes include samples of best practices and instructions for efficient e-learning course development and implementation. Upon agreement of Partners unanimous decision was made to develop guidelines both available in Moodle content and printed version thus providing open access and ease of use for teachers and IT specialists. The content of the guidelines includes the following topics:

Topic 1: Planning of e-learning. This section includes theoretical and practical information on benefits of e-learning, tips on how to plan an effective and sustainable e-learning course for border guards. The aim of the topic is to increase the lecturers' knowledge about the possibilities on the potential of e-learning in border guards training process, to guide the new lecturers in developing e-learning courses, to highlight the peculiarities of teacher – student, student – e-content interaction. Practical information is included on how to set e-learning outcomes, what are the roles of parties involved in e-learning?

Topic 2: Design and implementation of e-learning. This topic covers information on best practices in on the design stages of e-courses, the structure of the e-courses, user friendly navigation, visual attractiveness of the content, the interactivity elements and the grading and feedback.

Topic 3: Pedagogical tips on e-learning. This topic covers best practices that teachers should take into consideration when designing and delivering an e-learning course e.g. how to transfer classroom materials into interactive content, how to communicate with students online, development interactive teaching aids e.g. in H5P module. The aim of the topic is to increase the knowledge of the lecturers about the possibilities of developing interactive teaching aids, transforming classroom materials for use in e-environment. The handbook includes development of samples and instructions for interactive content development particularly in Moodle platform.

The Project involves teacher digital competence development activities by organising several formal and informal activities. In order to increase border guard training institutions teachers' knowledge and skills in e-learning planning, design and implementation Partners have been implementing professional development activities in Partner countries explaining, demonstrating and sharing the best practices of interactive training content and successful delivery of online lectures.

Data and Methodology

To determine the factors that influence, decrease and increase e-learning systems capacities for border guards, scientific, pedagogical and psychological literature was analysed and evaluated, a survey of trainers was conducted, the data obtained was processed and analysed, interpretation and content analysis of the results obtained were performed.

To explore the existing situation in the field of Covid-19 impact on border guards training systems in Latvia, Lithuania, Estonia and Finland a study was conducted. Opinions of teachers were gathered and based on the findings, opportunities for raising and improving the efficiency of the organization of the training process were explored. The research method included setting research objectives, the selection of methods for data gathering, processing, analysis and interpretation of the data. The following research objectives were put forward:

- perform a survey to find out the impact of Covid-19 on border guards training during since March 2020 onwards;
- process and analyze the data obtained for improving the efficiency of border guards training, particularly in remote learning context in order to further develop e-learning systems for border guards.

To ensure the validity of the data, teachers from all units involved in the fulfilment of the study processes were included in the study. The participants of the survey were teachers with the length of service in specific position was from 5 to 20 years. Mixed methods approach was used in data processing and analysis, which combines together quantitative and qualitative research strategies. To increase the reliability of the research results, data triangulation was used, obtaining and processing quantitative and qualitative data.

Research Results

To explore the existing situation, impact of Covid-19 on training process a survey of 44 teachers was conducted. To gathered the opinions of teachers survey from open questions was conducted and the respondents were given an opportunity to reflect their thoughts, attitudes, concerns and proposals related to border guards training process. A content analysis of the responses was performed with the aim to make conclusions and confirm the research results obtained theoretically and teacher survey about the existing situation related to Covid-19 impact on remote training process which helped to identify further development factors.

One of the key questions was to identify the level of teachers' digital competence which evidence the need to further conduct competence building activities. According to survey results 43% of the teachers when working with Moodle consider themselves as explorers who can add resources and build basic tests, 25% consider themselves to be beginners i.e. understanding basic functions and the rest of teachers consider themselves as the experts who can build advanced tests, modify settings, restrictions, tags, competences.

A positive aspect was drawn that the dominant part of teachers (78%) consider that since beginning of Covid-19 their Moodle competence has increased and they have had the opportunity (94% respondents) to increase their distant learning competence since Covid-19 started (working with Moodle, conducting online lessons). As a positive moment they mentioned the fact that due to Erasmus+ project they have access to materials (instructions) how to work with Moodle and conduct online lessons. Most of the teachers also agree that currently there are more opportunities to increase my digital competence (working with Moodle) than it was before Covid-19 started (79% of respondents in total). Not all teachers (12% only) consider the distant learning process their institution has been implemented successfully and 43% responded neutrally responded to this question which causes discussion and study what improvements are further needed. Similarly, their responses varied on the question whether they are able to carry out distance learning process efficiently - 50% respondents consider themselves to be efficient remote trainers but 12% believe their colleagues are not

able to carry out distance learning process efficiently. In total 86% consider their institution currently to be more efficient in distant learning process due to Covid-19. When answering the question on learning outcomes 75% believe that distance learning outcomes are not so effective as face to face learning outcomes. Although most of respondents (87%) have done online lectures in Zoom, Webex and other online platforms only 49% responded that they feel comfortable during online lessons. As the reason they don't feel comfortable during online lessons they consider psychological concerns as feeling of isolation, unusual students' behaviour online (unwillingness to use cameras, lack of interaction, connection problems) etc – 50%, concerns about their IT competence in using Zoom, Webex etc. – 25% (discomfort, lack of experience in videoconferencing applications and Moodle). 25% believe face to face communication to be more effective than online.

Surprisingly there were no equal agreement whether online communication between students and teachers allow to reach better learning outcomes and there was absolutely equal share of percentage in between strong agreement or strong disagreement which evidence the fact that teachers have no research-based conclusions what type of communication increases learning outcomes. Teachers also mention (42%) that most of the time students spend learning individually with computer, online lectures are not often implemented which provides us with the room for discussion of what is the efficiency percentage between student-centred and teacher-led model of remote training. Another evidence that there is dominantly classic dialogue built and teacher centred lectures carried out since only 18% of teachers during online lessons divide students in online working groups, in pairs, namely use breakout rooms function in Zoom or Webex. 97% of teachers believe they must have good pedagogical skills to conduct efficient online lessons and only 68% believe they have these skills. When answering whether they think that institution's management adequately organized distance learning process in Spring 2020 responses divided. At rate of 43% respondents a strongly agree and 12% disagree that management adequately supported them. Providing comments what was not so well-organized during distance learning process and what would respondents to be improved the following responses were provided by teachers:

- *Still there is some scepticism on e-learning, especially when it comes to the subjects, those that are by nature practical skills orientated ones.*
- *Teachers and students need to get clear instructions on how to use one or another tool, a kind of online seminar about the platform or tool they are going to use during online classes.*
- *There was no common concept of remote learning, no standard for all.*
- *Administration is reluctant to support teachers. Students can watch hundred moves with boxing matches, but they will not learn how to fight*

> *after all. What about shooting skills, physical activities? Working with data bases? They need practice, and we need to see their reaction immediately.*
> - *Faster management involvement in the technical field was required (provision of equipment, stable internet connection, etc.)*
> - *There was not enough good cooperation with commanders of training companies. There is a need to rethink the mechanism for motivating teaching staff to develop and integrate interactive learning material into Moodle. Specific requirements (which should be developed), evaluation criteria (if not available) and types of awarding should be defined (stipulating that only teachers whose material is considered to be of high quality and useful, as well as positively evaluated) will be awarded.*

As seen from responses teacher motivation system has to be revisited. Also when answering to motivational factors 80% of teachers believe that those who create interactive learning content in Moodle should be positively motivated by managers e.g. extra bonuses, rewards etc, 75% think teachers who cannot create interactive learning content in Moodle should be strongly influenced by managers to update their digital competence. As to the biggest motivators for development 56,3% state that they would develop their digital competence if there was a positive encouragement from management and 37,5% if there was feedback provided from students.

Conclusion

Based on scientific literature analysis and teacher survey conducted as the positive moment caused by Covid-19 pandemic across all education sectors is the increase of digital competence development opportunities for teachers. Highest concerns highlight low involvement of teachers whilst communicating online, disbalance of independent learning and online learning as well as the need to increase digital capacity of education institutions.

In order to further develop border guards training systems in Latvia, Estonia, Lithuania and Finland based on scientific literature research, analysis of Erasmus strategic partnership project outcomes and teachers survey authors of this research put forward the following suggestions:

1. In order to develop border guards training systems, particularly in remote training contexts, digital capacity in terms of technologies i.e. laptops, tablets, stable WI-FI coverage both for trainers and cadets should be put as one of priorities to further develop efficient e-learning environment.

2. Survey results disclose the need to continue the development of teachers' digital competence which should take place on a regular basis both at local and at international contexts such as Erasmus+ strategic partnerships or mobility visits and other formal, non-formal and informal teacher digital capacity development activities. Particular attention during teacher digital competence development activities should be focused on pedagogy and technology interaction and integration aspects in order to continue access to highly interactive and meaningful training content as well as provide efficient online collaboration opportunities.

3. Regular student feedback and support in interactive content development is needed in order to analyse positive and negative aspects of remote training. Graduate students should be involved in interactive content development, piloting and evaluation.

4. Specific mechanism for motivating teaching staff to develop and integrate interactive learning material into Moodle should be developed followed by adequate evaluation and supervision process, individual approach to each teacher to investigate factors influencing digital competence development. Specific requirements and evaluation criteria of interactive training content should be developed.

Acknowledgements

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COVID-19 AND THE DIGITAL TRANSFORMATION OF EDUCATION: THE CASE OF LATVIA AND LITHUANIA

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Abstract. *Educational ecosystem is facing rapid changes due emerging technologies and their rapid penetration to daily use. When the COVID-19 pandemic emerged, it only accelerated many of these trends. Nevertheless, some education systems have been able to adapt to the changing situation and digital transformation more easily than others. Digital competence is essential for learning, work and active participation in society in digital transformation context. Given the pressure of change on existing learning institutions and learning models, ICT offers broad opportunities for developing a different view. In order for digital education actors to adapt to the digital transformation in the education sector, they also need to have the skills needed to use technology effectively. However, there is a lack of computer and technological literacy. In Latvia and Lithuania, about one in three workers has limited or no digital skills, and most STEM vacancies remain unfilled because workers do not have the necessary competencies and are not inclined to study or retrain. The aim of the study is to assess the effect of dynamic capabilities for added value educational outcomes during COVID-19 recession. The results of the study revealed that dynamic capabilities have a direct positive effect on value based education outcomes.*
Keywords: *digital transformation, dynamic capabilities, education, e-learning, lifelong learning.*

Introduction

Digital transformation is defined as „*the process through which companies converge multiple new digital technologies, enhanced with ubiquitous connectivity, with the intention of reaching superior performance and sustained competitive advantage, by transforming multiple business dimensions <…>*" (Abdelaal, Khater, & Zakil, 2018, p. 7). Digital transformation is different from traditional forms of strategic changes because digital technologies determined the speed of change processes and this creates an environment that is much more unstable, uncertain and complex (Matt et al., 2015; Schoemaker et al., 2018; Loonam et al., 2018). This includes changes of key education services delivery and affects procedures, as well as organizational structures and management

principles in order to carry out these dynamic transitions across the organization and throughout the educational ecosystem (Matt et al., 2015). The development of information technology creates new challenges for the state, for schools as well as for society. Therefore, it is necessary to develop new abilities that could be used to diversify teaching methods to help educators and learners to orientate themselves in the modern learning process. The outbreak of the new coronavirus (COVID-19) caused unexpected and fundamental challenges in various areas of public life. In response to the threats posed by the pandemic, there is a need for rapid solutions and rapid response measures. Information gets older before we acquire the opportunity to use it because of technical innovation and insightful culture. For this reason, additional and/or expanded skills and abilities should be acquired to be flexible and adapt technological changes.

This study revolves around the question what is the relation between dynamic capabilities and value based education outcomes in rapidly changing environment.

The aim of this paper is to assess the effect of dynamic capabilities for added value educational outcomes during COVID-19 recession. Quantitative research method was applied in order to get deeper understanding about existing situation in Lithuania and Latvia.

This paper contributes to education and education innovation management literature by applying the dynamic capabilities framework to identify specific aspects of value creation and exchange. On the practical side, this paper sheds light on the current education situation in Lithuania and Latvia and helps to improve understanding of added value perceived by digitalization in education and how dynamic capabilities can help to adopt these changes.

Digital Transformation in Lifelong Learning Education during COVID-19 Recession

"The digital transformation calls for policies that foster strong foundation skills, promote life-long learning and strengthen the link between education, training and the world of work. Complementary structural policies that promote efficient resource allocation or that enhance investment in intangible assets can strengthen the link between skills and productivity. While education and training policies fall mostly under the responsibility of Member States, the EU can support human capital development by promoting cooperation and the exchange of best practices among Member States, and through targeted financial support" (ec.europa.eu, 2020). There is a growing consensus on the competencies needed according to changing environment. A wide variety of key competency formulations is shown in the Table 1, and this was already highlighted by UNESCO in 2017 (UNESCO, 2017).

Table 1 **Key Competencies** *(modified by the authors based on UNESCO, 2017)*

Basic skills	Modern skills and competences
Learning to learn	Collect, analyse, organize, and critically evaluate information
Personal skills	Taking responsibility for yourself and your actions
Social skills	Demonstrate an understanding of the world as a set of connected systems
Cognitive skills	Make effective use of science and technology
Communication skills	Communicate effectively
Information and communication technology	Ability to use digital tools

Any predictions we make now about education are bound to be partially wrong. We cannot depend on current predictions based on recent trends to carve our future educational goals, standards, and curricula in stone. Rather, we must create flexible guidelines that help prepare our students and educators to be versatile enough to succeed no matter how our unpredictable world changes around us. A succinct representation of versatility can be visualized via IBM's T-shaped individual—one who is capable of both depth and breadth (Spohrer, 2004), (see figure 1).

Figure1 **T-Shaped Individual** *(Spohrer, 2004, IBM)*

An important point to underscore COVID-19 accelerating progress of invention and technology, but we can carefully manage how they are used in our lives. We need to be clear about what we want most from technologies in order to continue to reduce their negative effects and further increase their positive potential. We need to be very aware of using technology as an enabling tool to achieve our goals, not just because of its attractiveness as an innovation. Our education systems need to concentrate on universally constructive outcomes - the growth of personal abilities, skills and understanding for all learners. Both students and educators need to learn to understand the larger effects of their actions, to behave actively in the world, and to reflect and adjust as the world changes.

Pros and Cons of E-learning

"As technology progresses, the education necessary to utilize it effectively also grows and education must adapt to keep up. In this way, technology and education are in a race" (C. D. Goldin and L. F Katz, 2009). "Educational institutions have recognized e-Learning as having the prospect to transform people, knowledge, skills, and performance" (Henry, 2001). Just as there are different types of e- Learning, there are also different ways of employing the technique in education. The adoption of e-learning in education process has several benefits, and given its several advantages and benefits, e-learning is considered among the best methods of education (OECD, 2020). Several studies and authors have provided benefits and advantages derived from the adoption of e-learning technologies into education process. Some studies give advantage of e-learning as its ability to focus on the needs of individual learners (Kapenieks, Daugule, 2019). E-learning strategies for delivering knowledge in digital age one of the advantages of e-learning in education is its focus on the needs of individual learners as an important factor in the process of education (rather than on the educators' or educational institutions' needs) (Lee, Cheung, & Chen, 2005). Each component plays an important role in an E-learning system.

*Table 2 **Advantages and Disadvantages of E-learning System** (modified by the authors based on OECD, 2019, Henry, 2001, Kapenieks, Daugule, 2019)*

Advantages of e-learning to the educators and/or educational institutions	• Reduced overall cost. • Learning times reduced. • Confidence that refresher or quick reference contents are available reduces burden of responsibility of mastery. • Proof of completion and certification, essential elements. of training initiatives, can be automated (EU, 2019).
Disadvantages of e-learning to the educators and/or educational institutions	• Consistent delivery of content is possible with asynchronous, self-paced e-learning (EU, 2019). • Flexibility of education. • The impersonality.
Advantages of e-learning to the students	• Students to complete training conveniently at from home and at any time. • Self-directed learning for slow or quick students reduces stress and increases satisfaction. • Interactivity: through the e- learning system educators can directly interact with student and solve their problems. • Expert knowledge also available to all student and student can access any time.
Disadvantages of e-learning to the students	• Reducing cultural and social disparities. Reduced social and cultural interaction can be a drawback. • The impersonality.

Dynamic Capabilities as a Driver for Added Value Education Outcomes

Research on dynamic capabilities has seen an increasing development but been considerably limited to conceptual theories. For example, dynamic capabilities are primarily represented through a microfoundation perspective (*See Figure 2*). This is a view that consists of (1) sensing opportunities and threats, (2) seizing opportunities, and (3) transforming the organization's business model (Teece et al., 2007; Arndt and Pierce, 2018; Salvato and Vassolo, 2018) Researchers in the field of strategic management are primarily concerned with dynamic capability variables of integration, building, reconfiguration, modification, activation and redirecting of substantial resources and routines to gain competitive advantage. Adopting the approach of Teece et al. (1997), this study defines dynamic capabilities as the capabilities to integrate, learn and reconfigure internal and external resources and competencies in response to changing environments.
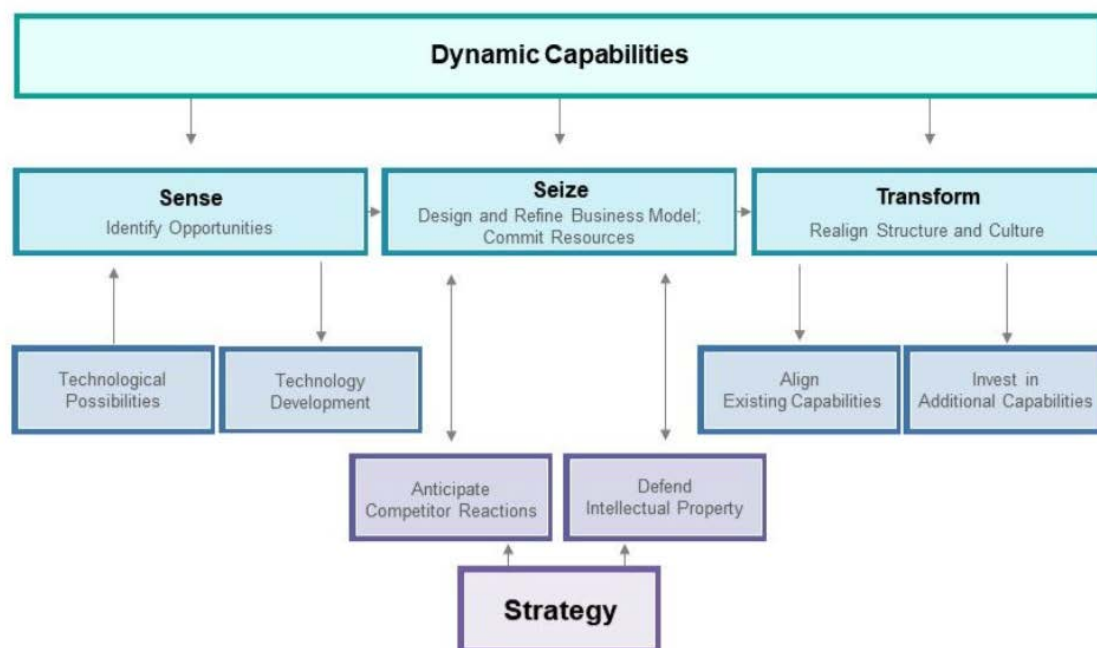
*Figure2 **The Key Elements of Dynamic Capabilities** (modified by the authors based on Teece et al., 2007; Arndt and Pierce, 2018; Salvato and Vassolo, 2018)*

Dynamic capabilities as a term itself refer to two key sub-concepts: "dynamic" and "capabilities". According to Teece et al., (1997), "dynamic is the capability to renew capabilities so that they keep pace with the changing operational environment" (p. 515). The key definitions of dynamic capabilities are provided in Table 2. Since the digital education providers in this study operate in an a rapidly changing environment caused by COVID-19, they need to identify,

develop, protect, and deploy resources and capabilities in a manner that will bestow them with a sustainable competitive advantage (Amit & Schoemaker, 1993, p.35) and ensure value added outcomes.

*Table 3 **Key Definitions of Dynamic Capabilities** (modified by the authors based on Zollo, and Winter (2002); Heftal et al. 2007; Teece 2007)*

Author	Definition
Zollo, and Winter, (2002, p. 340)	"A dynamic capability is a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness".
Helfat et al., (2007, p. 1)	Dynamic capabilities are "the capacity of an organization to purposefully create, extend or modify its resource base".
Teece, (2007, p.218)	Dynamic capabilities "can be disaggregated into the capacity (1) to sense and shape opportunities and threats, (2) to seize opportunities and (3) to maintain competitiveness through enhancing, combining, protecting and, when necessary, reconfiguring the business enterprise's intangible and tangible assets".

According to Amit and Schoemaker (1993), dynamic capabilities are very cardinal in the efforts to gain a competitive advantage in dynamic environments (See Figure 3).
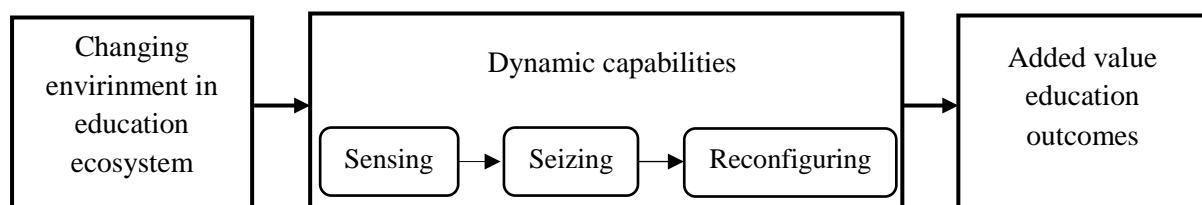
*Figure3 **The Impact of Dynamic Capabilities for Added Value Education Outcomes** (authors)*

In the educational sector, the results are called learning or education outcomes, and they are defined as "statements of what a learner knows, understands and is able to do on completion of a learning process, which are defined in terms of knowledge, skills and competence" (Mason et al., 2014, p. 74). Such added value education outcomes can only be necessitated by the dynamic capability which enables it to leverage current resources effectively, create new resources, acquire additional external resources, and eventually release existing resources to adapt to the changing environments (Lin and Wu, 2014).

Materials and Methods

Theoretical. To assess the challenges and opportunities of digital transformation in education, desk research was carried out, assessing existing education system review and delivery of educational services during COVID-19 and comparing these results in two countries: Latvia and Lithuania. These countries were chosen for the study owing to the similarity of their education systems. Pedagogical and managerial literature, legal and educational documents were analysed.

Empirical. Besides desk research quantitative research method chosen is the survey, implemented through a self-administered questionnaire. The variables were measured using Likert-type scales, so the respondents were asked to indicate their level of agreement with the items, in a range from 1 (strongly disagree) to 7 (strongly agree). This method has been adapted in order to evaluate self-assessment (Petrulyte, 1995), the Rosenberg self- evaluation scale (SES)) and learning motivation (Entwistle, 1980, 1983), and investigate the significance of dynamic capabilities for value based educational outcomes. We prepared a questionnaire consisting of 3 sections.

The first section of questionnaire (Q1-Q5) was focused on respondents' self-assessment, learning motivation, drivers and barriers to digitalize.

The second part (Q6-16) covered the background of development the dynamic capabilities. In this section the questions were related, firstly, with the experience with digital education tools and methods. It was expected to find out what kind of digital education solution they are dealing with. The subsequent questions were address for the understanding the development of dynamic capabilities in organization and was created based on Teece (2007) dynamic capability model, where sensing (or detecting the need – info channels), seizing (or decision making) and reconfiguring (deploying or appraisal) were analysed.

The third part of the questionnaire(Q16-Q20) focused on the value based education outcomes for education ecosystem actors and this section of the questionnaire enabled us to recognize added value outputs.

Statistics. Data grouping of the research, summarize and compare, graphical data representation by Windows Microsoft Office Excel 2016 and SPSS v17 programs.

Research Results

The data collection process took place from 2nd of April 2020 to 8th of November 2020. The survey was anonymous. The questionnaire was posted in https://docs.google.com/forms by automatic mode. This study uses the key informant method to collect survey data in the private and public educational

services industry in Latvia and Lithuania. In organizing the study, it was expected that despite this similarity, adaptation and adaptation will vary across countries. Analysing the answers received during the research, there was no significant difference between the respondents from Lithuania and Latvia, only slight differences in individual questions. For this reason, the data was analysed without disaggregating the results by country. Data related to the respondent (*N-278*) is detailed in Figure 4 and Figure 5.

Position occupied	Frequency (%)	Type of School	Frequency (%)
Principal	162(58.3%)	Private	220 (79.1%)
Vice-principal	8 (2.9%)	Public	32 (11.5%)
Head of Studies	24 (8.6%)	Subsidized	13 (9.4%)
Department Head	40 (14.4%)	*Number of students*	
Coordinator	10 (3.6%)	Less than or equal to 100	132 (47.4%)
Teacher with no extra responsibilities	28 (10.1%)	Between 101 and 200	140 (25.2%)
Others	2 (0.7%)	Between 201 and 300	34 (12.2%)
No answer	4 (1.4%)	Between 301 and 400	14 (5.0%)
Experience		Between 401 and 500	8 (2.9%)
More than 5 years	56 (20.1%)	More than 500	18 (6.5%)
Between 5 and 10 years	58 (20.9%)	No answer	2 (0.7%)
More than 10 years	160 (57.6%)	*Number of educators*	
No answer	2 (1.4%)	Less than or equal to 10	148 (53.2%)
		Between 11 and 20	74 (26.6%)
		Between 21 and 30	30 (10.8%)
		Between 31 and 40	8 (2.9%)
		Between 41 and 50	8 (2.9%)
		More than 50	8 (2.9%)
		No answer	2 (0.7%)

Figure 4 **Data Related to the Respondent (N = 278)**

Before COVID-19 pandemic the educational sector was an environment that is not subject to turbulent changes, and all changes was caused by continuous technological development. However, the COVID-19 and changed way of service delivery resulted a greater attention to the development of dynamic capabilities in order to improve learning outcomes.

Statistical summary of the constructs means, standard deviations, and correlations (N = 278).

	Mean	Standard deviation	(1)	(2)	(3)	(4)
(1) Continuous technological development	4.3082	1.05350	(0.901)			
(2) COVID-19	3.9347	1.11311	0.686[a]	(0.876)		
(3) Dynamic Capability	4.6602	1.26761	0.572[a]	0.651[a]	(0.911)	
(4) Learning Outcomes	5.0221	0.98657	0.551[a]	0.550[a]	0.662[a]	(0.922)

The square root of the average variance extracted (AVE) is reflected on the diagonal of the matrix.
[a] The correlation is significant at the level of 0.01 (bilateral).

*Figure 5 **Statistical Summary of the Constructs: Means, Standard Deviations and Correlations (N = 278)***

These findings are consistent with the theoretical proposals of Augier and Teece (2009), who argue that service providers need high levels of skills, abilities and experiences to build dynamic capabilities in order to adopt to rapidly changing environment. The results confirmed and reveals that dynamic capabilities have a direct positive effect on value based education outcomes. In other words, the data show that dynamic capabilities act as mediators between existing environment (having the usual technological development) and unexpected conditions (digitalisation caused by COVID-19) and the learning outcomes.

Conclusions

In general, the education system is not an environment of particularly significant and unanticipated transition. Educational ecosystem is facing rapid changes mainly due emerging technologies and their rapid penetration to daily use. When the COVID-19 pandemic emerged, it only accelerated many of these trends. Nevertheless, some education systems have been able to adapt to the changing situation and digital transformation more easily than others. The usual diffusion of technology and innovation is due to the inevitable development of the educational ecosystem and the shift in service delivery and communication networks. Under normal conditions, educators can choose the usual means for their activities and the way services are provided. After the COVID-19 lockdown was implemented in a very short period of time, there was a need to solve problems related to the education system. The lowest losses were for those institutions that had previously started the process of implementing digital change before the COVID-19 pandemic. In addition, those who took the initiative faster, reoriented and changed their operating strategies without waiting for management instructions and understood how to properly address the problem and invest in the

digitization of the institution, won less stress, lost revenue, did not lose jobs. In addition, they were able to ensure timely uninterrupted service and quality of service. E-learning and distance learning became the main and only one possible way to ensure the educational services. In addition, it was very important to ensure the quality of services. The results of the study showed that dynamic capabilities play an important role in adapting to the changed and volatile climate that has evolved in the context of COVID-19 in order to ensure added value for educational outcomes across various educational service delivery channels (e-learning, distance learning, etc.). The results of the survey revealed that 57.59 % of respondents are in favour of the transition to e-learning. 64.02 % of respondents to the survey say that the results of training services have not changed or even improved. As many as 82.7% of the respondents indicated the possibility to feel, use and reconfigure the current situation as the main element of change. Nevertheless, the results revealed the unexpected result that 36,84 % of learners (regardless of their young age) do not have the right digital skills and sufficient digital literacy.

Acknowledgements

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DIVPUSĒJAIS SOCIĀLAIS DIALOGS IZGLĪTĪBAS NOZARĒ LATVIJĀ COVID-19 PANDĒMIJAS APSTĀKĻOS

Bilateral Social Dialogue in the Education Sector in Latvia During the Covid-19 Pandemic

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Abstract. *In 2020, the world was unprepared for the spread of the coronavirus pandemic. In Latvia, respective decisions and restrictions were made at the national, municipal and educational institution's level, as it was important to respond promptly, flexibly and in accordance with the individual's health security to ensure safe educational process. During the Covid-19 pandemic, distance learning was provided at most educational institutions, which was not a common practice until now. It facilitated the digitalisation of education, led to rapid adaptation to change and learning to work in times of crisis and limited resources. In the paper, theoretical findings of human capital and the agent network theory are used to reflect the provision of professional support for teachers and to analyse the implementation of cooperation or bilateral social dialogue during the state of emergency in Latvia. In 2020, the Latvian Trade Union of Education and Science Employees conducted two surveys of teachers of pre-school, general, vocational and higher education institutions on the quality of professional life during the state of emergency. The most important factors influencing professional work are as follows: technical equipment of the study process and digital skills; organization of the work of the study process; ensuring cooperation with students and colleagues; observance of teachers' rights; protection against the risk of developing Covid - 19. Teachers working during the Covid-19 pandemic, essential provision of information technology, accessible and high-quality Internet, development of digital skills, reimbursement of teleworking, samples of adapted teaching aids, methodological and psychological support, guarantees of employment stability, observance of labour law, professional crisis communication with the parties involved in the educational process (employer, colleagues, students, parents).*
Keywords: social dialogue, teachers, professional support, human capital, flexicurity, emergency.

Ievads
Introduction

Pieejama un kvalitatīva izglītība ir katra indivīda cilvēkkapitāla un katras valsts veiksmīgas attīstības priekšnosacījums. Izglītības nozarē tiek īstenotas dažādas reformas, lai ilgtermiņā paaugstinātu daudzveidīgus izglītības kvalitātes rādītājus, taču lielā mērā mērķu sasniegšana atkarīga no nozarē strādājošo cilvēkkapitāla. Tāpēc būtiski sniegt pedagogiem savlaicīgu un pilnvērtīgu atbalstu, apzināt aktuālās problēmas un piedāvāt to risinājumus. Demokrātiskā sabiedrībā līdzsvarotas politikas īstenošana notiek efektīva sociālā dialoga ceļā, kas nodrošina mijiedarbību, tostarp sarunas un konsultācijas, starp valdības pārstāvjiem, darba ņēmējiem un darba devējiem. Valstis, kurās ir labi izveidota sociālā dialoga struktūras, ir labāk sagatavotas integrēt darba ņēmēju un darba devēju viedokli organizācijās (The role of social dialogue…, 2020).

Latvijā, līdzīgi kā daudzās citās Eiropas Savienības dalībvalstīs, sociālā dialoga kvalitāti ietekmēja Covid-19 pandēmija. Starptautiskajos forumos, konferencēs valstis ziņo par sociālā dialoga pasliktināšanos. (Global Deal Flagship…, 2020) Tāpēc Starptautiskā darba organizācija (SDO) vērš uzmanību, ka sociālo dialogu ir ne tikai svarīgs uzturēt, lai izveidotu sociālās aizsardzības sistēmu, gatavojoties krīzei un formulējot tūlītēju rīcību uz negaidītām izmaiņām, bet to arī ir jāturpina īstenot pastāvīgi, jo valstis risina dažādos jautājumus atšķirīgās krīzes fāzēs, kas var būt vidēja termiņa un ilgtermiņa. Kur strukturēta sociālā dialoga nav, tur valdībām būtu jāizmanto iespēju izveidot, stiprināt vai atjaunot sociālā dialoga kanālus, pakāpeniski nodrošinot pamatnosacījumus un vidi (The role of social dialogue…, 2020).

Konferencē "Globālais darījums" (Global Deal, 2020), lai stiprinātu sociālo dialogu Covid-19 pandēmijas pārvarēšanai, jo globālās krīzes laikā vajadzība pēc šādām partnerattiecībām ir lielāka nekā jebkad agrāk. Konferencē vienojās, ka būtiski ir risināt tādus jautājumus kā nabadzība un nevienlīdzība, izglītība un prasmes, veselība un darba vides kvalitāte, produktivitātes pieaugums un nodarbinātība, ekonomiskā stabilitāte un vide (Social dialogue in the 2030 Agenda, 2020).

Izglītības nozarē sociālajam dialogam ir ļoti liela nozīme pedagogu profesionālās dzīves kvalitātes nodrošināšanā un cilvēkkapitāla attīstībā. Covid-19 pandēmijas laikā šie jautājumi kļuvuši aktuālāki, jo tā ir jauna pieredze visiem sociālajiem partneriem gan trīspusējā, gan divpusējā sociālajā dialoga veidošanā. Ārkārtas situācija izglītības sektorā pašvaldību un izglītības iestāžu līmenī liek reaģēt izlēmīgi, elastīgi, nereti nesagaidot lēmumus nacionālā līmenī, tāpēc īpaši svarīga ir elastdrošība divpusējā sociālā dialoga ietvaros, jo tas attiecas uz darba ņēmēja un darba devēja mijiedarbību. Divpusējais sociālais dialogs ir viens no

sadarbības veidiem, kurā iesaistīti darba ņēmēju un darba devēju pārstāvji. (Ishikawa, 2003).

Pētījumā izmantotas cilvēkkapitāla un aģentu tīkla teorijas atziņas, jo būtiska ir iesaistīto pušu jeb aģentu sadarbība, elastdrošības ievērošana Covid-19 pandēmijas laikā, lai nodrošinātu pedagogiem nodarbinātības stabilitāti, psiholoģisko atbalstu krīzes situācijā, nodrošinot izglītības procesu. Pētījuma mērķis bija identificēt problēmas un izstrādāt priekšlikumus pedagogu nodarbinātības kontekstā Covid-19 pandēmijas laikā. Raksta mērķis ir atspoguļot divpusējā sociālā dialoga nozīmi izglītības nozarē, balstoties uz divu pētījumu rezultātiem par pedagogu nodarbinātību valsts ārkārtējās situācijas laikā. Svarīga ir divpusējā sociālā dialoga aģentu savstarpējā mijiedarbība, jo pandēmijas laikā darba vietas un pašvaldības līmenī var pieņemt atbilstošākos lēmumus visoperatīvāk.

Elastdrošība un atbalsts izglītības nozarē Covid-19 pandēmijas laikā
Flexicurity and Support in the Education Sector during the Covid-19 Pandemic

Cilvēkkapitāls tiek pētīts arvien vairāk, jo no tā atkarīga katras institūcijas pastāvēšana un no tā atkarīga katras valsts kopējā izaugsme. Cilvēkkapitāls-kopējais investīciju daudzums darbinieka apmācībā, ražīgumā un nākotnē. Cilvēkkapitāls var tikt skatīts kā darbinieka kompetence, viņa saskarsmes un vērtību radīšanas spējas klientam (Mietule, 2015). Cilvēkkapitāls ietver indivīda izglītību, profesionālo pilnveidi, veselību, fiziskās aktivitātes, un citus elementus, kas dod iespēju iegūt lielākus ieņēmumus (Becker, 1992). Izglītības procesa īstenošanu ietekmē izglītības nozarē strādājošo cilvēkkapitāls, nozarē strādājošo profesionālās dzīves kvalitāte.

2020. gadā pārmaiņas skāra pilnīgi visas tautsaimniecības nozares, un būtiski tika ietekmēta arī visa izglītības nozare.

Darba samaksa un darba devēja izdevumi darbinieku apmācībai, izglītībai un veselības aprūpei ir personāla izmaksu komponenti, kā arī cilvēkkapitāla veidošanās finansiālais nodrošinājums, kuru darba devējs var realizēt atšķirīgos veidos, t.i.,-izdarot tiešās investīcijas personāla apmācībā, izglītībā, medicīniskajā aprūpē u.tml. - vai nodrošinot darba samaksas līmeni, kas stimulē darba ņēmēju uz uzņēmuma rīcībā esošā cilvēkkapitāla potences kāpināšanu (Mietule, 2015). Pētījuma ietvaros tika jautāts par atbalstu jeb investīcijām darbinieku digitālajās prasmēs, psiholoģiskajā atbalstā, aizsardzības nodrošināšanā pret risku saslimt ar Covid-19, stabilas darba samaksas nodrošināšanā.

Cilvēkkapitāla pētnieks J. Veiss (Weiss, Y.) uzsver, ka cilvēkkapitāls ietver daudzveidīgas prasmes, kuras var izmantot ienākumu gūšanai darba tirgū, kā arī to, ka arī pats indivīds var izvēlēties, vai ieguldīt savā cilvēkkapitālā. Arī Covid-19 ārkārtas situācijas laikā pedagogi varēja izvēlēties, vai izmantot darba devēja piedāvāto iespēju pilnveidot savas digitālās, stresa vadības vai komunikācijas prasmes. Izglītība un apmācības ir vissvarīgākie ieguldījumi cilvēkkapitālā, savukārt finansiālie stimuli var arī nebūt paši būtiskākie (Becker, 1993). Ārkārtējās situācijas laikā izglītības nozarē aktualizējās darba devēja loma pedagogu profesionālās pilnveides jautājumu risināšanā, kā arī materiāltehniskā nodrošinājuma (datori, vebkameras, mikrofoni, sejas maskas, dezinfekcijas līdzekļi) sagādē, lai pedagogi varētu kvalitatīvāk veikt savus darba pienākumus.

Izglītības nozarē tiek īstenotas daudzveidīgas reformas, kuru ietvaros sociālie partneri (darba devēji, darba ņēmēji un valdības pārstāvji) cenšas rast kompromisus, lai nodrošinātu nepieciešamos resursus attiecīgo pārmaiņu kvalitatīvai īstenošanai. Covid-19 pandēmijas laikā ir jāsaskaras ar nepieredzētām situācijām, ir jāmeklē operatīvi risinājumi un elastīgi jāreaģē uz notiekošajām izmaiņām, procesiem. SDO ir analizējusi sociālā dialoga nozīmi veiksmīgākas krīzes pārvarēšanā, norādot, ka krīze padziļinās un situācija pasliktinās, ja sociālie partneri netiek iesaistīti lēmumu pieņemšanā jau sākotnēji (Rychly, 2009). Kopīgajā rīcībā ir iesaistītas vairākas puses jeb aģenti. Latūrs (*Latour*) norāda, ka par aģentu tiek uzskatīts ikviens, kas rada rīcību un pret ko tiek vērsta rīcība noteiktu mērķu sasniegšanai (Latour, 1997). Aģents var būt ikviens, kas apvieno citus, padara citu rīcību atkarīgu no savas rīcības, skaidro citu gribu savā darbībā un retorikā (Callon & Latour, 1981). Izglītības nozarē aģenti ir sociālie partneri, kuri īsteno sadarbību jeb mijiedarbību sociālā dialoga ietvaros. SDO nosaka, ka ne vienmēr valdībai jāiesaistās sociālā dialoga veidošanā, jo sociālais dialogs var būt divpusējs, kurā iesaistās darba devēju un darba ņēmēju pārstāvji. Latvijā nacionālā līmenī sociālo dialogu veido trīs puses, ko pārstāv darba devēju, darba ņēmēju un valdības pārstāvji, taču tiek īstenots arī divpusējais dialogs. Izglītības nozarē divpusējā sociālā dialoga aģenti ir pedagogi, arodbiedrības, izglītības iestādes (administrācija), pašvaldības (vadība, deputāti).

Divpusējais sociālais dialogs arī ir neatņemama demokrātiskas valsts sastāvdaļa, tas ir sadarbības veids starp darba devēju organizācijām un arodbiedrībām, ar mērķi saskaņot dažādo sabiedrības slāņu intereses sociālajos un ekonomiskajos jautājumos, garantējot sociālo stabilitāti. Divpusējais sociālais dialogs ir sociālo partneru sadarbība jeb mijiedarbība, diskutējot un lemjot par izvēles iespējām apspriežamo jautājumu klāstā, kas tiek iekļauti vai arī varētu tikt iekļauti koplīgumā (Krīgers, 2009).

Izglītības nozarē divpusējā sociālā dialoga ietvaros sadarbības puses var būt:
- darba vietā jeb izglītības iestādē aģenti ir izglītības iestādē strādājošie, arodorganizācija, izglītības iestādes administrācija;
- pašvaldībā aģenti ir pedagogi, arodorganizācija, politiskās partijas, vecāki, pašvaldības administrācija u.c. (skatīt 1.att.).

1.attēls. ***Divpusējā sociālā dialoga aģenti***
Figure 1 ***Bilateral Social Dialogue Agents***

Covid-19 pandēmijas laikā divpusējās sadarbības īstenošanā bija būtiska ne tikai abu iesaistīto pušu sadarbība, bet to ietekmēja arī valdības pieņemtie lēmumi (normatīvie akti), sniegtais atbalsts, jo svarīgi bija nodrošināt sociālo un veselības drošības stabilitāti. Divpusējā dialoga nozīme palielinājās, jo nacionālā līmenī nebija iespējams prognozēt un noteikt daudzu būtisku funkciju īstenošanu izglītības sektorā, ko ietekmēja Covid-19 straujā izplatība, tāpēc būtiska bija elsatdrošība divpusējā sociālā dialoga ietvaros.

Elastdrošība (*flexicurity*) kļūst par vienu no sociālā dialoga stūrakmeņiem. un tā ir integrēta stratēģija, lai vienlaikus uzlabotu elastību un drošību darba tirgū. Ar šo iezīmi var raksturot sabiedrību, kas ir gatava un spēj mainīties un gūt labumu no globālās vides, nezaudējot iekšējo saliedētību un dzīves kvalitāti. Elastdrošības modelis cenšas savienot sociālo taisnīgumu ar augstiem ekonomiskiem rādītājiem. Elastdrošības kontekstā ne tik daudz tiek veidoti kādi jauni politikas pasākumi, bet gan vairāk uzmanība pievērsta sociālās un nodarbinātības politikas kopsakarībām, palīdzot justies darbiniekiem/indivīdam pietiekami aizsargātam, tajā pašā laikā saskatot globalizācijā un darba tirgus izmaiņās jaunas iespējas (Labklājības ministrija).

Valsts ārkārtējās situācijas laikā būtiski ir censties elastīgi pielāgoties situācijai, meklēt jaunus un atbilstošākos risinājumus, ko apliecina, piemēram, attālināto mācību ieviešana, digitalizācija. Izglītības sektorā strādājošo nodarbinātības stabilitāte ir darba devēju atbildība un sociālo garantiju stabilitāte ir valsts atbildība.

L.Kalniņa norāda, ka elastdrošība ir uzņēmuma un darbinieka apzināta sadarbība, saņemot valsts atbalstu aktīvas nodarbinātības politikas un sociālo garantiju veidā, sekmīgā uzņēmuma un darbinieka personības ilgtspējīgā attīstībā. Pastāv dažādi elastdrošības principi, kas attiecināmi gan uz privāto, gan publisko sektoru, taču ārkārtas situācijas laikā izglītības nozarē divpusējā sociālā dialoga ietvaros tika pievērsta lielāka uzmanība šādiem principiem: elastīgi un droši darba līguma nosacījumi; līdzsvars starp darba devēju, darbinieku un valsts institūciju tiesībām un pienākumiem; labas kvalitātes darba vietas un darba organizācija; darba prasmju uzlabošana; dzimumu līdztiesība, gan sekmējot vienādu pieeju nodarbinātībai, gan piedāvājot iespējas savienot ģimenes un darba dzīvi; dialogs starp valsti un sociālajiem partneriem, lai veicinātu ātrākas pārmaiņas un veiksmīgāku politikas īstenošanu; efektivitāte attiecībā uz budžeta izmaksām pret visām iesaistītajām pusēm (Kalniņa, 2011).

Covid-19 ārkārtējās situācijas laikā pedagogi īstenoja izglītības procesu gan klātienē, gan attālināti, tāpēc svarīgi noskaidrot, vai mainoties darba apstākļiem Covid-19 pandēmijas laikā divpusējā sociālā dialoga ietvaros ir bijis atbalsts, pietiekamas investīcijas cilvēkkapitālā.

Pētījuma metodoloģija
Research Methodology

Autores, izmantojot Latvijas Izglītības un zinātnes darbinieku arodbiedrības (LIZDA) resursus, 2020.gadā veica divas anonīmas elektroniskas aptaujas, kas tika izveidotas aptaujas portāla VisiDati.lv. Informācija par aptaujām tika izplatīta LIZDA sociālajos tīklos. Pirmā aptauja tika veikta martā un aprīlī par problēmām un to risinājumiem attālināta izglītības procesa nodrošināšanā valsts ārkārtējās situācijas apstākļos. Aptaujā tika noskaidrots vispārējās (izņemot pirmsskolu), profesionālās izglītības pedagogu un augstskolu mācībspēku viedoklis par nozīmīgākajiem attālinātu izglītību ietekmējošajiem faktoriem. Otrā aptauja tika veikta aprīlī par pirmsskolā nodarbināto profesionālo dzīves kvalitāti valsts ārkārtējās situācijas apstākļos. Aptaujā tika noskaidrots pirmsskolas pedagogu un viņu palīgu viedoklis par nozīmīgākajiem nodarbinātību ietekmējošiem faktoriem pirmsskolās. Abās aptaujās kopumā piedalījās 8686 respondenti (5003 vispārējās, profesionālās un augstākās izglītības iestādēs strādājošie; 3683 pirmsskolas izglītības iestādēs strādājošie). Aptaujas dati liecina, ka no vispārējās, profesionālās un augstākās izglītības iestādēs strādājošo respondentu grupas 2089 jeb 41,7 % strādā republikas nozīmes pilsētās, 2915 jeb 58,3% strādā novados (t.sk., mazpilsētās). Attiecīgās respondentu grupas darba vietas atrašanās reģionāli: 21,5% Rīgā, 12,4% Pierīgā, 20% Vidzemē, 15,1% Kurzemē, 15,9% Latgalē un 15,1% Zemgalē. Savukārt no pirmsskolas izglītības iestādēs strādājošajiem darba vieta republikas nozīmes pilsētā atrodas 1758 respondentiem

jeb 47,7% un novadā (t.sk. mazpilsētā) 1925 respondentiem jeb 52,3%. Pirmsskolas izglītības iestādēs strādājošo respondentu darba vieta atrodas reģionāli: 25,6% Rīgā, 11,7% Pierīgā, 20,7% Vidzemē, 19,8% Kurzemē, 11,9% Zemgalē, 10,2% Latgalē. Tika veiktas divas aptaujas, jo pētījumu autores ņēma vērā gan vienas, gan otras respondentu grupas nodarbinātības specifiku, kā arī apstākli, ka pirmsskolas izglītības iestādes strādāja klātienē, taču pārējās izglītības iestādes mācību procesu nodrošināja attālināti.

Aptaujās tika iekļauti jautājumi, lai noskaidrotu respondentu viedokli gan par nozīmīgākajiem nodarbinātību ietekmējošiem faktoriem gan par to, kāds būtu primāri nepieciešamais atbalsts, lai pedagogi un pedagogu palīgi varētu nodrošināt kvalitatīvu darbu. Aptaujas jautājumi ietvēra vairākus tematiskos blokus: mācību procesa tehniskais aprīkojums un digitālās prasmes; mācību procesa darba organizācija (t.s.k. komunikācija ar iesaistītajām pusēm – darba devējs, izglītojamie, kolēģi, vecāki); pedagogu tiesību ievērošana; aizsardzība pret risku saslimšanai ar Covid - 19. Visiem respondentiem bija iespēja sniegt viedokli par katru no iepriekš minētajiem ietekmējošiem faktoriem sniegt atbildi atvērtajos jautājumos, taču pirmsskolas izglītības iestādēs strādājošajiem aptaujas anketā tika iekļauti jautājumi par aizsardzība pret risku saslimšanai ar Covid - 19, jo darbs bija jāveic klātienē.

Iegūtie abu aptauju rezultāti tiek atspoguļoti apkopotā veidā, kā arī dati tiek analizēti gan kvantitatīvi, gan kvalitatīvi.

Pētījuma rezultāti
Research Results

Pētījumā būtiski bija noskaidrot pedagogu kā aģentu viedokli par problēmām un to risinājumiem Covid-19 pandēmijas laikā, jo līdz 2020. gadam pedagogi nebija strādājuši un sociālais dialogs nebija jāīsteno valsts ārkārtējās situācijas apstākļos. Pētījuma apkopotie dati var tikt ņemti vērā, lai priekšlikumus izmantotu divpusējā sociālā dialoga īstenošanā un lai nodrošinātu lielāku atbalstu cilvēkkapitālam, kā arī veicinātu elastdrošību. Līdz šim nebija veikti pētījumi par cilvēkkapitāla novērtēšanu pedagogu darba dzīves kvalitātes kontekstā, valsts ārkārtējās situācijas apstākļos, tāpēc pētījuma rezultāti var noderēt, lai analizētu riskus un īstenotu veiksmīgāku aģentu mijiedarbību.

2020. gada 11. martā Latvijā tika izsludināts ārkārtas stāvoklis visā valstī līdz 2020. gada 9. jūnijam ar mērķi ierobežot Covid-19 izplatību. Tika noteikts, ka, pirmsskolas izglītības iestādēm un iestādēm, kas nodrošina bērnu uzraudzības pakalpojumu, jānodrošina dežūrgrupu darbība, lai nepieciešamības gadījumā nodrošinātu pirmsskolas pakalpojumu sniegšanu bērnu likumiskajiem pārstāvjiem, kas paši nevar nodrošināt bērnu pieskatīšanu. Papildus MK noteica

izglītības jomā pārtraukt mācību procesa norisi klātienē visās izglītības iestādēs, visu veidu izglītības procesu klātienes formā ārpus izglītības iestādēm un nodrošināt mācības attālināti, ievērojot noteiktus izņēmumus ("Par ārkārtējās situācijas izsludināšanu", 2020). Jāsecina, ka pamatojoties uz MK rīkojumu būtiski mainījās izglītības nozarē strādājošo nodarbinātības apstākļi un radās jauni nodarbinātību ietekmējošie faktori.

Pētījumā tika noskaidrots, cik lielā mērā respondenti piekrīt noteiktiem apgalvojumiem par nepieciešamo un pieejamo atbalstu, darba samaksu, pieejamo informāciju, darba apstākļiem (skatīt 2.att.).
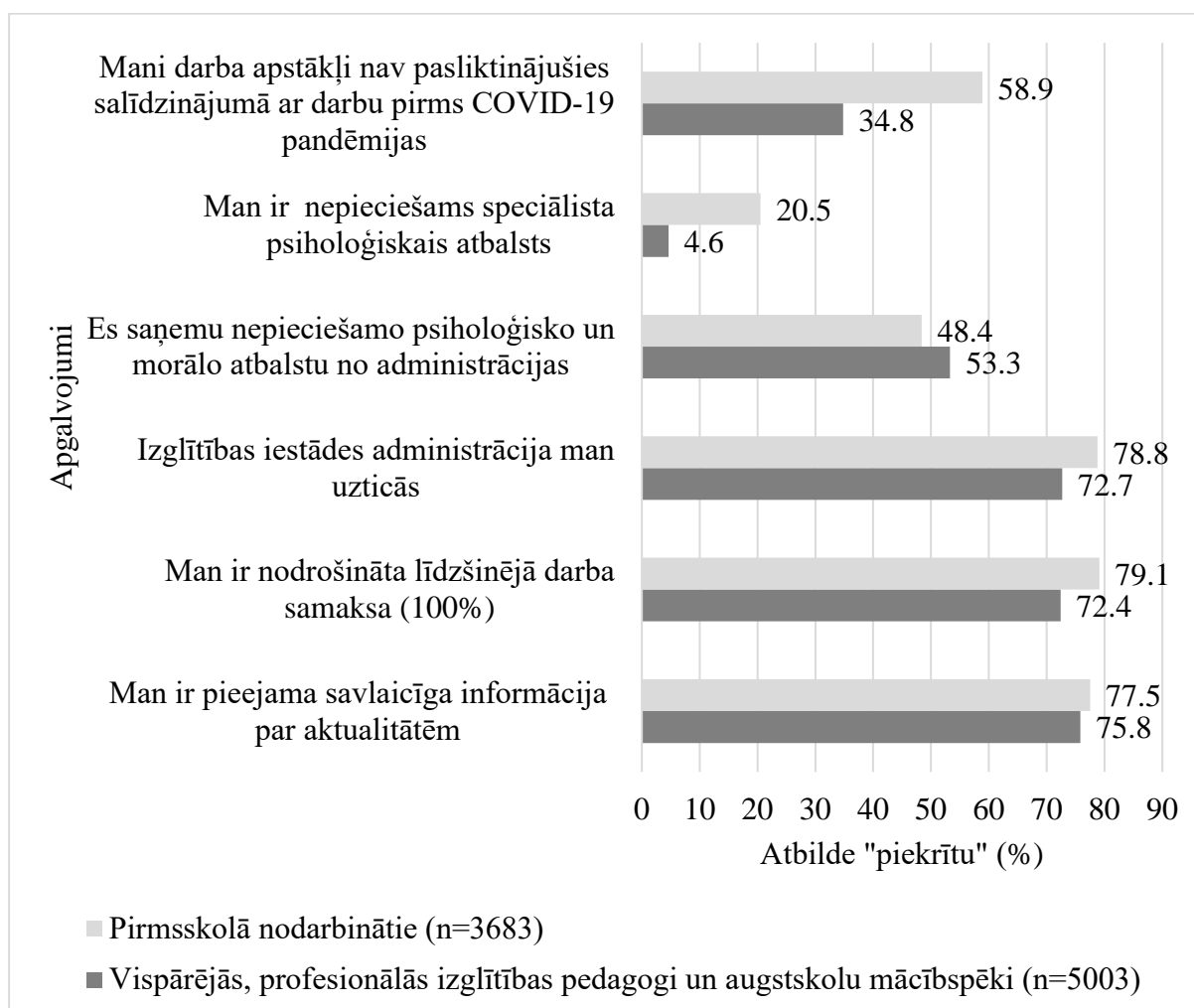
Avots: LIZDA aptaujas dati

2.attēls. **Pedagogu apgalvojumi par divpusējā sociālajā dialogā risināmajiem**
problēmjautājumiem COVID-19 pandēmijas laikā
Figure 2 **Teachers' Statements on Issues to be Addressed in Bipartite Social Dialogue**
during the COVID-19 Pandemic

Jāsecina, ka lielākā daļa respondentu pilnībā piekrita, ka viņiem bija pieejama savlaicīga informācija par aktualitātēm, tika nodrošinātā līdzšinējā darba samaksa, un izglītības iestādes administrācijas uzticējās pedagogiem. Arī SDO norāda, ka valdībām vairāk jāinformē sabiedrība un jānodrošina sociālā aizsardzība, savukārt sociālajiem partneriem jāveicina sabiedrības izpratne par atbalsta pasākumiem, ko nosaka attiecīgo normatīvo aktu regulējums (The role of social dialogue…, 2020).

Aptuveni puse respondentu norāda, ka saņēma nepieciešamo psiholoģisko un morālo atbalstu no administrācijas, bet 20,5% pirmsskolas izglītības iestādēs nodarbinātajiem ir bijis nepieciešams psiholoģiskais atbalsts. Neraugoties uz to, ka pirmsskolām bija jānodrošina darbs klātienē, 58,9% pirmsskolu respondentu atzīst, ka darba apstākļi kopumā 2020. gada pavasarī nebija pasliktinājušies salīdzinājumā ar darbu pirms Covid-19. Šādas respondentu atbildes apliecina, ka divpusējais sociālais dialogs bija sekmīgs vairākumā jautājumos, taču nepieciešams nodrošināt papildus psiholoģisko atbalstu un jāuzlabo darba apstākļi vispārējās, profesionālās, augstākās izglītības pedagogiem, jo 34,8% jeb trešdaļa norāda par darba apstākļu pasliktināšanos.

Ņemot vērā, ka daļai pedagogiem darbs bija jānodrošina klātienē, bet daļai attālināti, respondentiem tika uzdoti jautājumi par to kas specifiski ietekmē viņu darba ikdienu. Pirmsskolas izglītības iestādēs strādājošiem ikdienā bija intensīvāks tiešais kontakts ar bērniem, kolēģiem, vecākiem, tāpēc uz viņiem attiecās paaugstinātākas higiēnas normu ievērošanas prasības. Savukārt citiem pedagogiem bija jāīsteno attālinātās mācības, izmantojot informācijas un komunikācijas tehnoloģijas, citas mācīšanas formas. Respondentiem tika jautāts, cik lielā mērā viņi piekrīt noteiktiem apgalvojumiem par mācību procesa darba organizācijas nodrošināšanu un pirmsskolas pedagogiem tika uzdoti jautājumi par aizsardzību pret saslimšanu ar Covid-19 izraisošo vīrusu (skatīt 3.un 4.att).
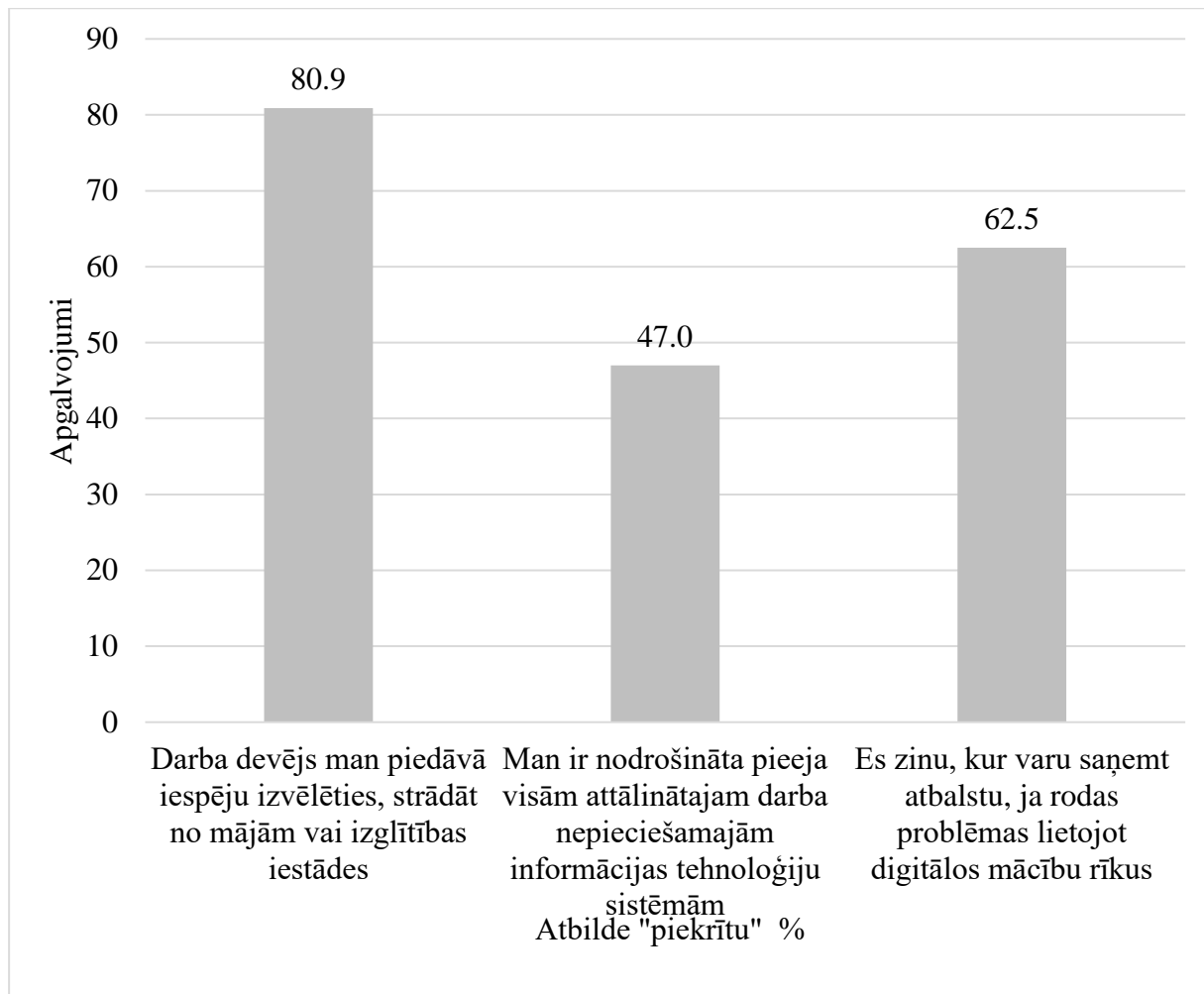
Avots: LIZDA aptaujas dati

3. attēls. **Pirmsskolā nodarbināto apgalvojumi par divpusējā sociālajā dialogā risināmajiem problēmjautājumiem COVID-19 pandēmijas laikā (n=3683)**
Figure 3 **Statements by Pre-School Employees on Issues to be Addressed in Bipartite Social Dialogue during the COVID-19 Pandemic (n=3683)**
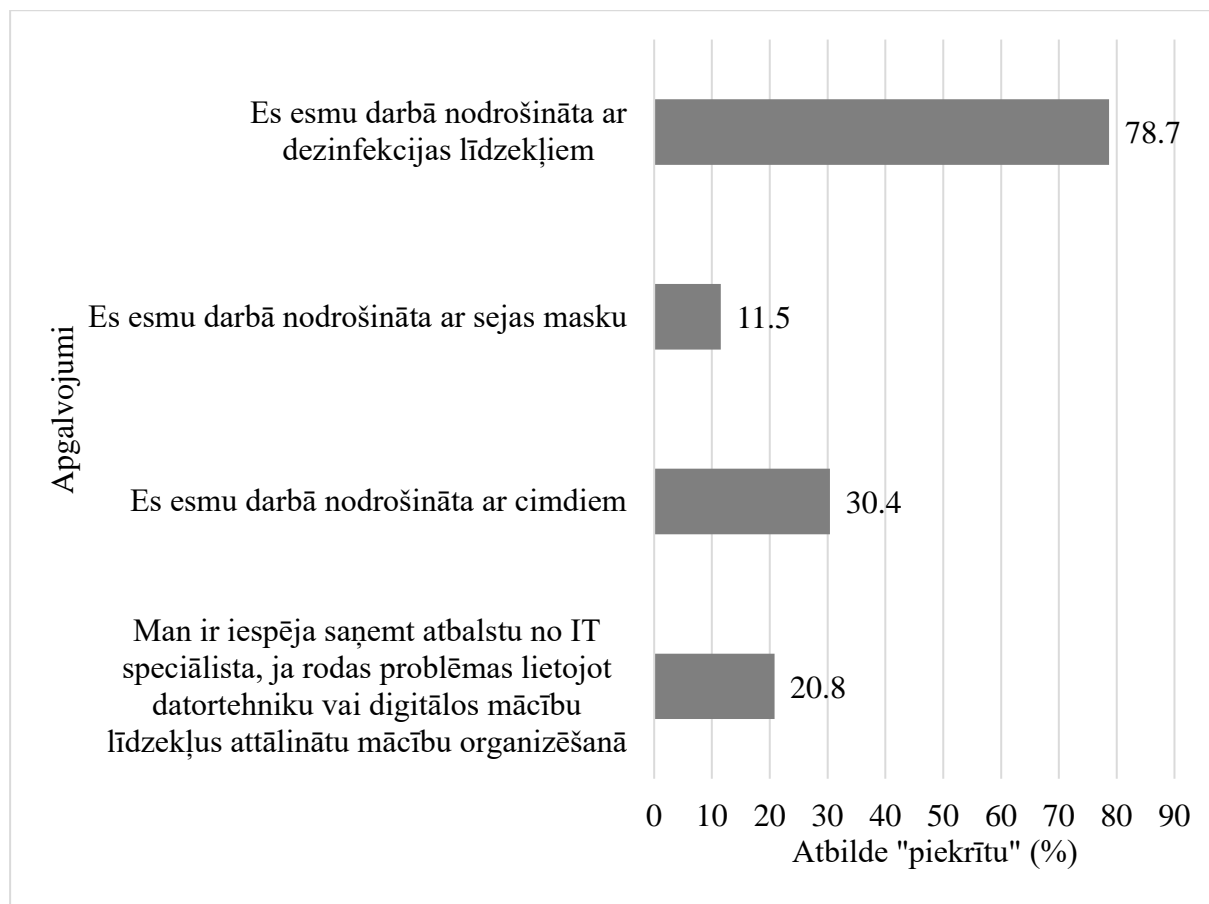
Avots: LIZDA aptaujas dati

4.attēls. **Vispārējās, profesionālās izglītības pedagogu un augstskolu mācībspēku apgalvojumi par divpusējā sociālajā dialogā risināmajiem problēmjautājumiem COVID-19 pandēmijas laikā (n=5003)**
Figure 4 Statements by General, Vocational Education Teachers and University Lecturers on Issues to be Addressed in Bipartite Social Dialogue during the COVID-19 Pandemic (n=5003)

Jāsecina, ka lielākajai daļai jeb 80,9% vispārējās, profesionālās, augstākās izglītības iestāžu pedagogu darba devēji piedāvāja iespēju izvēlēties strādāt no mājām vai darba vietas. Tas apliecina darba devēja elastdrošību un rūpes par darbinieku drošību, ko ietekmē veselības aspekti. Vairāk kā puse jeb 62,5% vispārējās, profesionālās, augstākās izglītības iestāžu pedagogiem norāda, ka bija informēti par atbalsta saņemšanas iespējām, lietojot digitālos mācību rīkus. Tātad darba devēji bija parūpējušies, lai tiktu sniegts atbalsts, ja digitālās prasmes nav pietiekamas, jo ārkārtas situācijā nav bijis pietiekami laika, lai investētu darbinieku profesionālajā pilnveidē. Savukārt, pirmsskolas izglītības iestādēs tikai 20,8% respondentu norādīja, ka viņiem bijusi iespēja saņemt nepieciešamo atbalstu, ja radušās problēmas, lietojot datortehniku vai digitālos mācību

līdzekļus. Tas liecina, ka pirmsskolās sociālā dialoga aģentiem jārisina šī problēma, lai nepieciešamības gadījumā arī pirmsskolu pedagogi var pilnvērtīgāk pildīt savus pienākumus. Mazāk kā puse (47%) respondentu norādīja, ka viņiem ir nodrošināta pieeja informācijas tehnoloģiju sistēmām, kas ļauj secināt par iespējamām problēmām attālināto mācību kvalitatīvā īstenošanā.

Jautājumos par veselības aizsardzības nodrošināšanu pret inficēšanos ar Covid-19, 78,7% pirmsskolas izglītības iestāžu darbinieki norādīja, ka darbā ir nodrošināti ar dezinfekcijas līdzekļiem, ievērojami mazāks respondentu skaits (30,4%) bija nodrošināti ar cimdiem, bet tikai 11,5% respondentu apstiprināja masku pieejamību. Aptaujas dati apliecina, ka darba devēji ir nepietiekoši parūpējušies par darba ņēmēju veselības drošību, un aģentu mijiedarbība nav bijusi pietiekama būtiska mērķa sasniegšanā.

Aptaujas kvalitatīvās informācijas apkopojums sniedz priekšlikumus divpusējā sociālā dialoga partneriem par nepieciešamo elastdrošību un atbalstu:

- **tehniskajā nodrošinājumā** *(informācijas un komunikācijas tehnoloģijas; datorprogrammu licences; apmaksāts interneta un telefona abonements; kompensēti izdevumi par attālināto darbu un tiešsaistes platformām; internets augstu un nemainīgu pārraidi; bibliotēkas resursi un digitālie mācību līdzekļi; bezkontakta termometri);*
- **darba organizācijā** *(atbalstoša attieksme no vadības; metodiskais atbalsts; IT speciālista konsultācijas; digitālās prasmes; attālinātais darbs pirmsskolās; komunikācija ar vecākiem; mazāks izglītojamo skaits klātienes kontaktā; psiholoģiskais atbalsts; uzticības tālrunis; mazināt birokrātisko slogu; aktuālās informācijas sniegšana; izglītības iestādes vadībai uzturēt aktīvāku komunikāciju ar vecākiem; kolektīva iedrošināšana un komandas saliedēšana; sadarbība ar pašvaldību par atbalstu izglītojamajiem no nelabvēlīgām ģimenēm un mācīšanās problēmām);*
- **darba tiesībās** *(skaidrojums par normatīvo aktu piemērošanu; darba samaksas saglabāšana; piespiedu atvaļinājumu nepieļaušana; juridiskā palīdzība no arodbiedrības; atlaišanas risks turpinoties ārkārtas situācijai; piemaksas par darbu ārkārtējā situācijā; pedagoga darba laika noteikšana; Darba aizsardzības likuma ievērošana);*
- **aizsardzībā pret Covid-19 saslimšanu** *(dezinfekcijas līdzekļi; aizsarglīdzekļi; UW lampas; darbinieku imunitātes stiprināšana; veselības apdrošināšana; bezmaksas Covid-19 tests).*

Apkopotie priekšlikumi liecina, ka sociālajiem partneriem kopā jārisina aktualizētās problēmas, jo tās skar vairākus cilvēkkapitālu veidojošos elementus, kas ietekmē individuāli darba ņēmēju un organizācijas kopējo darbību. Jāsecina,

ka sociālajiem partneriem jāveicina elastdrošība, kas īpaši nozīmīga ārkārtas situācijas laikā, kad nozarē strādājošajiem nepieciešami steidzami problēmu risinājumi, no kuriem atkarīga katra profesionālā darba dzīves kvalitāte, kvalitatīva un pieejama izglītības procesa īstenošana, sabiedrības veselības drošības veicināšana, Covid-19 izplatības mazināšana.

Izglītības likums nosaka darba devējiem un darba ņēmējiem noteiktus pienākumus un tiesības, taču pilnvērtīga to ievērošana un atbilstošu investīciju nodrošināšana cilvēkkapitālā ārkārtas situācijas laikā rada papildus izdevumus, tāpēc būtiski divpusējā sociālā dialoga partneriem meklēt risinājumus un nepieciešamības gadījumā vērsties pie nacionālā līmeņa sociālajiem partneriem.

Secinājumi un priekšlikumi
Conclusions and Recommendations

1. Starptautiskās organizācijas norāda, ka tieši tagad vairāk nekā iepriekš jāstiprina sociālais dialogs Covid-19 pandēmijas pārvarēšanai, kā arī sociālie partneri jāiesaista problēmu risināšanā jau sākotnēji krīzes laikā.
2. Divpusējā sociālā dialoga partneru jeb aģentu mijiedarbība var notikt izglītības iestādes un pašvaldības līmenī.
3. Pēc Ministru kabineta rīkojuma pieņemšanas par ārkārtējās situācijas izsludināšanu mainījās pedagogu nodarbinātības aspekti, nosakot attālinātās mācības, paaugstinātus veselības drošības pasākumus un veicinot digitalizāciju izglītības sistēmā.
4. Izglītības nozarē ārkārtējās situācijas laikā divpusējā dialoga ietvaros ir iespējams daudz operatīvāk rast risinājumus problēmām un nodrošināt sociālo stabilitāti, veselības drošību.
5. Izglītības nozarēs strādājošo cilvēkkapitāla attīstību vislabāk var veicināt divpusējā sociālā dialoga ietvaros, jo darba ņēmējs vislabāk pārzina situāciju izglītības iestādes kolektīvā.
6. Cilvēkkapitāla attīstībā, elastdrošībā noteicoša loma ir izglītības iestādes vadītājam, tomēr arī sociālie partneri, tajā skaitā arodbiedrības, var būtiski ietekmēt lēmumu pieņemšanu izglītības iestādes, pašvaldības un nacionālajā līmenī.
7. Izglītības iestādēs jābūt labākam tehniskajam nodrošinājumam, jāpilnveido darba organizācija, jāievēro darba tiesības, jānodrošina aizsardzība pret inficēšanos ar Covid-19.
8. Lielākajai daļai pedagogu darba vietā pieejama savlaicīga informācija par aktualitātēm, nodrošināta līdzšinējā darba samaksa, izglītības iestādes administrācijas uzticas.
9. Pirmsskolas pedagogiem nodarbinātība nav ievērojami pasliktinājusies salīdzinājumā ar darba periodu pirms Covid-19 pandēmijas, taču vispārējās,

profesionālās, augstākās izglītības iestāžu pedagogiem nodarbinātības apstākļi ir pasliktinājušies.

10. Vispārējās, profesionālās, augstākās izglītības iestāžu pedagogiem pieejamas vairāk IKT, kā arī pieejama nepieciešamā IT speciālistu palīdzība, izmantojot digitālos mācību līdzekļus, strādājot attālināti tiešsaistēs, taču pirmsskolu pedagogiem šis atbalsts ir nepietiekams.

11. Pirmsskolas pedagogiem akūti nepieciešamas sejas maskas un roku dezinfekcijas līdzekļi, jo strādā klātienē un pakļauj savu veselību lielākam riskam inficēties ar Covid-19, taču citiem pedagogiem šie jautājumi nav aktuāli, jo mācības notiek attālināti.

12. Vairākums pedagogu norāda, ka nepieciešams kompensēt izdevumus, kas radušies attālinātā darba laikā (IKT iegāde, palielinājušies izdevumi mājsaimniecībā).

13. Pirmsskolas pedagogiem nepieciešams vairāk psiholoģiskais atbalsts salīdzinājumā ar citiem kolēģiem.

14. Sociālajiem partneriem jāveicina elastdrošība Covid -19 pandēmijas laikā, jp nozarē strādājošajiem nepieciešami steidzami problēmu risinājumi, no kuriem atkarīga katra profesionālā darba dzīves kvalitāte, kvalitatīva un pieejama izglītības procesa īstenošana, sabiedrības veselības drošības veicināšana, Covid-19 izplatības mazināšana.

15. Aģentu mijiedarbība risina aktuālās problēmas izglītības iestādēs, taču nepieciešams uzlabot savstarpējo sadarbību, jo respondenti norādījuši daudzveidīgus priekšlikumus.

16. Divpusējā sociālā dialogs ietvaros izglītības nozarē Covid-19 pandēmijas laikā tiek atrisināti daudzi aktuāli jautājumi pedagogiem, taču visus tos nav iespējams atrisināt fiskālās ietekmes dēļ, tāpēc sociālajiem partneriem būtu jāiesaista problēmu risināšanā nacionālā līmeņa trīspusējā sadarbības padome jeb nacionālā līmeņa sociālie partneri – valdība, Latvijas Brīvo arodbiedrību savienība, Latvijas Darba devēju konfederācija.

Summary

The article reflects the importance of bilateral social dialogue in the education sector, based on the results of two studies on the employment of teachers during the state emergency. The aim of the research was to identify problems and develop proposals in the context of teacher employment during the Covid-19 pandemic. In the education sector, social dialogue plays a very important role in ensuring the quality of teachers' professional life and the development of human capital. In Latvia, as in many other European Union member states, the quality of social dialogue was affected by the Covid-19 pandemic. The emergency situation in the education sector at the level of local governments and educational institutions requires a decisive, flexible response, often without waiting for decisions at the national level, so flexicurity is especially important

in bilateral social dialogue, as it concerns employee-employer interaction. In international fora and conferences, countries report a deterioration in social dialogue, although the need for such partnerships is greater than ever during the global crisis.

In March and April 2020, LIZDA conducted two anonymous on-line surveys on the problems and their solutions in ensuring the distance learning process in the conditions of the state of the emergency. In one of the surveys (n = 5003) the opinion of general education, vocational education teachers and university academic staff on the most important factors influencing distance education was clarified. In the second survey, pre-school teachers (n = 3683) were asked about the quality of professional life in the conditions of the state emergency. The survey sought the opinion of pre-school teachers and their assistants on the most important factors influencing employment in pre-schools. The data collected by the study can be taken into account in order to use the proposals in the implementation of bipartite social dialogue and to provide more support to teachers, as well as to promote flexicurity.

The results show that the majority of respondents had access to timely information on current affairs, the salary was ensured at the pre-pandemic level, and the administrations of the educational institutions trusted the teachers. About half of the respondents indicated that they received the necessary psychological and moral support from the administration, but 20.5% of the employees in pre-school educational institutions have needed psychological support. 58.9% of pre-school respondents admitted that working conditions in general did not deteriorate in the spring of 2020 compared to work before Covid-19. For the majority or 80.9% of teachers of general, professional and higher education institutions, employers offered the opportunity to work from home. This confirms the employer's flexicurity and concern for employee safety, which is affected by health aspects. Employers had taken care to provide support when digital skills were insufficient, as there was not enough time in an emergency to invest in the professional development of employees. On the other hand, in pre-school education institutions only 20.8% of respondents indicated that they had the opportunity to receive the necessary support if they had problems using computer equipment or digital teaching aids.

The survey data show that employers have not taken sufficient care of workers' health safety and that the interaction of agents has not been sufficient to achieve a significant goal. Educational institutions must have better technical support, improve work organization, respect labor rights, and provide protection against Covid-19 infection. The employment of pre-school teachers has not deteriorated significantly compared to the pre-Covid-19 pandemic period, but the employment conditions of general, vocational and higher education teachers have deteriorated. Teachers of general, vocational and higher education institutions have access to more ICT, as well as the necessary help of IT specialists using digital teaching aids, working remotely online, but for pre-school teachers this support is insufficient. Pre-school teachers are in dire need of face masks and hand sanitizers because they work face-to-face and put their health at greater risk of becoming infected with Covid-19, but other educators are not concerned about these issues because the training takes place remotely.

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LIFE WITH COVID-19: SWOT ANALYSES FOR TRANSFORMATIVE DIGITAL LEARNING IN EDUCATORS' PERSPECTIVE

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Abstract. *Covid-19 pandemic has influenced all fields of life, including education, teaching and learning procedure. Initially the situation seemed vague and uncertain, but still challengeable, by moving almost all processes online and offering the digital or distance learning.*
The aim of the article to identify key aspects of distance learning from educator's perspective following Covid-19 and basing on the research results to offer transformative digital learning strategy for educational institution. The authors draw attention to the procedure how to re-direct weakness and threats into strengths and opportunities, by implementing necessary changes at four indicated levels: individual, institutional, local government and state one. An important part for any strategy creation, including transformative digital learning (TDL) strategy for educational institution, is the detailed situation analyses. SWOT analysis structure has been offered by analyzing respondents' views for the conducted online questionnaire for educators and experts' interviews Additionally literature review has been made to create the list of key elements necessary for the TDL strategy development, including global networking providers and nowadays paradigm shift –the transformative one.
Keywords: SWOT analyses, transformative digital learning, distance learning, paradigm shift, TDL strategy.

Introduction

Covid-19 pandemic has influenced all fields of life, education, teaching and learning hasn't been an exception. If from the beginning of Covid-19 pandemic the situation in education seemed vague and uncertain, but still challengeable, by moving almost all processes online and offering the digital or distance learning. Covid-19 pandemic has triggered digital transformation of learning requiring the new strategy development on the education institution level.

An important part for strategy design and development is the detailed situation analyses. SWOT analysis is one of the most common strategic planning tools. It allows to conduct analytical work in order to determine the strengths and weaknesses of an educational institution, as well as opportunities and threats of the external environment (Patrahina, 2015).

In unknown situation the strategic planning is a way to help an institution be more productive, how to guide the allocation of available resources in order to achieve defined goals and objectives, as a strategic management tool. By conducting an external analysis, an institution should identify the critical threats and opportunities that it is facing. It also helps an institution to understand which of its resources and capabilities can provide additional advantages. Based on SWOT Analysis, educational institutions can choose the appropriate learning strategy (Gurel, Tat, 2017).

The stage of scanning the external and internal environment of an education institution is the base for an assessment of the data obtained, these data is the basis for a problem-oriented analyses of the educational institution's activities and further strategic goal defining as well as to carry out more comprehensive analysis (Morrison, 2018).

Alongside with this, for educational institutions the paradigm shift directs the particularity of the transformation strategy development highlighting the key elements that should be transformed. Some scientists name the distance learning followed by Covid-19 as emergency paradigm shift in teaching and learning. As this has been an operative solution to the current situation done with doubts and enthusiasm, while showing considerable achievements and positive attitudes with addressed additional problems (Mondol, Mohiuddin, 2020). While distance learning or digital learning is not new. It is a mixture of tools and tactics, some of already used, to maximize uncertain circumstances of education (Baum, 2020).

Latvian educational institutions moved online among others. The strain during the pandemic affect the management of education institutions, including educators and learners. All parties involved are worried about the life with Covid-19 in the context of education. Several surveys, questionnaires, interviews with experts in the field have been conducted. The situation is still uncertain, the transformation strategy is required taking into consideration the distance or digital learning aspect, to make effective outcomes (Ozola-Balode, 2020).

The Theoretical Framework of the Research

First, the literature analyses for the SWOT factors have been done. The issue is covered from the educators' perspective. According to practitioners' guide for next gen learning the following key elements have been listed (see figure 1).
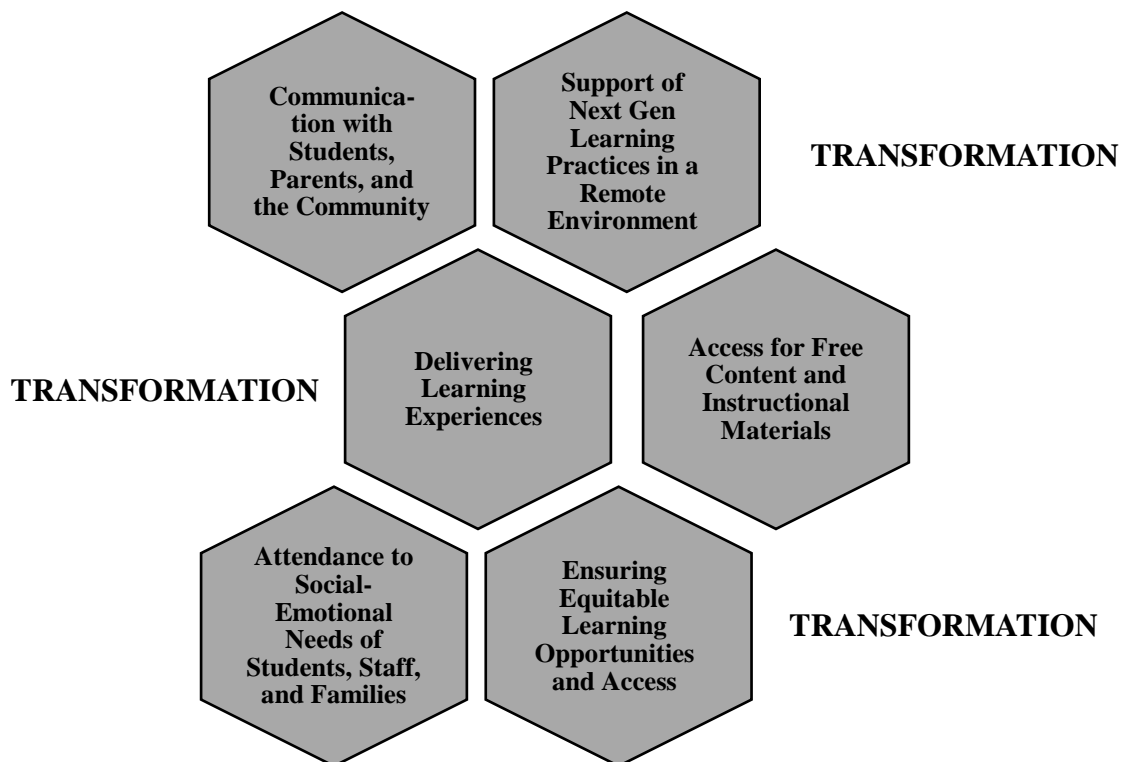
Figure 1 **Transformation of Education Following Covid-19**

According to Fig.1 the most important are the following elements: firstly, communication with all parties involved in the educational process. That can be concluded by Remote Learning Plan implementation and guidelines. Secondly, support for next gen learning practices in a remote environment. That require designing deeper learning for online distance learning during social distancing. Thirdly, to ensure equitable learning opportunities and access, enhancing inclusion and equity, social equity. Fourthly, attending social-emotional needs of students, staff and families, coping with the stress of the Covid-19 outbreak, managing anxiety around the pandemic. Fifthly, delivering learning experience, including guide to distance learning, resource hubs, resources links for support, approaches to instructions. Finally, access to free content and instructional materials, to recommended network sources (Avallone, 2020).

The inner environment consists of the following components: 1) resources of the institution (staff, information, knowledge, technologies, finance, equipment, culture, values and reputation, etc.); 2) processes (methods, approaches, communication, achievement of the objectives); 3) practical work of the institution (results, indexes, achievement, collaboration). While the outer environment consists of factors with direct and indirect influence, like political, economic, social, technological etc. (Patrahina, 2015).

Paradigm Shift

Educational organization strategy is directly based on the nowadays paradigm as well. The modern educational paradigm highlights the following aspects: changing the relationship between educator and learner; personality formation, including learning as a key activity; cooperation during teaching/learning; the development of a holistic personality as the primary objective of education; focus of competences development; long life overall learning (Blūma, 2016).

Today's paradigm in education has been developed basing on the expected results reflected in the 2030 School program, where the key concept included: firstly, the active participation of parties involved: integrity, significance and involvement. Secondly, the new experience creation, transformation, by providing safe learning environment, goal-oriented, regular, different context learning/teaching (Grīnfelde, 2017).

In order to reflect the nature of the paradigm shifts in education, it is necessary to describe the hierarchical system of the learning process, the main determinant of which is the objective. On the other hand, all other elements are interrelated, which could be arranged as follows: educational objectives; educational content; learning/teaching materials and features; organization of study process; roles of educator/leaner; relations between educator/learner; the achievements of the learner (assessment) (Blūma, 2016).

As mentioned by Guntars Catlak, head of the National Center of Education of Republic of Latvia, today's educational challenge to prepare young people for a successful future in changing world, not only to acquire knowledge and its purposeful usage, but also to develop the capacity and willingness for lifelong learning. Global trends analyses show that significant changes are required in teaching/learning content, approaches and evaluation. At the same time, the role of personality development of young people is highlighted, including the development of behavioral habits (Skola2030, 2016).

Therefore, when the educational objective is changed by different factors, all the other elements have to be transformed accordingly, i.e. the whole paradigm should be transformed. That also defines the nature of any educational paradigm, as now we are facing the transformative paradigm including digital learning.

Digital Transformation of Education Institution

For any organization, and for educational organization in particular for any change or transformation implementation the strategy is needed. The detailed analysis of the situation is the pre-condition for the strategy development. SWOT

analysis is offered by the author as the method for situation analyses for the further strategy of transformative learning development in the context of education.

As for educational organizations, to implement any changes, and in the specific case of transformative digital learning, a strategy is needed that requires a detailed analysis of the situation.

American leading corporation Alcatel Lucent offered their concept of Digital Transformation, general one for any organization, including the educational one. The first and the most important step – strategy design and development. A clearly defined strategy that leverages opportunities presented by the new technology while meeting the objectives of the stakeholders. The following four steps necessary to develop a DT strategy for education:

1. Connect everything to support tomorrow's digital world. Set up strong strategic partnerships and build an ecosystem connecting the people, processes and things to build a communications network that is high capacity, secure and smart.
2. Deploy analytics to automate, understand and save money, necessity to use real life, real-time data to drive strategic initiatives that improve performance, roll out upgrades and make infrastructure decisions.
3. New business models are needed, updated software and on-demand services to make the procedure cheaper, more flexible and simpler to manage than traditional systems.
4. A single, simple platform needed or on-premises or in the cloud, the ultimate goal of digital transformation is to provide a single platform as the foundation of the network and communications infrastructure for the institution (Alcatel-Lucent, 2018).
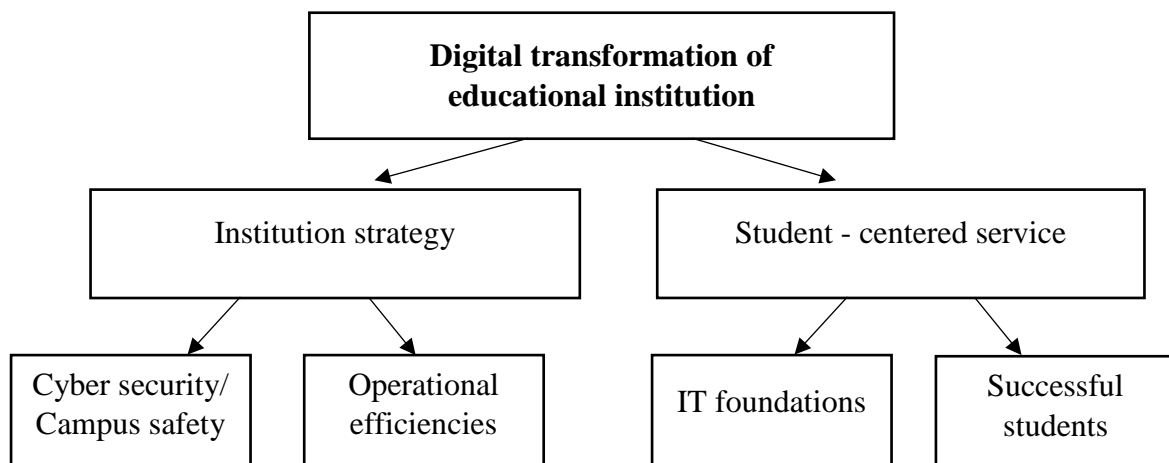
Figure 2 **Digital Transformation of Educational Institution** *(Alcatel-Lucent, 2018)*

Digital transformation of educational institution by covering two key points: institution strategy and student-centered service can provide the solution to situation followed by the Covid-19 pandemic.

Methodology of the Research

The SWOT method was originally developed for business and industry, but it is also useful for development and education. As SWOT analysis guides to identify the organization's strengthens and weaknesses and also broader opportunities and threats. Providing a full awareness of the situation that is necessary for strategic planning and decision-making that is the key factor for the implementation of transformative digital learning (Renault, 2020).

Additionally, SWOT analysis is a tool as for analyzing the internal like individual and organization perspectives and external like local government or state perspective. This method provides the way for growth and further development on both perspectives (Plumb, Kelsey, 2018).

By analyzing SWOT structure than the key elements include: strengths by describing positive aspects, assets, resources, prospects; weaknesses by describing negative aspects, limitations, restrictions, challenges; strengths are also possible opportunities; weaknesses are also possible threats.

There are many internal factors that should be taken into consideration: human resources; physical resources; financial; activities and process; previous or past experience (Sharma, 2005).

If to name forces and facts that are not under the organization control, these include: future trends in the field; funding sources; the economy – local and national; legislations; local or national events (Renault, 2020).

Questionnaire Results

The questionnaire tool place from 25th of August till 15th of September 2020, online in the framework of the project "Life with Covid-19: Evaluation of overcoming the coronavirus crisis in Latvia and recommendations for societal resilience in the future" CoLife Nr. VPP-COVID-2020/1-0013. The current analyses include the respondents answers on the two main aspects: statements concerning distance learning and recommendations for distance learning procedure at state, institution and individual level.

Additionally, the experts' interviews have been analyses and the comparison provided. The described analyses are made in the educators' perspective.

Total 559 Latvian educators have participated in the questionnaire. Kronbah's alpha is α= ,955 and shows good internal consistency of the questionnaire.

The results are interpeted using SWOT analyses, including strengthens, weaknesses, opportunities and threats.

Research Results

In order to clarify the attitude towards distance learning from educators' perspective the online questionnaire has been conducted. 15 statements about distance learning have been offered to the respondents. The statements have been worked out basing on the Independent Educational Society, which allows for better understanding and comparative analysis at a later stage. The Likert scale was used, where 1 – disagreement and 4 –totally agree. The average index is presented in Table1.

According to Table 1 the highest average index is for the statements of complicated perception of learner's emotions, for promoting professional development and for the necessity of more online learning materials. While the lowest average index is for the individual approach for each learner and less quality of learning process.

Table 1 ***Statements Analyses in Educators' Perspective***

Statement	Average Index
Very useful experience for both educators/learners	3,19
To reveal strengths and weaknesses in education system	3,25
New challenge as for educators as for learners	**3,66**
Promote professional development	3,16
Individual approach to each learner	2,48
Develop learning skills	2,99
Less quality of learning process	2,69
Everyday work and the learning process haven't changed significantly	1,88
More difficult to organize the learning process (no flexibility to change methods and work forms)	2,96
Improvement of digital skills of educator and learner	3,36
Development of self-sufficiency of learners	3,05
Complicated perception of learner's emotions	**3,90**
Low quality of communication	3,08
More online learning materials needed	**3,48**
Lack of technical aids (computers, etc.)	3,22

The statements in the questionnaire have been offered basing on the similar survey of Independent Educational Society that took place at the end of the 2019/2020 study year, with 849 respondents, the comparison has been conducted to highlight the trends and key aspects. In both questionnaires the similar tendencies have been observed (NĪB, 2020).

The majority of respondents of both questionnaires agree with the statement that distance learning revealed as strengths and weaknesses of educational system, but can't provide the sufficient perception of learner's emotions. Despite the fact the questionnaires have been carried out at a different time and different groups of respondents have been participated it can be defined that the trends remain the same following Covid-19 pandemic.

Afterwards the offered statements have been put into SWOT analyses structure, where the key weaknesses have been indicated as threats and risks (see table 2).

*Table 2 **SWOT Analyses of Distance Learning in Educators' Perspective***

STRENGTHS	WEAKNESSES
✓ Very useful experience for both educators/learners ✓ Individual approach to each learner	✓ Less quality of learning process ✓ Complicated perception of learner's emotions ✓ Low quality of communication ✓ Lack of technical aids ✓ No joint platform ✓ Lack of material ✓ No developed digital competence as for educators/ as for parents
OPPORTUNITIES	THREATS/RISKS
✓ To reveal strengths and weaknesses in education system ✓ New challenge as for educators as for learners ✓ Promote professional development ✓ Develop learning skills ✓ Improvement of digital skills of educator and learner ✓ Development of self-sufficiency of learners ✓ More online learning materials needed	✓ More difficult to organize the learning process ✓ Complicated perception of learner's emotions ✓ Low quality of communication ✓ Lack of technical aids ✓ Next COVID waves ✓ Uncertainties in educational policy, affecting work of educational leaders, resulting in the entire educational process

The majority of statements have been put into opportunities, but the effectiveness of their implementation directly depends on the strategy worked out afterwards by the educational institution for transformative digital learning implementation.

By analyzing the open questions, the respondents indicated the four different levels for the changes implementation in order to improve the distance learning in educator's perspective: firstly, individual level (change of thinking and attitudes, openness to co-operation, development, responsibility and self-reflection of different skills (digital, time-management, self-organization, communication, mutual trust, etc.). Secondly, educational institution level (developing organization strategy and operational plans, identifying the digital tools to be used, providing security and support measure, developing precise criteria for the acquisition of the content, ensuring the communication and co-operation involved, etc.). Thirdly, local government level (provide support for the development and implementation of developed strategy, operational plans and documentation of the educational institutions, to develop high-skilled IT, social and psychological support plans and coordinate the implementation, to provide the professional competence development according to the needs, etc.). Finally, at State level (unique platform for digital and interactive learning resources for random access, determination of responsibilities and obligations, clearly indicated guidelines; development of recommendations for evaluating learner learning performance, revision of educator workload, provision of various types of financial, social and psychological support and coordination, etc.).
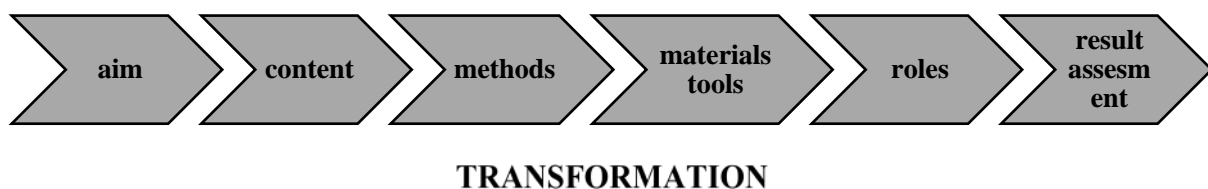
TRANSFORMATION

*Figure 3 **Transformation Strategy***

Following the detailed analyses, the transformation strategy should be designed. On Fig.3 the education paradigm key elements are explained in the transformation perspective. So Covid-19 has influenced the general situation including educational aspect, so in order to achieve good results the following transformation strategy is offered, that is the integral part for transformative digital learning implementation, where starting from the education aim and objective the key elements: content, methods and approaches, used materials and tools, roles of learner and educator, are transformed for best results achievement, using also transformed assessment strategy.

Conclusion

The results of the research show that distance or digital learning is full of opportunities from educators' perspective, while the aspects of four defined levels should be taken into consideration: individual, institutional, local government and state one.

As the result of the research, according to SWOT structure, the following strengths, weaknesses, opportunities and threats were identified, basing for the offered questionnaire statements. The strengths of distance learning are useful experience for both educators and learners and individual approach to each learner, while the opportunities include the display of strengths and weaknesses in education system; new challenges for educators and learners; promotion of professional and learning skills development, digital skills improvements and self-sufficiency of learners. Moreover, the weaknesses correspond to the threats and risks, including less quality of learning process; complicated perception of learner's emotions, low quality communication and lack of technical aids; more complicated to organize the learning process.

We can conclude that designing the transformation strategy for distance/digital learning the key elements of paradigm shift should be taken into consideration, from the aim formation to the assessment of the achieved results from the educators' perspective. Further analyses and discussions are recommended covering the learners' perspective in the distance or digital learning context.

Acknowledgment

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PHYSICAL ACTIVITY OF STUDENTS AT HIGHER EDUCATIONAL INSTITUTIONS WITH KINESIOLOGY AND HEALTH MAJORS IN THE SETTING OF COVID-19 PANDEMIC

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Abstract. *The purpose of this study was to discover the peculiarities of students' physical activities that study at higher educational institutions with kinesiology and health majors in the setting of COVID-19 pandemic. In order to accomplish it, an online survey was conducted among a total of 236 students of Lviv State University of Physical Culture named after Ivan Boberskyj. With its help, we were able to determine both domestic and organized physical activity levels' self-assessments of the sample group before and during the quarantine restrictions. The majority of the students evaluated their physical activity levels as "excellent" and "good". No significant changes among the physical activity assessments were not tracked during the quarantine restrictions. We established that 59% of the study group had regularly visited gyms before the pandemic breakout and 12% of the students systematic did home exercises. The remainder of active students (26%) exercised seldom. Before the pandemic, only 3% of the participants had not engaged themselves into organized physical activities. We observed an overall studentship physical activity decrease in terms of instances and intensity during the quarantine limitations. The forms of physical activities were substantially changed. Thus, the students began to stroll more often, as well as train alone or with online-coaches. Cardio and muscle strengthening remained dominant among activities both before and after the quarantine. After the quarantine restriction weakening, half of the study group re-embarked on gym training. 28% of the students continued exercising the same way they did during the quarantine. 12% of the respondents exercised on their owns. 7% of the participants did not*

return to training. With the respect to the results of this study, we can infer that Ukrainiastudents prefer group exercises where they can interact with either coach or other participant of the training sessions, as well as modern technologies cannot fully fulfill their needs of physical activity.
Keywords: *physical activity, students, COVID-19 pandemic.*

Introduction

In the latest years, in light of educational process intensification at Ukrainian higher educational institutions, it has been observed there is a tendency to decreased physical activity among students, which, in turn, negatively impacts both their physical and emotional states (Zavydivska, Rymar, & Malanchuk, 2015; Solovei, Rymar, Yaroshyk, & Sorokolit, 2017; Sorokolit & Kukhar, 2019; Yaroshyk, Malanchyk, & Solovei, 2020). The everyday life activities and lifestyle of mankind, in general, have been significantly altered since the COVID-19 quarantine restrictions were established to prevent the virus spread (Tison, Avram, Kuhar, Abreau, Marcus, Pletcher, & Olgin, 2020; Ding, del Pozo Cruz, Green, & Bauman, 2020; Malatska et al., 2020). Therefore, it is important to monitor student hood's physical activity levels as a measure of health preservation, virus resistance as well as to avert hypodynamia in the pandemic setting.

The purpose of this study was to determine the specifics of students' physical activities during the COVID-10 pandemic who study at higher educational institutions with Kinesiology and Health majors.

Methods

In order to assess the impact of quarantine restriction on physical activity, we conducted a survey among the students of Lviv Ivan Boberskiy State University of Physical Culture. The survey was online with the help of Google Forms. The questionaire contained 25 enquiries aimed at determination of student's physical activity peculiarities before the pandemic outbreak as well as during the quarantine restrictions. 236 participants took part in the conducted survey. The vast majority of the respondents live in the city (75%), the rest (25%) live in the rural area. Among the participating group, the most significant subgroup was of third-year students (61%), and then of second-year students (25%). The rest were in their fourth year of tuition (11%) and the fifth year (3%). Slightly more than half of the participants were the students of the faculty of Physical Culture and Sport – 54%, and the second largest group represented the faculty of Pedagogics (36%). The Physical Therapy and Ergotherapy majors accounted for only 10% of the respondents. 67% of the experiment group stated they had combined work and tuition. 30% of the students declared their work

requires high physical activity levels. 26% of the survey participants have jobs associated with average-level physical activity, and only 6% of the response group members have low-level physical activity work. 5% of the students work at the offices, with no physical activity whatsoever. On average, students spent up to 19 hours per week at their jobs.

Results

Human's physical activity has a wide variety of manifestations. The two most popular forms of activities are domestic and organized physical activity. We assume that the quarantine restrictions should have caused quantitative and qualitative changes in their structuring and durations.

Thus, as the result of the conducted study before the quarantine outbreak, 41% of the students assessed their household physical activity at 5 points, 35% of the respondents – at 4 points, 20% - at 3 points, 3% - at 2 points, and 1% at 1 point. The pre-quarantine organized physical activity scored 5 points by 36% of the students, 4 points by 33% of the participants, 3 points – by 19% of the study group members, 2 points – by 5% of the participants and 1 point among 7% of the students.

Table 1 **Self-Assessment of Students' Physical Activity before and during Quarantine**

Assessment of physical activity, points	Before quarantine, %		During the strictest phase of quarantine*, %	
	Household Phys. Activity	Organized Phys. Activity	Household Phys. Activity	Organized Phys. Activity
5	41	36	38	34
4	35	33	34	34
3	20	19	21	20
2	3	5	6	6
1	1	7	1	6

n=236

*the strictest phase of quarantine in Ukraine lasted from 6 April until 20 May 2020

Had analyzed the table results, we observed that little to no changes were seen in the assessments of their physical activity levels during the strictest phase of quarantine restrictions. We presume that is due to the contingent of the experiment participants. Primarily, those students were Physical Culture and Sports majors as well as Pedagogics majors, and they all regularly exercised their sports of choice, and worked as coaches or instructors. Apparently, their regimes of physical activities are rationally organized, and all of them systematically

exercise physically intensive workouts out of habit. Therefore, the quarantine restrictions have just slightly impacted their everyday physical activity levels.

With the respect to the obtained survey results, we found out that 59% of the students regularly visited gym (or some sports group, swimming pool, stadium, etc.) before the pandemic as well as that 12% of the participants trained on their own. 13% of the respondents stated they seldom visited gym (or some sports group, swimming pool, stadium, etc.), other 13% rarely engaged in training sessions all alone. Only 3% of the study group members had not been involved in any organized physical activity before the study was conducted [Figure 1].
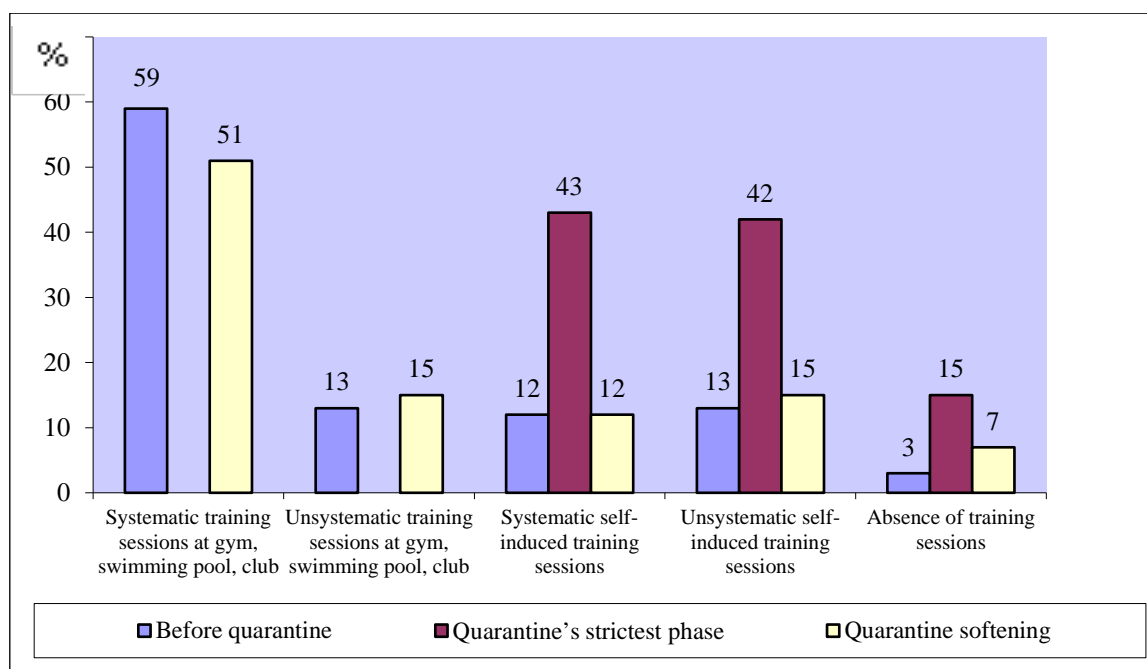
Figure 1 **Involvement of Students in Physical Activity before and during Quarantine (%)**

Two of the most popular physical activity forms before the pandemic outbreak among students were weight lifting (44%) and cardio-trainings (37%). Swimming pool exercising and dancing exercises / stretching were popular only among 5% and 4% of the students, respectively. On average, the study group members spent about 3 days with organized physical activity (27%), 4 days – 14%, 5 days – 22%, 6 days – 22% of the respondents. Before the pandemic breakout, the students spent from 1 to 2 hours in organized physical activity a day (37%), from 2 to 3 hours a day – 24% of the participants, from 30 mins to 1 hour – 20%, from 3 to 4 hours – 9%, below 30 minutes a day – 4% of the experiment group members, and above 4 hours – only 2% of the respondents. The data pieces we were able to gather testify that the students of Lviv Ivan Boberskiy State University of Physical Culture had great physical activity levels before the pandemic outburst.

According to the responses during the pandemic, for 41% of the students nothing changed with the respect to their physical activities. 21% of the participants declared they experienced a slight decrease in their physical activity levels, and they only had to switch from one particular type of physical activity to another one. However, for 19% of the study group members, the pandemic negatively influenced their activity levels. 7% of the participants experienced a positive impact on their activity during the pandemic period. Among the most wide-spread influencing factors during the pandemic mentioned by the participants were: "I started training on my own" (34%), "My fitness center got closed (sport group, gym, swimming pool, etc." accounted for 34% of the responses, "I started strolling more often" (22%), "I started jogging" (14%), "I could not leave my house to go exercise" (8%), "I began training with an online coach" (6%).

Resting on the students' replies to the survey, 43% of the experiment participants regularly engaged in organized physical activity during the strictest phase of the quarantine. Seldom, 42% of the students got involved in physical exercising. Only 15% of the students did not participate in any organized physical activity session. The students mainly exercised at their homes – 41%, outdoors and at the stadiums – 32%, at the sports grounds – 20%. The dominant forms of physical activities were cardio-trainings (44%) and strength training (33%). The vast majority of the survey participants trained alone during the strictest phase of quarantine – 81%, and only 9% of them were involved in online coaching sessions. Half of the experiment group members began to utilize digital and online resources for physical activity – exercise videos from YouTube channels or fitness applications. On average, the students spent about 3 days (22%) being engaged into organized physical activity, 4 days – 14% of the respondents, 5 days a week – 25%, and 6 days per week – 12 % of the students.

During a day, at the times of the strictest phase of the quarantine, the study group members spent from 30 minutes to 1 hour involved into organized physical activity – 36%, from 1 to 2 hours – 32%, from 2 to 3 hours – 11%, less than 30 minutes a day – 9%, from 3 to 4 hours – 4%, and only 1% of the respondents had more than 4 hours of organized physical activities during a day. The obtained results testify that the overall physical activity engagement has decreased during the strictest phase of the quarantine restrictions. The intensity of the training sessions got softer too. According to the student responses, in 65% of the cases, their physical activities did not significantly influence their breathing rhythms and pulse. Only 28% of the students got themselves involved in high-intensity physical training sessions.

According to the survey results, 36% of the students began to pay more attention to their states of health. The rest of the respondents affirmed that they

had cared for their health even before the pandemic outbreak, and thus, they simply continued their everyday routines during the quarantine.

The majority of the experiment group members did not experience any weight changes during the quarantine – 50% of the responses stated it. 21% of the students faced weight gain. 17% of the participants encountered body weight loss. We presume that body weight parameter fluctuations should have been caused by nutrition habit changes or worsening of sleep quality. Considering the responses of our participants, only 32% of them experienced nutrition changes, the rest continued to eat as they had done before the pandemic. Only 20% of the students adhered to healthy nutrition principles during the quarantine. 42% of the experiment group members stated they had experienced sleep worsening, which included long time to fall asleep, insomnia, and perceptions of not enough sleep.

After the quarantine restrictions had gotten softened, half of the study participants turned back to gym training (sports group, swimming pool, etc.). 28% of the students continued to train as they had done during the strictest phase of the quarantine. 12% of the study group members exercised on their own after the softening of the quarantine regime. We observed similar results during the analysis of pre-quarantine responses of the students (Figure 1). Only 2% of the students got involved more into online training sessions. 7% of the respondents did not engage in any physical activity after the quarantine softening.

With the respect to the results of this study, we can infer that Ukrainian students prefer group exercises where they can interact with either coach or other participants of the training sessions, as well as modern technologies cannot fully fulfill their needs of physical activity. This speculation is supported with ample evidence observed among the student responses regarding their habits of being involved in physical training even during the quarantine. Thus, 54% of the respondents declared that they acquired the habit of being systematically physically active during the quarantine. 23% of the students stated they did not obtain the habit of being physically active, and the rest of the experiment group members were hesitant to decide what group they would belong to. Among the negatively influencing factors resulting into the not-acquired habit of being physically active, the most popular ones were a) alternation of everyday life activities, b) excessive relaxation in the new vital settings, c) significant decrease in in-human communications with coaches and friends, and d) decreased overall ability to work after overcoming the illness.

Conclusions and Discussion

The conducted study provided us with ample evidence to determine some of the peculiarities of Ukrainian students who study at higher educational institutions with Kinesiology and Health majors in the pandemic setting:

1. Before the pandemic outbreak, most of the students assessed their physical activity levels as "excellent" and "good". 71% of the participants regularly engaged in physical training, 26% of the students did it seldom and only 3% of them never involved themselves in organized physical activities. Among the most popular forms of activities were cardio-trainings and strength exercises. Primarily, the training sessions lasted from 1 to 3 hours a day. The amount of training sessions per week averaged from 3 to 6 times a week. Half of the respondents declared that they paid enough attention to the state of their health, adhered to healthy nutrition and did not experience any issues with sleep quality before the pandemic breakout.

2. Since the quarantine restrictions were established, 41% of the students had stated that their physical activity was not impacted by the quarantine. Insignificant influence was remarked by 21% of the participants. Positive effect and negative effect of the quarantine was perceived by 7% and 19% of the studentship members participated in the survey, respectively. During the strictest phase of quarantine, 43% of the students continued to take part in organized physical activities as they had done before it. However, the forms of physical activities were considerably altered as well as the locations they were performed at. The students noted they preferred to train on their own at homes or outdoors. Only 9% of the students incorporated digital solutions to get involved into physical activities (online coaching sessions or online resources). The overall intensity and training exercise amounts during physical activity sessions had decreased. Most of the participants favoured mild physical activity levels that lasted from 30 minutes to 2 hours, 3-4 times per week, on average. The percentage of inactive students had increased to 15% during the strictest phase of the quarantine restrictions, who did not engage in any physical activity at all. During this phase, the students experienced body weight fluctuations as well as worsened sleep quality conditions.

3. After the quarantine restrictions had been softened, the physical activity levels of the participants returned almost to its original levels as they had been before the pandemic. However, a big group of students did not turn back to systematic training after the quarantine (7%). Before the pandemic, there had been only 3% of such students. The experiment group members declared that among the most wide-spread limiting factors that emerged during the restrictions and did not induce systematic physical activity were a) alternation of everyday life activities, b) excessive relaxation in the new vital settings, c) absence of systematic training sessions; d) significant decrease in in-human communications with coaches and friends, and e) decreased overall ability to work after overcoming the illness.

With the results that we were able to obtain, we can see the similarities that arise during other conducted studies in the majority of the countries (Ding et al.,

2020; Tison et al., 2020). The overall interest in alternative physical exercising had risen since the strictest phase of the quarantine restrictions among most of the citizens across the globe, although, the physical activity levels had decreased since the pandemic. After the quarantine limitations had gotten softer, most of the population began to return to organized physical activities. The most significant surges of activity were observed in Great Britain and Australia where outdoor physical activities were supported by the local governments (Ding et al., 2020).

With the respect to the fact that quarantine restrictions are still present in Ukraine, it is important to continue monitoring physical activity of the population in the pandemic setting. In the future, we plan to conduct a study aimed at discovery of physical activity peculiarities of the students who study at higher educational institutions that do not offer Kinesiology and Health major programs and to compare the results with the current study.

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PERCEPTION OF FORCED DISTANCE LEARNING BY IT STUDENTS: THE INFLUENCE OF GENDER AND JUNGIAN PERSONALITY TYPES

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Abstract. *Learning in a pandemic situation has shown an increased role and need for research and implementation of personalized learning, and therefore the factors necessary to take into account when forming such an approach. The purpose of this study was, firstly, to find out how students of technical specialties perceive the fact to refuse from classroom studies, and, secondly, to determine the influence of person's individual characteristics on attitude towards distance learning. The research results showed that a significant part of full-time IT students (about 70%) reacted positively to the advantages of distance learning and that the attitude towards this form of education is to some extent determined by gender, as well as a manifestation of Introversion-Extraversion and Thinking-Feeling.*
Keywords: *distance learning, Jungian typology, learning styles, Myers-Briggs Type Indicator.*

Introduction

The forced refusal from full-time education and a complete transition to distance learning revealed many problems associated not only with organizational issues, but also with the ambiguous attitude of students to the refusal of full-time studies.

Learning styles vary from person to person, so people with different personality traits tend to prefer different learning styles (Durling, Cross & Johnson, 1996; Felder & Silverman, 1988; Zagulova, Boltunova, Katalnikova, Prokofyeva, & Synytsya, 2019). The peculiarities of the attitude to the forced distance learning form may be due to the psychological characteristics of the personality (Dewar & Whittington, 2000; Graf, 2007), traits and aspects of the

learning style (Furnham, Jackson, & Miller, 1999; Graf, Liu, & Kinshuk, 2010). In this case, type theories can explain the differences that students have compared to others in different areas. Understanding the characteristics of different types of behavior in the educational process can help in solving problems that students may face (J. C. Carland & J. W. Carland, 1990).

Currently, when studying the individual characteristics of learning, focus on two main methods: Felder-Silverman Learning Style Model and the Myers-Briggs Type Indicator, MBTI, which is based on The Jungian typology (Shen, Prior, White & Karamanoglu, 2007).

In the context of this research, the authors believe it is more promising to study the influence of the typological characteristics of the individuals described by C.G. Jung (Jung, 2014) on the attitude to distance learning. Since Jungian typology is based on the mechanisms of selection of signals perceived by the psyche, on the mechanisms of information metabolism, or the rules of the language through which information is transmitted (Augustinavichjute, 1995). The Jungian typology was used to adapt the learning of online writing instructors (Hewett & Martini, 2018), medics (Ramachandran et al., 2020), learning styles of mathematics of pupils (Kang, 2020), when selecting working groups of engineers (Shen, Prior, White, & Karamanoglu, 2007) and many others.

Until now, it was possible to analyze the relationship between the features of personal characteristics and distance learning in groups where students themselves chose the type of education that suits them. The uniqueness of this situation lies in the fact that all students, teachers and lectors were deprived of the opportunity to choose and were placed in the conditions of the mandatory use of distance learning. This situation makes it possible to more reliably explore the relationship between different aspects of distance learning and personality traits. Such studies can become the basis for the development of more effective algorithms for creating educational materials from the perspective of personalized learning.

Understanding the influence of the psychotypological personality traits on the attitude to distance learning (DL) will optimize the process of adaptation of students to the absence of full-time studies.

In this regard, the purpose of this article was, firstly, to investigate some aspects of the attitude of students to DL, and, secondly, to determine the influence of typological features on this attitude.

Jungian Typology

According to P. Guild and S. Garger (Guild & Garger, 1985), the diversity of types in the context of learning is often recognized in words, but ignored in practice, and the adoption of a variety of styles can help create an atmosphere and

experience that encourages each person to reach their full potential. According to the views of Isabel Briggs Mayer and Catherine Briggs (Myers, McCaullev, Quenk, & Hammer, 1998), who developed the theory of Jung's types, a person's orientation is characterized by the Extraversion-Introversion dichotomy, the activity of the mind can be described by two dichotomous functions Sensing-iNtuition and Thinking-Feeling, and Judgment and Perceiving attitudes (Table 1). At the same time, the Sensing and Thinking functions were classified by Jung as rational (Judgment), and iNtuition and Feeling as irrational (Perceiving). These preferences determine what people pay attention to in different situations, their perception, actions and conclusions (Myers I. B. & Myers P. B., 2002).

*Table 1 **Description of Functions according to the Jungian and Myers-Briggs Typology (O'Brien, Bernold & Akroyd, 1998; Hewett & Martini, 2018; King & Mason, 2020)***

Orientation to the external or internal world	Extroversion (E)	Extroverts are more focused on the external world of people and things. An extrovert is comfortable among people, he feels deprivation when there is no interaction with the external world, is exhausted during solitary activity.
	Introversion (I)	Introverts are mostly focused on the internal world, concepts and ideas. An introvert needs "personal time" and space to recharge, he can be "closed" to the external world, has intrinsic motivation, and prefers individual communication.
Preferences in the field of cognitive perception	Sensing (S)	With the predominance of Sensing (S), people rely more on sensations when interpreting facts or events, on one or more of the five senses. These people value experience, perception is based on reality, focus on details and specifics. They need practical information and action.
	iNtuition (N)	Others rely more on intuition (I), use a more abstract, intuitive process. They are more focused on concepts, use metaphors, intuitively perceive information, can give "complete" answers without explanation. They prefer variety, challenging tasks and creativity. They can easily get distracted and lose touch with their environment.
Thinking preferences	Thinking (T)	With a pronounced Thinking (T) function, people rely on logic and consistency when making decisions. As a rule, such people have a rule-based judgment, they present information logically, can be analytical and critical, they need a lot of details.
	Feeling (F)	In other cases, they rely more on Feeling (F), decision making is based on internal or external value systems, more subjective. Personal, emotional and value judgments predominate, there may be vivid emotional reactions. These people can develop better through formal training in an educational institution.

Features of the way of making decisions	Judgment (J)	People in the "Judgment" (J) category prefer to choose a course and follow it precisely, their lives and actions are more planned and orderly. They may have a sense of urgency until a decision is made, they set deadlines and take them seriously. They prefer to be ahead of deadlines, move consistently from task to task.
	Perception (P)	Those who belong to Perception (P) prefer to collect all possible information before acting and remain open to various options for action. They have flexible deadlines, but they are time-tolerant and perform better when there is a time frame. Can plan on the go, prefers multitasking, variety, mixing work and play. They believe that work should be enjoyable.

Based on Jung's theory, the Myers-Briggs indicator (Myers, McCaullev, Quenk, & Hammer, 1998) was developed, which has become a very popular psychometric tool in business and personal development, including education. The frequency of occurrence of individuals with the severity of certain functions differs both in different countries (Table 2) and among different professions (Table 3).

*Table 2 **Distribution of Dichotomous Population Preferences in the UK, US and Korea (Shen, Prior, White & Karamanoglu, 2007)***

	Introversion (I) Extraversion (E)		iNntuitive(N) Sensing (S)		Thinking (T) Feeling (F)		Judging (J) Perceiving (P)	
UK	E	52,6	S	76,5	T	45,9	J	58,3
N=1634	I	47,4	N	23,5	F	54,1	P	41,7
US	E	49,3	S	73,3	T	40,2	J	54,1
N=500000	I	50,7	N	26,7	F	59,8	P	45,9
Korea	E	41,0	S	75,0	T	63,0	J	63,0
N=13308	I	59,0	N	25,0	F	37,0	P	37,0

Relation of the distribution of different psychotypes in the UK and US are similar, while the inhabitants of Korea differ in a large number of residents with pronounced Introversion, Thinking and Judging.

In the field of research, it is shown the justified use of Jung's personality types both in the educational sphere and in matters of vocational guidance and vocational counseling. Differences in individual priorities of cognitive activity explain the differences in the representation of different types among different fields of activity (Table 3): among Psychology students and Twitter users there are more Perceiving and Feeling, among Managers and Engineering students − Thinking and Judging etc.

Table 3 **Typological Results for Accounting Students, Managers and Psychology Students**
(Briggs, Copeland & Haynes, 2007; O'Brien, Bernold & Akroyd, 1998;
Lima & de Castro, 2019)

	Accounting students (%)		Managers (%)		Psychology students (%)		Engineering students (%)		Twitter users (%)	
Introversion | Extraversion	50.7	49.3	49.6	50.4	51.5	48.5	41,0	59,0	64.1	35.9
iNntuitive | Sensing	75.7	24.3	47.3	52.7	36.9	63.1	28,0	72,0	77,5	22,5
Thinking | Feeling	**68.1**	31.9	**83.7**	16.3	43.0	57.0	**75.0**	25,0	41,6	**58,4**
Judging | Perceiving	**61.5**	38.5	**68.2**	31.8	44.2	**55.8**	**61,0**	39,0	58,8	41,2

Research Methods

The studies were conducted on the basis of Riga Technical University Faculty of Computer Science and Information Technology in 2020. The course "Algorithmization and Programming of Solutions" is taught to the first year students of Computer Systems (CS), Automation and Computer Engineering (A&CE), Information Technology (IT), Financial Engineering (FI) and Intelligent Robotic Systems (IRS).

To study the attitude of full-time students to distance learning, they were asked the following questions:

1. Do you agree to completely switch to DL, if at the same time there would be an opportunity for both face-to-face and distance consultations? (answers: yes; rather yes, than no; hard to answer; rather no, than yes; no)
2. Do you agree that DL, in most cases, can fully replace learning in the audience? (answers: Strongly agree; Agree; Partly agree; Disagree; Strongly disagree)

When analyzing the answers to these questions, answers with a positive connotation, such as "Yes", "Rather yes than no", "Strongly agree", "Agree", "Partly agree" were combined and labeled as "Yes", respectively combined responses with negative connotation, such as "Rather no than yes", "No", "Disagree," "Strongly disagree" are labeled as "No".

To assess the deficiencies of distance learning, a semantic differential from 0 to 3 was used, where 0 – does not matter; 3 – very important, wherein such factors were assessed: Communication difficulties with teachers, Communication difficulties with fellow students, Lack of student events, Social isolation, Lack of

competition between students, The need of self-discipline and self-motivation, Fears that the employer will not appreciate the knowledge gained from DL.

To assess the benefits of DL, students were asked to evaluate the importance of such factors as: Money saving, Availability of all course materials, Own choice of learning rhythm, Own choice of learning time, Independence from the studies place, Convenient combination of work and studies, The ability to use audio materials, The ability to use video materials. At the same time, the following answer options were presented: I do not consider it as an advantage, Important, Rather important, Rather not important, Not important.

The MBTI questionnaire was used to determine the psychotype (Myers I. B. & Myers P. B., 2002).

Frequency data are presented as relative (%) and absolute numbers (n) of respondents and 95% confidence intervals (CI) 95% confidence intervals for frequencies were determined using the Wilson method (Brown, Cai & DasGupta, 2019). Fisher's exact test (FET) was used to evaluate 2x2 contingency tables. The critical level of significance when testing statistical hypotheses was taken equal to 0,05. Risks were considered significant if there was no value equal to 1 between the CI.

Research Results

The attitude of full-time students to distance learning

Faculty of Computer Science and Information Technology students mostly reacted positively to the opportunity to study remotely (Table 4): no more than 30% of students negatively assessed this form of education. These data significantly differ from the data obtained in other studies, where more than 54% of students deny this form of learning (Zagulova, Shirjaeva, Gunare, & Averin, 2020).

Table 4 Assessment of Full Transition to Distance Learning by Full-time Students

Question	Answer		
	Yes n (%) [CI]	No n (%) [CI]	p
Do you agree to completely switch to DL, if at the same time there would be an opportunity for both face-to-face and distance consultations?	127 (70,9%) [67,3%-74,1%]	52 (29,1%) [25,9%-32,7%]	0,0000
Do you agree that DL, in most cases, can fully replace learning in the audience?	155 (77,9%) [74,7%-80,6%]	44 (22,1%) [19,4%-25,3%]	0,0000
Do you agree that the new material is better perceived in lectures in the audience than in online broadcasting?	143 (71 ,9%) [68,5%-74,8%]	56 (28,1%) [25,2%-31,5%]	0,0000

The attitude of full-time students to the negative factors of distance learning

Analysis of students' attitude towards negative DL factors showed that for the majority of students, all factors are important, except one factor "Lack of competition between students". At the same time, more than 30% of students noted social isolation and the need for self-discipline and self-motivation as a very important factor.

It is worth to mention that the attitude towards two negative distance learning factors was depended on the gender of the students:

− **Communication difficulties with teachers** during DL, the majority of female students assessed with 2-3 points (n=47/64, 73,44%), in comparison with male students (n=67/131, 51,15%), (p=0,003);

− **Social isolation** was considered as a very important factor by 60,00% of female students (n = 30/50) and 37,50% (n = 36/96) of male students, which is statistically significantly different at the p = 0,01 level.

Table 5 ***Evaluation of Potential Negative Distance Learning Factors by Full-time Students***

Factor	Answer			
	0 n (%) [CI]	1-2 n (%) [CI]	3 n (%) [CI]	p_{0-3}
Communication difficulties with teachers	20 (10,1%) [8,3%-12,6%]	139 (69,8%) [66,4%-72,9%]	40 (20,1%) [17,6%-23,2%]	0,006
Communication difficulties with fellow students	34 (17,1%) [14,7%-20,1%]	127 (63,8%) [60,3%-67,1%]	38 (19,1%) [12,6%-17,6%]	0,6
Lack of student events	54 (27,1%) [24,2%-30,5%]	99 (49,7%) [46,2%-53,3%]	46 (23,1%) [21,4%-27,5%]	0,1
Social isolation	28 (14,1%) [12,0%-16,9%]	105 (52,8%) [49,2%-56,3%]	66 (33,2%) [10,0%-14,6%]	0,0000
Lack of competition between students	112 (56,3%) [52,7%-59,7%]	81 (40,7%) [37,3%-44,3%]	6 (3,0%) [2,2%-4,7%]	0,0000
The need of self-discipline and self-motivation	31 (15,6%) [13,3%-18,5%]	103 (51,8%) [48,2%-55,3%]	65 (32,7%) [11,3%-16,1%]	0,0001
Fears that the employer will not appreciate the knowledge gained from DL	49 (24,6%) [21,8%-27,9%]	111 (55,8%) [52,2%-59,2%]	39 (19,6%) [19,2%-25,0%]	0,2

Note: 0 - does not matter; 3 - very important

The attitude of full-time students to the positive factors of distance learning

The students reacted positively practically to all the factors that were classified as positive. The only two factors Money saving and Convenient combination of work and study were not considered as positive by about 30% of students, which is most likely due to the insignificance of these factors for them.

*Table 6 **Assessment of Potential Positive Distance Learning Factors by Full-time Students***

Factor	Answer		
	Positive n (%) [CI]	Negative n (%) [CI]	p
Money saving	138 (69,3%) [65,9%-72,4%]	61 (30,7%) [27,6%-34,1%]	0,0000
Availability of all course materials	190 (95,5%) [93,5%-96,5%]	9 (4,5%) [3,5%-6,5%]	0,0000
Own choice of learning rhythm	175 (87,9%) [85,3%-89,9%]	24 (12,1%) [10,1%-14,7%]	0,0000
Own choice of learning time	173 (86,9%) [84,2%-89,0%]	26 (13,1%) [11,0%-15,8%]	0,0000
Independence from the studies place	162 (81,4%) [78,3%-83,9%]	37 (18,6%) [16,1%-21,7%]	0,0000
Convenient combination of work and studies	135 (67,8%) [64,4%-71,0%]	64 (32,2%) [29,0%-35,6%]	0,0000
The ability to use audio materials	159 (79,9%) [76,8%-82,4%]	40 (20,1%) [17,6%-23,2%]	0,0000
The ability to use video materials	183 (92,0%) [89,6%-93,5%]	16 (8,0%) [6,5%-10,4%]	0,0000

Note: Positive - positive connotation of answers; Negative - negative connotation of answers.

The relationship between personality type with the attitude of full-time students to distance learning

The conducted research revealed the distribution of psychotypes among the students of the Faculty of Computer Science and Information Technology (Fig. 1), which is explainable from the professional choice point of view and coinciding with the corresponding literature data presented in Table 3. The only thing is that the number of introverts among our students coincided with Twitter users rather than with Engineering students.
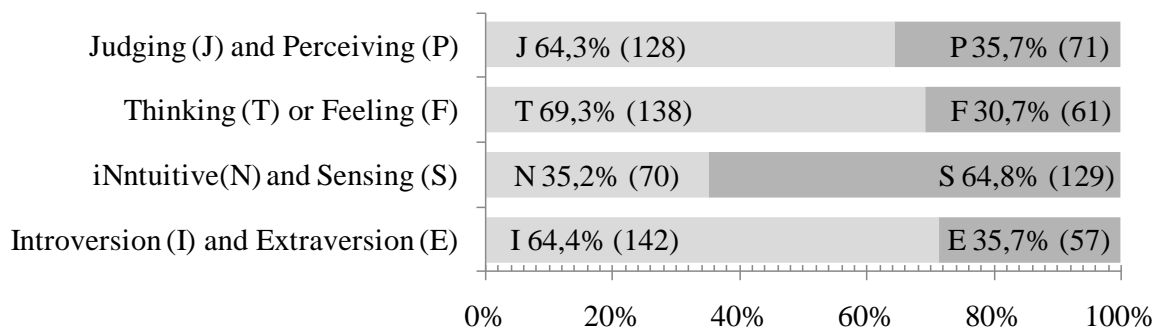
*Figure 1 **Distribution of Dichotomous Jungian Personality Types according to Scales: Introversion (I) and Extraversion (E), iNntuitive(N) and Sensing (S), Thinking (T) and Feeling (F), Judging (J) and Perceiving (P)***
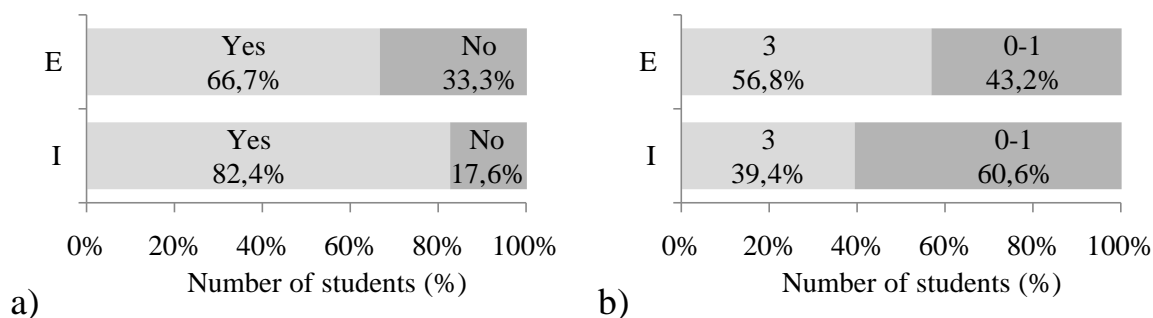
Figure 2 **Influence of Introversion (I) and Extraversion (E) on Attitude towards DE:**
a) the number (%) I (n=142) and E (n=57) of agreed students (Yes) and disagreed students (No) with the fact that DE can fully replace full-time education (p=0,02), b) the number (%) I (n=104) and E (n=44) with different assessment of social isolation importance as a disadvantage (0 - does not matter; 3 – very important) (p=0,04). p-Values were calculated with Fisher's exact test

The expected attitude towards distance learning was depended on the Introversion-Extraversion index (Fig. 2). The majority of students with pronounced extraversion had a more negative attitude towards DL:

−   the risk of negative attitude towards full transition to DL is 1,9 times higher for extraverts than for introverts (CI_{RR}=1,14-3,16: CI does not contain value 0, which means that RR is statistically significant);

−   the risk of attributing social isolation during DL to very important problem is 1,4 times higher for extraverts than for introverts (CI_{RR}=1,02-2,05: CI does not contain value 0, which means that RR is statistically significant).

In addition, the attitude towards distance learning for full-time students was different from students with Feeling and Thinking traits (Table 7):

−   the risk of disagreement to full transition to DL is 1,6 times higher for Feeling than for Thinking (CI_{RR}=1,03-2,53: CI does not contain value 0, which means that RR is statistically significant);

−   the risk of money saving assessment as an advantage during DL is 1,25 times higher for Feeling than for Thinking (CI_{RR}=1,05-1,48: CI does not contain value 0, which means that RR is statistically significant);

−   the risk of assessment of difficulties in communication with teachers as a problem during DL is 1,14 times higher for Feeling than for Thinking (CI_{RR}=1,06-2,23: CI does not contain value 0, which means that RR is statistically significant);

−   the risk of assessment of lacking student events as a problem during DE is 1,25 times higher for Thinking than for Feeling (CI_{RR}=1,02-1,52: CI

does not contain value 0, which means that RR is statistically significant);

- the risk of assessment of the self-discipline and self-motivation need as a problem during DL is 1,2 times higher for Feeling than for Thinking (CI_{RR} = 1,03-1,42: CI does not contain value 0, which means that RR is statistically significant).

Table 7 **Influence of Thinking (T) Feeling (F) on Attitude towards Distance Learning Factors (p-Values were calculated with Fisher's exact test)**

Question/Factor	Answer	Personality traits		p-Values
		T, n (%)	F, n (%)	
Consent for full transition to DL	Yes	75,6% (93)	60,7% (34)	0,0008
	No	24,4% (30)	39,3% (22)	
	Total	123 (100%)	56 (100%)	
Assessing money savings as advantages	Positive	64,5% (89)	80,3% (49)	0,02
	Negative	35,5% (49)	19,7% (12)	
	Total	100,0% (138)	100,0% (61)	
Assessment of communication difficulties with teachers as a problem	1-3	86,2% (119)	**98,4**% (60)	0,009
	0	13,8% (19)	1,6% (1)	
	Total	100,0% (138)	100,0% (61)	
Assessment of lack of student events as a problem	1-3	**81,9**% (113)	65,6% (40)	0,01
	0	18,1% (25)	34,4% (21)	
	Total	100,0% (138)	100,0% (61)	
Assessment of the need for self-discipline and self-motivation as a problem	1-3	73,2% (71)	**88,6**% (39)	0,03
	0	26,8% (26)	11,4% (5)	
	Total	100,0% (97)	100,0% (44)	

Note: 0 - does not matter; 3 - very important

Conclusion

The results of conducted research did not give expected results by all aspects. Unexpectedly, full-time students have a positive attitude towards distance learning. Apparently, this is due to the specifics of the professional direction and the initial readiness for computer learning without direct contact with the teacher. Most of the Information Technology (IT) sector students study programming and some other exact sciences on their own during their school years.

The purpose of this study was to identify the factors that must be taken into account when personalizing learning and the ability to focus on the psychotype and other characteristics of the student. As studies have shown, female students, more than male students, may need the support of teachers and it is more difficult to experience social isolation. These students should be offered a specific learning

strategy, giving them the opportunity of consultations, and creating an environment that eliminates social isolation.

Despite the fact that the majority of students have a positive attitude towards DL, there may be a rejection of this form of learning among individuals with high Extraversion and Feeling indexes. More research is needed to understand the reasons for this rejection. However, already at this stage we can say that such students need special preparation for DL. In particular, for students with a pronounced Feeling function, for whom the problem with self-discipline and self-motivation is more important than for others, it is necessary to create special conditions with external motivation and the structure of the learning process, which does not require independent control of the discipline from the student.

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THE IMPACT OF COVID-19 PANDEMIC ON SERVICES FOR PERSONS WITH NEURODEVELOPMENTAL DISORDERS: AN ITALIAN CASE

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Abstract. *The COVID-19 pandemic has had severe effects on social health services worldwide. Many people with neurodevelopmental disorders have lost their professional support. The interruption of supportive assistance has been devastating since it has negatively affected their continuity of care as well as their social inclusion and socialization. This paper aims to illustrate the impact of the COVID-19 on an Italian Public Social Health System Services for people with disability. It highlights and discusses the strategy that was adopted in order to ensure the continuity of care assistance provided to the service clients as the organization of emergency remote support and individual support services for independent living. An exploratory study was conducted involving the entire population of people with neurodevelopmental disorders (n=333) included in the Disability System Services of Udine (Friuli Venezia Giulia Region, North-East Italy) to analyze the main repercussions occurred on the organization of services during the pandemic period. A comparative analysis of the number of persons enrolled in the different types of support services and of individuals' support needs, evaluated throught the Support intensity scale (SIS), pre- and post-pandemic crisis (January 2020 – January 2021) was conducted. The data shows that, despite the enormous difficulties, the adopted strategy has succeeded in limiting the risks of isolation and the negative impact on individual interventions, and opened the way to new alternative and innovative strategies for planning and implementing support.*
*Keywords***:** *covid-19, neurodevelopmental disorders, intellectual disability, autism, social-health services, support needs.*

Introduction

People with neurodevelopmental disorders (ND) represent one of the groups most vulnerable to COVID-19 on account of their associated pre-existing health conditions, mental disorders, and social disadvantage (Emerson & Hatton, 2008; Buonaguro & Bertelli, 2021). Cognitive and adaptive behavioral impairment also pose barriers in understanding information and implementing basic measures for reducing the risk of contagion (Courtenay & Perera, 2020). During the pandemic

period, important obstacles in ensuring the continuity of interventions emerged because of serious disruptions to the services they rely on (WHO, 2020).

Many people with disabilities have temporarily lost access to qualified support interventions, and currently face uncertain situations regarding the return of baseline services (Constantino, Sahin, Piven, Rodgers, & Tschida, 2020). The day care centers (DCC) that previously defined the weekly agenda of many people with ND were suddenly faced with the need to radically change, if not close down entirely. The resulting service interruptions and the enforced confinement of these people, as everyone else, to their own homes threatened to drastically slow down processes aimed at increasing their social inclusion and reducing their sense of isolation (den Houting, 2020).

Previous studies, conducted before the COVID-19 pandemic, indicated that drastic changes in daily routines (e.g. the interruption of activities, access to places, and interpersonal relationships), forced coexistence, loss of support, and perception of loneliness, can result in regression, loss of ability, and psychological and physical distress in people with ND (Hedley, Uljarević, Wilmot, Richdale, & Dissanayake, 2018; Wormald, McCallion, & McCarron, 2019). In people with ND who have severe cognitive and communicative difficulties, psychological distress is very often associated with significant behavioral changes and the aggravation of behavioral disturbances (Bertelli, Rossi, Scuticchio, & Bianco, 2015; Hurley, 2006; Hurley, 2008). For these reasons, throughout the year 2020, social health care services had to rapidly devise solutions to ensure the continuity of care and limit the risks of isolation of people with ND and their families (Mills et al. 2020).

The Impact of COVID 19 on Disability Services in Italy

In Italy, the first lockdown measures began to be applied on February 21st. On March 9th, the Italian government imposed a national quarantine through a series of decrees stipulating urgent measures to be taken for the containment and management of the COVID-19 epidemiological emergency. The lockdown lasted until May 18th 2020. The emergency situation continued throughout the year 2020, and protective and restrictive measures were adopted according to the relative spread of the infection. In respect to the activities undertaken by the social and health services to manage the pandemic crisis, three main phases can be identified:

- *First wave of contagion and lockdown (February-May 2020)*. In this period, all DCC programs were suspended, and consequently people with ND were entrusted entirely to the care of their families. Government policy was aimed at balancing the priority of reducing the risk of the contagion spread with the need to ensure continuity of care, with the conversion of DCC programs into *home care support*, and *at*

distance (phone calls and remote assistance) or *in presence interventions*.

Obviously residential services (RS) remained open and continued to operate their established intervention activities, but those living in residential services were subjected to the lockdown provisions like any other citizen, thus precluding social interactions, social activities outside the residence, and meetings with family members.

- *End of lockdown and resumption of activities (May-September 2020).* As a consequence of the reduction in the spread of infection in the country, the government ordered the gradual recommencement of all productive and social activities. At the same time, a regional plan for the gradual reactivation of DCC programs through adherence to the individual alternative interventions was ratified.

- *Second wave of contagion (October-December 2020).* Following a second outbreak of contagion, new social restrictions were imposed by the Government. During this phase, DCC programs have not been interrupted, but the repeated occurrence of COVID-19 contagions (among persons with ND, family members, and operators) have made it necessary to implement several suspensions of the programs. In contrast, the same level of lockdown restrictions was reapplied in relation to RS facilities.

Conversion of Day Care Centers Programs during the Pandemic Period

During the lockdown period, the following alternative interventions were offered to all individuals and families included in the DCC:

- *Phone calls*: all users and family members were periodically contacted to provide telephone support, to assess needs, and to plan alternative services.

- *Remote assistance* (Tassé, Wagner & Kim, 2020; Bertelli et al. in press), was used with the aim of maintaining learning, adaptive, cognitive, and motor training programs already defined in the individual plans; it was proposed to people with communication and IT skills and individual characteristics compatible with the activity.

- *Home care support*: provided access to the DCC's operators at home to realize personalized educational or assistance programs.

- *In presence interventions*: interventions realized in the DCC with staggered access (i.e. imposing time slots and alternating days), without creating aggregation, and while ensuring adherence to all measures of protection from contagion risks (i.e. implementing rotation plans for the

use of rooms, avoiding activities in large groups, distancing, obligation to use face masks, systematic disinfestations of the environments).
- *Independent living services programs* (UN, 2006; European Union Agency for Fundamental Rights, 2018): the impossibility of accessing the care facilities due to the risks of contagion, has led to the possibility of redirecting personalized programs in smaller structure, apartments or at person's home where independent living programs were provided.

The choice of the most appropriate type of intervention was based on the characteristics of the individual's functioning, their support needs, and their socio-family context. Their activation was subordinated a) to the person and their family's acceptance and agreement, through subscription to an individual plan, and b) to the evaluation of an order of priority in relation to the intensity of the persons' problems (e.g. support needs level, behavioral disturbs, psychopathological disorders, fragility of caregivers and support network).

Individual Supports Provided to Persons with ND

During the pandemic crisis the following support interventions for people with ND was implemented: a) communication and explanation of the issues and risks associated with the COVID-19 emergency situation, and the rules to follow in order to avoid contagion risks; b) constant monitoring of specific signs of distress; c) management of the distress, fear, and anxiety of people related to the changes in their social routines and life context; d) implementation of new daily agendas and appropriate activities delivered by alternative methods and solutions (Istituto Superiore di Sanità, 2020). Individual support was provided with reference to Applied Behavior Analysis (ABA) techniques (Cooper, Heron, & Heward, 2019) and to the following support systems practices:
- *Augmentative and Alternative Communication (AAC):* visual communication methods used to overcome the difficulties of people with ND in producing or understanding spoken or written language (Beukelman & Mirenda, 2013; International Society for Augmentative and Alternative Communication, 2020)
- *Structured teaching - Treatment and Education of Autistic and Communication Handicapped Children (TEACCH)*: devised in order to ensure predictability and the positive management of anxiety and stress, set up new daily routines, and foster positive adaptation to the changes that had occurred (Schopler, Mesibov, & Hearsey, 1995).

Methodology and Objectives

The study was conducted in the Public Social Health Disability System Services of Udine (Friuli Venezia Giulia Region, North-East Italy). The Disability System Services of Udine is targeted at people with ND (intellectual disability (ID) and autism spectrum disorders (ASD)) in adulthood. At the end of February 2020, 20 DCC and 9 RS were being provided to 333 people, of whom 247 were entered in DCC programs and 86 were in RS. These services had been assigned according to the support need intensity level of the subjects, evaluated through the application of the Support Intensity Scale - SIS (Thompson et al., 2004), along a continuum ranging from services for people with a high intensity of support needs (in which protection and assistance interventions are a priority) to services for people with a low intensity of support needs (in which independence and social inclusion are the principal targets).

The SIS is an assessment tool specifically designed to scientifically measure the level of practical support required by people with ND in relation to the activities of daily life. It also measures their supplementary medical and behavioral support needs. In the Disability System Services of Udine, the SIS is systematically evaluated, by staff operators, during the initial assessment phase of the person and then annually thereafter, in order to monitor individuals and plan the appropriate level of support in their programs.

Both DCC and RS services included from a minimum of 4 to a maximum of 22 individuals.

Graph 1 shows the distribution by age group of people entered in the services. A wide age range can be observed, from minors aged under 18 to those aged over 60. In general, RS included people with a higher age than those included in DCC programs.
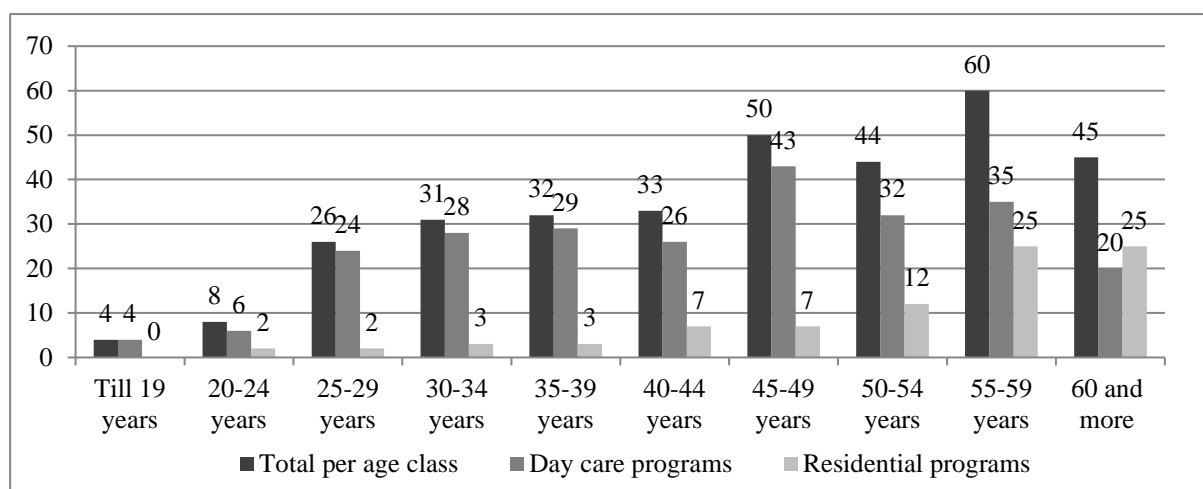
Figure 1 ***Distribution of People Admitted to DCC an RS by Age Group***

The aim of this paper was to illustrate the coping strategies that were implemented in order to limit the negative effects of the pandemic crisis in a Public Social Health System's Services for persons with ND during the year 2020. An exploratory study was conducted involving the entire population of people with ND included in the Disability System Services of Udine in order to analyze:

- alternative solutions and interventions to DCC programs adopted in order to ensure the continuity of care, and to limit service interruptions and isolation risks;
- the main repercussions of the pandemic crisis on the organization of system services, evaluated through a comparative analysis of the number of people enrolled in the different types of services in January 2020 (before the pandemic crisis) and in January 2021;
- the changes in individual support needs, evaluated through the SIS, pre- and post-pandemic crisis by means of a comparative analysis of the differences in support needs recorded in January 2020 (prior to the pandemic crisis) and in January 2021, using the non-parametric Mann-Whitney *U* test in SPSS 21.

Results

Overall, during the year 2020, 37 people with ND were infected with COVID-19, of whom 5 were hospitalized and 2 died. Due to contagions, 11 interruptions of day care interventions were necessary, in addition to the lockdown. Around 50% of DCCs in which alternative interventions were realized have experienced at least one outbreak after the time of the lockdown. At the end of the year 2020, the total days of interruption in the DCC programs equaled 1151 out of a total 4400 days of operation in a normal year (220 days per year per DCC).

- *Alternative interventions to the DCC programs.* Table 1 shows the numbers and percentages of alternative interventions carried out during the different phases of the pandemic in the year 2020.

During the 8.5%, in presence intervention 3.2%, and independent living services programs 2.8%), while 33.6% of people received remote assistance intervention. At the end of the lockdown, the provision of direct interventions increased (in presence interventions 46.2%, and independent living services programs 8.5%), although home care support decreased. During the second wave of contagion phase, in presence intervention and independent living services programs further increased (to 49.8% and 11.3%, respectively), while the provision of remote assistance interventions continued at the same rate.lockdown period, the families of the 247 people included in the DCC programs received telephone support, and 48.1% of users also received an alternative type of

individual intervention. Of these, 14.5% received direct interventions by qualified personnel (home care support

- *The main repercussions of the pandemic crisis on the system of services.*

Table 1 **Number and Types of Alternative Interventions Provided in the Different Phases of the COVID-19 Emergency**

Types of alternative interventions		Lockdown (February - May 2020)		End of lockdown and activities reprise (May - September 2020)		Second wave of contagion (October-December 2020)	
		no.	%	no.	%	no.	%
At distance	Phone calls	247	100	As required	-	As required	-
	Remote assistance	83	33.6	22	8.9	22	8.9
Direct	Home care support	21	8.5	6	2.4	2	0.8
	In presence interventions (DCC)	8	3.2	114	46.2	123	49.8
Tot.	Support services for independent living	7	2.8	21	8.5	28	11.3
	Total direct interventions	36	14.5	141	57.1	153	61.9

Table 2 shows a comparative analysis of the number of people entered in the different types of services in January 2020 (before the pandemic crisis) with that in January 2021.

Table 2 **Comparison Analysis of System Services Organization Pre- and Post- pandemic Crisis**

Type of Services		January 2020		January 2021		Differences	
		no. of services	no. of persons	no. of services	no. of persons	no. of services	no. of persons
DC program	Day care center for high level of support needs	5	54	5	45	0	-9
	Day care center for medium level of support needs	6	78	4	27	-2	-51
	Day care center for low level of support needs	7	96	7	55	0	-41
	Support services for independent living	2	19	4	30	2	11
	Remote assistance	-	0	-	22	-	22
	Tot	20	247	20	179	0	-68

RS	Protected residence for high level of support needs	1	23	1	23	0	0
	Housing residence for high level of support needs	5	38	5	37	0	-1
	Housing residence for medium-low level of support needs	2	21	2	21	0	0
	Cohousing apartment for independent living	1	4	1	4	0	0
	Tot	9	86	9	85	0	-1

*Table 3 **Comparison Analysis of Distribution of Persons Admitted to DCC and RS by Age Group Pre - and Post - pandemic Crisis***

Age class	January 2020			January 2021				Differences	
	Total per age class	Day care prog-rams	Resi-dential prog-rams	Total per age class	Day care programs		Residen-tial programs	Day care prog-rams	Residen-tial programs
					In presenc e-DCC	Remote assistan-ce			
Till 19 years	4	4	0	4	4	0	0	0	0
20-24 years	8	6	2	8	4	2	2	0	0
25-29 years	26	24	2	27	21	2	4	-1	2
30-34 years	31	28	3	33	23	4	6	-1	3
35-39 years	32	29	3	33	16	9	8	-4	5
40-44 years	33	26	7	34	22	4	8	0	1
45-49 years	50	43	7	40	23	1	16	-19	9
50-54 years	44	32	12	29	15	0	14	-17	2
55-59 years	60	35	25	34	20	0	14	-15	-11
60 and more	45	20	25	22	9	0	13	-11	-12
Tot.	333	247	86	264	157	22	85	-68	-1

A substantially unchanged situation in regards to the number of services (difference = 0) and in the number of people entered in RS programs (difference = -1) is highlighted. On the other hand, a significant reduction in the number of people included in the DCC programs was recorded (difference = -68). However, while there has been a significant decrease in participation in DCC programs for medium and low levels of support needs (difference = -51 and = -41), there has also been a notable increase in the services offered and the number of people included in independent living services programs (differences = 11) and in remote

assistance (differences = 22) that were not available before the pandemic and that have continued since the end of the lockdown. This means that for 33 of the 101 people no longer included in the DCC programs, new types of services were provided. In contrast, for the remaining 68, it was not possible to provide any other type of service. Table 3 shows the age group distribution of people included in both DCC and RS programs before and after the pandemic crisis. A significant decrease in DCC programs can be observed, especially in the age groups between 45 and 60 and more years.

-       *Pre-post pandemic crisis comparative analysis of support needs.*

    Graph 2 and Graph 3 show the comparison of the raw mean scores of the support needs of the two surveys (2020-2021) conducted on all subjects of DCC and RS programs. The levels of support needs have changed in all areas between the years 2020 and 2021. The results of the non-parametric Mann-Whitney *U* test data analysis show a significant difference in all areas of daily life, medical, and behavioral support needs (interval .000 - .015, with a significance level of .05).
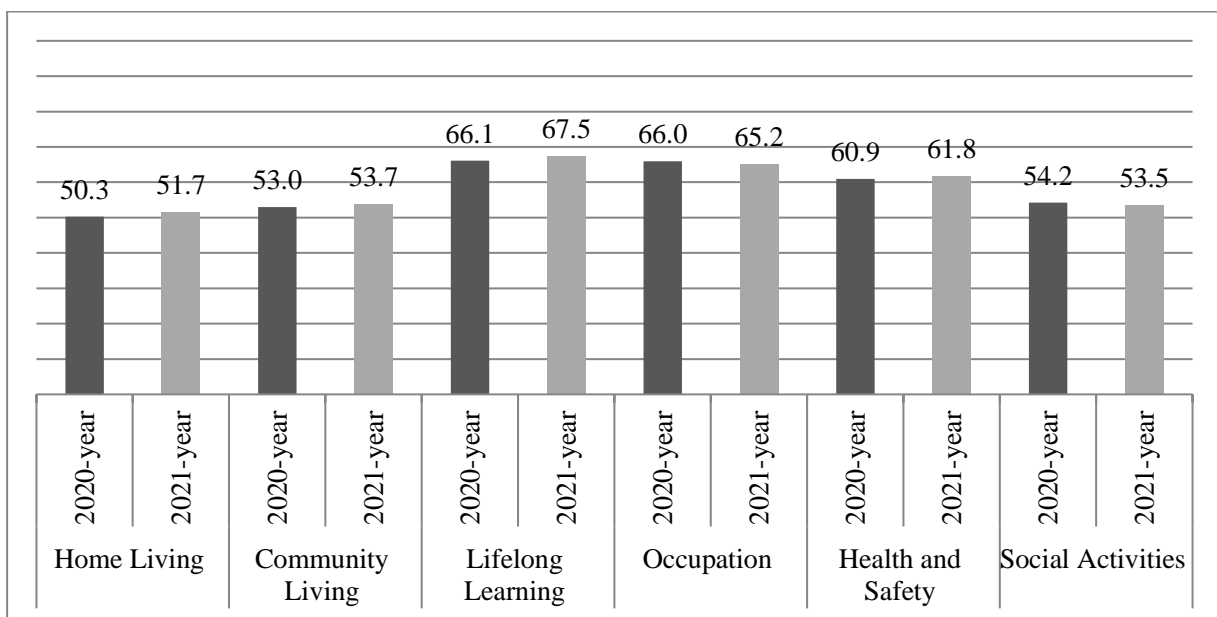
Figure 2 **The Comparison Analysis of the Raw Mean Scores of the Support Needs in the Day Life Activities**
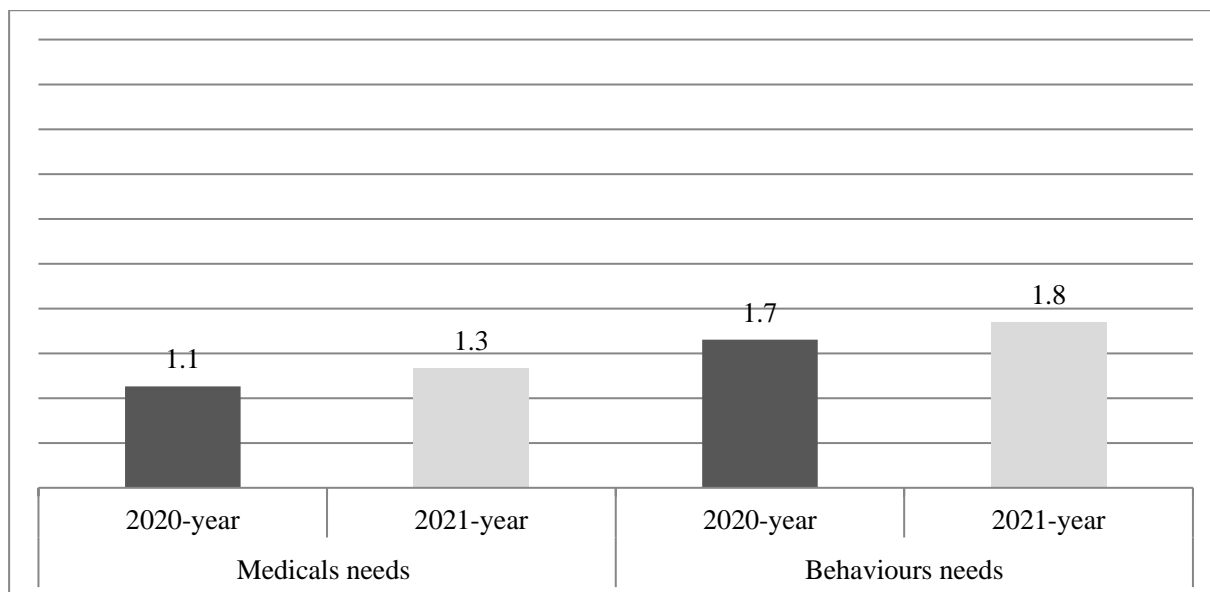
Figure 3 ***The Comparison Analysis of the Raw Mean Scores of Medical and Behavior Support Needs***

Conclusion

This paper reported the effects of the pandemic crisis in relation to one Public Social Health System's Services for people with ND. Despite the limited size and representativeness of the sample of users and services on which this research was based, the data obtained confirm the effectiveness of individual alternative interventions (home care, at distance or in presence interventions) for reducing the negative impact of the pandemic emergency on support services for people with ND. The coping actions that were adopted have succeeded in limiting the severity of the contagion. It is probable that the small number of people per DCC and RS (from 4 to 22) has favored the containment of his spread. The situation of RS has not changed and the impact on people has been attenuated. The alternative interventions adopted reduced the risk of isolation and ensured the continuity of care of persons with ND entered in DCC programs, although about 25% of them have not returned to the centers following the end of the lockdown. For those who have ceased to draw on care services, a significant proportion of the families involved have expressed concern about the risks of contagion. Furthermore, for those people with ND who are still enrolled in health system services in the year 2021, individual support needs have changed from what they were in the year 2020 in regards to every aspect of daily life, medical treatment, and personal behavior. The pandemic crisis is still ongoing, and needs are continuously evolving. However, despite the enormous difficulties and negative repercussions, the pandemic crisis may give rise to improvements in the provision of system services, exploiting the current complex situation to review past approaches and

potentially find new solutions. In fact, the paradigmatic changes that have occurred in the last few years in accordance to the UN convention on the rights to social inclusion, participation, and empowerment of people with disabilities (UN, 2006), had made some parts of DCC programs obsolete even before the pandemic outbreak. Instead, during the crisis, certain types of alternative interventions that had not previously been realized, such as remote assistance and independent life support programs, have been implemented and expanded. Paradoxically, then, this unwelcome and highly complex situation might ultimately be seen as an "accelerator" of positive change in the services. Going forward, we must draw on the experience gathered from this crisis and learn to incorporate the positive features into best practice. At the same time, innovative organizational solutions for improve these practice must stil be found, and the need remains for additional research to be carried out on these iusses in the future.

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INFORMĀCIJAS TEHNOLOĢIJU IZMANTOŠANA IZGLĪTĪBĀ

Information Technologies in Education

ОБРАЗОВАТЕЛЬНЫЕ ЛАНДШАФТЫ В КОНТЕКСТЕ ИНФОРМАЦИОННОГО ОБРАЗОВАТЕЛЬНОГО ПРОСТРАНСТВА

Educational Landscapes in the Context of the Digital Educational Environment

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Abstract. *The concept of "educational map", as well as a number of related concepts such as "concept map", have been the subject of numerous studies in the field of pedagogy over the years. They are a tool for describing and analyzing the knowledge of a specific student at a specific point in time. Recently, there has been interest in the problem of generalization and aggregation of information contained in separate individual maps. The concept of "Concept Landscape" was proposed as an approach to solving this problem (Mühling, 2017). However, this concept is focused exclusively on the analysis of the knowledge structure of a group of students. Accordingly, the problem arises of finding a more general and more universal tool that allows us to organically fit aggregated educational maps into the structure of the digital educational environment. We propose to consider this environment as a context that unites all possible educational maps. In accordance with the proposed approach, by the educational landscape we mean the result of the aggregation of several educational maps, united by the digital educational environment as a common context. We also set ourselves the task of identifying technologies for the aggregation of educational maps. We consider superposition, inclusion and absorption as such technologies and disclose the content of these operations in our article. We also establish the main form of the formal description of the educational landscape - a graph with colored vertices and edges. We propose a five-component algorithm for constructing and processing an educational landscape and describe the content of all its stages in the article. In our study, we also give an answer to the question about the role of the educational landscape within the digital educational environment. This role is, in our opinion, multifactorial. The main factors include: the formation of a space of possible individual learning trajectories; analysis and forecasting of the group dynamics of knowledge and skills of students; creation of a tool for supporting the design of an digital educational environment.*
Keywords: *educational landscape; concept landscape; educational map; concept map; digital educational environment.*

Введение
Introduction

Понятие «образовательная карта», как и ряд родственных ему понятий, такие, как «карта концептов», являются предметом многочисленных исследований в области педагогики на протяжении многих лет. Они представляют собой инструмент описания и анализа знаний конкретного обучающегося в конкретный момент времени. В последнее время отмечается интерес к проблеме обобщения, агрегирования информации, содержащейся в отдельных картах. В качестве подхода к решению данной проблемы было предложено понятие «Concept Landscape» (Mühling, 2017). Однако данное понятие ориентировано исключительно на анализ структуры знаний группы учащихся безотносительно специфики педагогической среды, в которой проходит учебный процесс. Вместе с тем, последние десятилетия характеризуются информатизацией образовательной сферы и ростом интереса к такой форме информатизации, как информационное образовательное пространство (цифровая образовательная среда). Возникает вопрос разработки такого способа агрегирования информации, которое бы отражало специфику информатизации и определенных её форм. Соответственно возникает проблема поиска более общего и более универсального инструмента, позволяющего органично вписать агрегированные образовательные карты в структуру информационного образовательного пространства. Такому инструменту должны быть сопоставлены технологии его создания и сценарии (алгоритмы) его использования при проектировании и реализации учебного процесса. Необходимо также охарактеризовать роль этого инструмента в рамках информационного образовательного пространства. Пути решения отмеченного круга проблем и составляют содержание настоящего исследования. В нашей работе мы использовали такие методы, как анализ научной литературы по теме исследования, метод логического обоснования, сравнительный анализ.

Анализ проблемы и постановка задачи
Solving the Problem

Понятие «карта концептов» (Cañas, 2003, Mühling, 2017), а также родственные ему понятия, такие как «образовательная карта» (Cosentino de Cohen, & Chu Clewell, 2007), «карта интеграции знаний» (Schwendimann, 2014) являются в настоящее время предметом многочисленных исследований. Возникновение интереса к данным понятиям было вызвано

исследованиями когнитивных процессов в обучении. Д.Л.Трамповер с соавторами выделяют три основные элемента в структуре процесса анализа знаний обучающегося (Trumpower, Sharara, & Goldsmith, 2010, 6). Это «извлечение знаний», «представление знаний» и «оценка знаний». Необходимость такого подхода очевидным образом следует из непосредственной ненаблюдаемости знаний как таковых. Об их наличии у обучающегося мы можем судить только по косвенным признакам. Соответственно необходим инструмент экстернализации знаний. Одним из таких инструментов и являются карты концептов. Они представляют собой инструмент структуризации и анализа знаний данного обучающегося в данный момент времени.

Согласно данным Дж.Д. Новака, концепт представляет собой воспринимаемую субъектом закономерность, событие или объект, который обозначен определенным образом – с помощью метки (Novak, 2010, 25). Основной «смысловой единицей», содержащейся в когнитивной структуре субъекта, является предложение. Оно формируется в ситуации, когда два или более концептов объединяются с помощью определенных «связующих слов» (Novak, 2010, 26). Структуру предложения составляют два (или более) концептов и «ярлык связи», объединяющий их. А.Канас определяет карту концептов, как «графическое представление знаний, основными элементами которого являются понятия и отношения между ними» (Cañas, 2003, 5). А. Мюлинг поддерживает точку зрения, согласно которой карты концептов могут рассматриваться в качестве результата экстернализации знаний обучающихся (Mühling, 2017, 2).

Дж.Д.Новак и А.Канас (Novak & Cañas, 2010) отмечают успешный опыт применения карт концептов для решения задачи описания и оценки структуры знаний учащихся в различных предметных областях. Анализ карт концептов, построенных обучающимися, позволяет выявить текущий уровень знаний в предметной области, соотнести его с эталоном (целями обучения). Многие исследователи (Cañas, 2003; Mühling, 2017; Novak & Cañas, 2010) указывают на высокий уровень достоверности и надежности информации об учащемся, получаемой в результате анализа карт концептов.

Наработанный к настоящему времени объём исследований в области карт концептов позволяет ставить проблему обобщения, генерализации информации, содержащейся в отдельных картах концептов. Генерализация может проходить в одном из двух возможных направлений – «временном» или «субъектном».

Говоря о генерализации во временном направлении, мы имеем в виду обобщение различных карт, характеризующих одного субъекта в разные

моменты времени. Такая генерализация в первую очередь позволяет описывать и анализировать динамику изменения знаний обучающегося.

Говоря о «субъектном» направлении, мы имеем в виду обобщение различных карт, характеризующих разных субъектов в один момент времени. В последнем случае, очевидно, субъекты должны быть объединены, помимо момента времени, ещё и общей предметной областью, знания в рамках которой подлежат формализации и анализу. Такая генерализация позволяет в первую очередь описывать и анализировать структуру знаний группы обучающихся. Соответственно возникает возможность соотнесения знаний данного учащегося с обобщенными результатами всей группы, что позволяет делать выводы об эффективности используемых технологий обучения применительно к данному учащемуся.

Также возможна генерализация в обоих направлениях одновременно. При этом возникает возможность анализа динамики групповых результатов.

А.Мюлинг вводит понятие концептуального ландшафта (Concept Landscape) как «общее понятие для агрегирования данных нескольких концептуальных карт с целью анализа этой комбинации [как единого целого]» (Mühling, 2017, 7). Предлагается «новый способ исследования состояния и развития структуры знаний в группах людей, основанный на использовании карт концептов» (Mühling, 2017, 1). При этом создаются предпосылки для использования инструментов интеллектуального анализа данных.

А.Мюлинг, автор концепции образовательного ландшафта, понимает под ним результат агрегирования нескольких карт концептов, объединенных общим контекстом. В качестве объединяющего контекста могут выступать общие авторы, один и тот же момент времени, в который сгенерированы карты, или одинаковая предметная область, которая описывается этими картами (Mühling, 2017, 7).

Основная идея, лежащая в основе концептуального ландшафта: вместо традиционного подхода, основанного на дидактометрии одного обучающегося (однократно или многократно в различные моменты времени) и изолированном рассмотрении результатов разных учащихся, систематически агрегировать результаты отдельных учащихся с тем, чтобы получить представление о состоянии и развитии знаний группы обучающихся в целом.

Агрегирование может осуществляться на основе двух технологий (Mühling, 2017, 9):

1. «Накопление». В рамках этой технологии карты концептов рассматриваются как отдельные объекты. Информация, содержащаяся в

них, объединяется таким способом, который даёт возможность её дальнейшего анализа.

2. «Объединение». Основным инструментом реализации данной технологии является аппарат теории графов. Отдельные карты концептов объединяются в виде графовой модели.

Обработка информации, содержащейся в концептуальном ландшафте, в первую очередь подчинена задаче изучения структуры знаний обучающихся.

С точки зрения А. Мюлинга, наиболее интересными аспектами концептуального ландшафта являются следующие (Mühling, 2017, 12-13):

1. Внутренняя дифференциация в структурах данных. Анализ такой дифференциации позволяет выявить группы обучающихся, различающиеся по способу организации структур знания. Осуществление анализа требует привлечения методов интеллектуального анализа данных.

2. Общие элементы структур знаний. Анализ таких элементов позволяет выявить основные, базовые элементы знания, структурирующие весь концептуальный ландшафт. По мнению А. Мюлинга, для выделения таких элементов предпочтительно использовать технологию слияния. Процесс анализа при этом имеет сложную структуру, он может, в частности, включать в себя элементы кластерного анализа (Mühling, 2017, 13).

Наиболее общая форма концептуального ландшафта – это граф с нагруженными ребрами. Веса ребер описывают «степень общности» связи между понятиями (частоту, с которой данная связь наблюдается на всех картах концептов, образующих ландшафт). Такой граф, как отмечает А. Мюллинг, сам по себе не подходит для качественной проверки (Mühling, 2017, 14), так как он как правило очень плотный (т.е. содержит количество рёбер, близкое к максимальному для графа, не содержащего кратных ребер). На таком графе структурная информация содержится как в весах ребер, так и в весах вершин. Обработка информации, содержащейся в данном графе, возможна с применением всего богатого арсенала средств теории графов.

Наряду с картами концептов, большой интерес представляют и образовательные карты, которые представляют собой инструмент описания и анализа знаний конкретного обучающегося в конкретный момент времени. В дальнейшем мы будем называть такие образовательные карты индивидуальными образовательными картами. Ц. Козентино де Коэн и Б. Чу Клевелл понимают под образовательной картой "совокупность промежуточных целей, задач, путей их достижения в рамках решения обобщенной задачи обучения" (Cosentino de Cohen & Chu Clewell, 2007, 1), они помещают это понятие в контекст понятия "дорожная

карта", как более общего. Данный подход связывает понятия «образовательная карта» и «образовательный маршрут», что представляется нам весьма перспективным. Б.А.Швиндеманн вводит понятие «карты интеграции знаний», исходя из задачи развития количественных методов анализа информации, содержащейся в карте (Schwendimann, 2014, 18). Для карт интеграции знаний характерно наличие весов у элементов знаний и связей между ними. Дидактометрическую составляющую образовательных карт и карт концептов отмечали и И. Йин с соавторами, используя понятие «измерение структуры знаний» (Yin, Vanides, Ruiz-Primo, Ayala, & Shavelson, 2005, 167). При этом возможна количественная оценка понятий, уровней иерархии, связей между понятиями, предложений (Cañas, 2003, 5; Yin et al., 2005, 166). Заметим, что к настоящему времени отсутствуют работы, в рамках которых ставится вопрос об агрегировании информации, содержащейся в образовательных картах, подобно тому, как это было сделано А. Мюлингом применительно к картам концептов.

Другим аспектом, актуальным для современной педагогики, является информатизация образовательной сферы и соответствующий рост интереса к такой форме информатизации, как информационное образовательное пространство (цифровая образовательная среда). Проблема структуры такой среды, её свойств и технологий, которые обеспечивают её проектирование, является предметом многочисленных исследований (Boyarinov, 2019; Boyarinov, 2020; Cañas, 2003; Cosentino de Cohen & Chu Clewell, 2007; Schwendimann, 2014 и др.). Естественным является рассмотрение современной образовательной среды, как основанной на применении современных через информационно-коммуникационных технологий, технологий искусственного интеллекта. Такой подход позволяет наметить направления использования аппарата карт концептов в контексте информационной образовательной среды. В работе Х.Чу, Г.Хванг и Й.Лианг рассматривается проблема интеграции технологий карт концептов в рамках "web-based learning environment" с акцентом на карты концептов, создаваемые обучающимися (Chu, Hwang, & Liang, 2014, 19). В работе П. Двиведи, В. Кант и К. Бхарадваджа анализируется построение индивидуальных траекторий обучения на основе методов интеллектуального анализа данных (Dwivedi, Kant, & Bharadwaj, 2018). М. Фриас с соавторами также рассматривает нечёткие когнитивные карты в контексте интеллектуального анализа данных (Frias et al., 2018).

Однако к настоящему моменту проблема агрегирования информации, содержащейся в образовательных картах в контексте информационного образовательного пространства не является решённой.

Таким образом можно констатировать как наличие в современной педагогической литературе проработанных подходов к построению и обобщению карт концептов, образовательных карт, так и определенных ещё не реализованных возможностей в этой сфере, в первую очередь относящихся к вопросам интеграции этих объектов в информационное образовательное пространство.

Результаты
Results

Рассматривая проблему поиска общего и универсального инструмента, позволяющего органично вписать агрегированные образовательные карты в структуру информационного образовательного пространства, мы предлагаем рассматривать это пространство как контекст, объединяющий все возможные образовательные карты. Под информационным образовательным пространством мы будем понимать коммуникативную информационно-образовательную среду, взаимодействующую со своими субъектами (обучающимся, преподавателем), отражающую личностные установки и личностные смыслы субъектов, обеспечивающую построение и реализацию индивидуальных траекторий обучения. Под образовательным ландшафтом мы понимаем результат агрегирования нескольких образовательных карт, объединенных информационным образовательным пространством как общим контекстом.

После определения образовательного ландшафта естественным образом возникает задача разработки технологий и алгоритма создания и обработки такого ландшафта.

Мы устанавливаем основной вид формального описания образовательного ландшафта – граф с раскрашенными вершинами и ребрами. Цвета (в терминологии теории графов) вершин и рёбер графа представляют собой числа, отражающие количественную информацию, характеризующую соответствующий объект. Применительно к индивидуальным образовательным картам это в первую очередь информация о степени усвоения данным учащимся данной информации в определенный момент времени.

В качестве технологий создания образовательного ландшафта мы рассматриваем суперпозицию, включение и поглощение.

Технологии включения и поглощения требуют использования как индивидуальных образовательных карт, так и формальной модели всего изученного теоретического материала. Технология суперпозиции основана на использовании только индивидуальных образовательных карт и в этом смысле родственна технологии объединения в понимании А. Мюлинга.

Суперпозиция основывается на наложении индивидуальных образовательных карт. Оно осуществляется на основе операции лексикографического произведения графов (в терминологии теории графов). Суперпозиция содержит только те вершины и рёбра, которые содержатся хотя бы в одной из индивидуальных образовательных карт. Цвета этим элементам приписываются на основе усреднения цветов эти же элементов в индивидуальных образовательных картах. Результатом суперпозиции является образовательный ландшафт, отражающий обобщенные параметры усвоения учебного материала рассматриваемой группой обучающихся. Суперпозиция позволяет осуществлять анализ и прогнозирование групповой динамики знаний и навыков обучающихся.

Включение основывается на наложении образовательных карт учащихся и графовой модели теоретического материала. Включение содержит все вершины и рёбра, содержащиеся в модели теоретического материал, вне зависимости от их представленности в индивидуальных образовательных картах. Цвета этим элементам приписываются, как минимум соответствующих значений на индивидуальных образовательных картах (если они в них представлены) или условное значение "бесконечность" (если они не представлены ни на одной индивидуальной карте). Результатом включения является образовательный ландшафт, содержащий информацию об актуальном состоянии субъектов информационного образовательного пространства – обучающихся. Эта информация в графовой форме представления может служить основой проектирования информационного образовательного пространства.

Поглощение, как и включение, основывается на наложении образовательных карт учащихся и графовой модели теоретического материала. Поглощение содержит все вершины и рёбра, содержащиеся в модели теоретического материал, вне зависимости от их представленности в индивидуальных образовательных картах. Цвета этим элементам приписываются, как максимум соответствующих значений на индивидуальных образовательных картах (если они в них представлены) или число "0" (если они не представлены ни на одной индивидуальной карте). Результатом поглощения является образовательный ландшафт, содержащий информацию о всех возможных траекториях изучения рассматриваемого теоретического материала – как действительно реализованных обучающимися в процессе обучения (актуальные траектории), так и возможными к реализации при иной организации процесса изучения материала (потенциальные траектории). такая информация может быть получена в явном виде с помощью реализации известных алгоритмов поиска кратчайших путей на графах. В свою очередь, информация об актуальных и потенциальных траекториях

изучения материала позволяет осуществлять их сравнение, оценку относительной эффективности и выбор оптимальных траекторий обучения на основе такой оценки.

Рассмотренный нами выше подход А. Мюлинга к построению алгоритма работы с концептуальным ландшафтом представляется весьма перспективным, однако он не отражает особенности информационного образовательного пространства. Исходя из нашего понимания образовательного ландшафта, мы предлагаем следующий пятиэтапный алгоритм:

1. Анализ предметной области, знания в которой будут предметом моделирования. Данный анализ в первую очередь должен дать ответ на вопрос, каким образом организация информации в рамках предметной области соотносится с организацией информации в рамках информационного образовательного пространства. Информационная модель предметной области должна быть построена с использованием того же языка формализации, что и информационная модель информационного образовательного пространства. В качестве основного средства моделирования применительно к информационному образовательному пространству мы выбрали язык теории графов. Соответственно результатом этапа анализа являются принципы построения графовой модели предметной области. Реализация данного этапа существенно облегчается тем фактом, что к настоящему моменту существуют разнообразные проработанные подходы к графовому моделированию различных предметных областей (Cañas, 2003, Mühling, 2017; Schwendimann, 2014).

2. Выбор технологии построения образовательного ландшафта – суперпозиция, включение или поглощение. Выбор технологии в первую очередь определяется задачами, которые ставятся перед создаваемым образовательным ландшафтом. Формирование и анализ индивидуальных и групповых траекторий обучения предполагает выбор технологии поглощения. Анализ и прогнозирование групповой динамики знаний и навыков обучающихся предполагает выбор технологии суперпозиции. Создание среды поддержки проектирования информационного образовательного пространства предполагает использование технологии включения.

3. Использование выбранного метода – построение образовательного ландшафта.

4. Интеграция образовательного ландшафта в информационное образовательное пространство. Предпосылкой для реализации этого этапа является наличие единого языка формализации для построения информационной модели как информационного образовательного пространства, так и предметной области (см. этап 1).

5. Анализ и интерпретация результатов, полученных при использовании образовательного ландшафта. Эти результаты относятся к следующим трем основным группам:

5.1. Анализ и прогнозирование групповой динамики знаний и навыков обучающихся. Результаты анализа позволяют как оценить хоп учебного процесса в группе в целом, так и поместить известные академические результаты конкретного обучающегося в контекст групповых результатов. Последнее позволяет как оценить данного учащегося по отношению к группе в целом, так и сделать выводы относительно степени эффективности применявшихся методических подходов и технологий применительно к обучению данного учащегося во всей совокупности его индивидуальных характеристик.

5.2. Формирование пространства возможных индивидуальных траекторий обучения – как групповых, так и отдельного учащегося. Построение индивидуальной траектории обучения является одним из ключевых свойств информационного образовательного пространства. Образовательный ландшафт, созданный на основе технологии поглощения, представляет собой описание не только тех траекторий обучения, которые фактически реализованы обучающимися в процессе обучения (актуальных траекторий обучения), но и всех возможных альтернатив им (потенциальных траекторий обучения). Это даёт возможность сравнения актуальных и потенциальных траекторий, оценки их относительной эффективности, экстраполяции результатов сравнения и оценки на проектируемую учебную деятельность с целью построения в дальнейшем оптимальных образовательных траекторий в рамках информационного образовательного пространства.

5.3. Создание среды поддержки проектирования информационного образовательного пространства. Данный аспект специфическим образом связан с информационным образовательным пространство и в силу этого наиболее значим в нашем исследовании. Информационное образова-тельное пространство должно отражать в своей структуре специфику своих субъектов – обучающихся. Информация об этой специфике на обобщенном уровне содержится в образовательном ландшафте. Соответственно в процессе проектирование информационного образова-тельного пространства образовательный ландшафт является одним из основных источников информации. В свою очередь, этот вывод вызывает необходимость определенного пересмотра принятых подходов к процессу педагогического проектирования информационного образовательного пространства, его этапов, их содержания и взаимосвязи между ними.

Обобщая сказанное выше, необходимо отметить, что в рамках информационного образовательного пространства образовательный

ландшафт имеет следующий функционал: формирование пространства возможных индивидуальных траекторий обучения; анализ и прогнозирование групповой динамики знаний и навыков обучающихся; создание среды поддержки проектирования информационного образовательного пространства.

Выводы
Conclusions

Результаты проведенного нами теоретического исследования позволяют сделать вывод о необходимости и возможности поиска инструментов агрегирования информации, содержащейся в образовательных картах и последующей интеграции этих инструментов в информационное образовательное пространство. В частности, использование образовательного ландшафта в предлагаемой нами трактовке позволяет обеспечить формирование пространства возможных индивидуальных траекторий обучения; анализ и прогнозирование групповой динамики знаний и навыков обучающихся; создание среды поддержки проектирования информационного образовательного пространства.

Предложенную нами теоретическую модель можно использовать при проектировании информационного образовательного пространства, разработки и сопровождения индивидуальных и групповых траекторий обучения в рамках такого пространства. Дальнейшие исследования в данном направлении должны быть связаны в первую очередь с практической апробацией разработанной теоретической модели.

Summary

The concept of "concept map", as well as related concepts such as "educational map", "knowledge integration map" are currently the subject of numerous studies. The volume of research in the field of concept maps accumulated to date allows us to state the problem of generalization of information contained in concept maps of individual learners. The solution to this problem was proposed by A.Mühling in the form of the "Concept Landscape". The main idea underlying the concept landscape: instead of the traditional approach based on the didactometry of one student (once or repeatedly at different points in time) and an isolated consideration of the results of different students, systematically aggregate the results of individual students in order to get an idea of the state and development of knowledge groups of students as a whole. Along with concept maps, educational maps are also of great interest. Educational maps are a tool for describing and analyzing the knowledge of a specific student at a specific point in time. Also, the informatization of the educational sphere causes an increase in interest in such a form of informatization as the digital educational environment. However, to date, the problem of aggregating the information contained in educational maps in the context of the digital educational environment has not been solved. As a solution to this

problem, we propose to consider the educational landscape as a result of the aggregation of several educational maps, united by the educational information environment as a common context. We state the basic form of the formal description of the educational landscape - a graph with colored vertices and edges. We consider superposition, inclusion and absorption as technologies for creating an educational landscape. We propose a five-stage algorithm for working with the educational landscape, which includes: 1) analysis of the subject area, knowledge in which will be the subject of modeling; 2) the choice of proper technology for constructing the educational landscape - superposition, inclusion or absorption; 3) using the chosen method - building an educational landscape; 4) integration of the educational landscape into the digital educational environment; 5) analysis and interpretation of the results obtained using the educational landscape. Within the framework of the digital educational environment, the educational landscape implements three main functions: the formation of a space of possible individual learning paths; analysis and forecasting of group dynamics of students' knowledge and skills; creation of an environment for supporting the design of a digital educational environment. The theoretical model we have proposed can be used in the design of a digital educational environment, the creation and facilitation of individual and group learning paths within such an environment.

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DIGITAL SUPPORT SYSTEM FOR FULL-TIME AND REMOTE MASS INDIVIDUALIZED EDUCATION WITH ELEMENTS OF MACHINE LEARNING

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Abstract. *The requirements to the digital support system for opened individualized learning are formulated in the conditions of accelerated transition to remote forms. A version of a digital support system for development, search and provision of students with electronic educational resources in physics focused on the formation of individual trajectories of students in the educational space is considered. The possibility of several options for such a construction is allowed: 1) independent choice of the student; 2) the appointment of the trajectory by the teacher, supervisor or employer; 3) automated construction of trajectories by the system, organized on the basis of machine learning and artificial intelligence technologies.*
Keywords: *distance learning, educational paths, individualized learning, MOOC technologies, online education.*

Introduction

The coronavirus pandemic in 2020 was a powerful accelerator of the process of computerization of education and the introduction of electronic and remote forms of subject learning (Government of Saint Petersburg, 2020). An unexpected testing ground for remote education ideas and projects in the real everyday learning process has demonstrated a number of important features of remote learning implementation in modern reality, which are necessary for further effective development of digital support tools for subject-based learning.

First of all, it turned out that the vast majority of teachers refused to use the completely acceptable in a force majeure situation and officially provided opportunity to minimize their own efforts by redirecting students to ready-made and published on-line courses. In the new conditions, the educational process in physics was mainly implemented in accordance with the established educational traditions of educational institutions, their own programs of disciplines and pedagogical ideas of teachers. At the same time, it was not the ideology and

content of the courses that changed significantly, but their technical implementation, which required serious additional efforts from teachers due to the huge (several times) increase in labour intensity to maintain the quality of education when switching to the remote version. The difficulties encountered were mainly due to a significant reduction in the width of information communication channels between teachers and the audience of students. Interesting and important was the fact that most teachers do not use specialized electronic systems for organizing subject learning (Moodle (Büchner, 2016) or similar systems), but rather more familiar to them and students, and significantly more flexible general-purpose tools: social networks, public remote communication tools Skype (Skype, 2020), Zoom (Skytech, 2020), text, graphics, audio and video editors, etc. The practice of mass remote learning in 2020 (using the example of teaching physics courses in several Russian universities) has shown that there is a real demand from teachers not for ready-made full remote courses, but for separate "point-based" electronic learning resources of various types and very diverse in topics and levels of complexity.

Objectives of the study under discussion are:

1) development of the current version of the electronic system for the accumulation, systematization and storage of electronic educational resources in order to provide teachers with convenient services for the rapid development of their own MOOC courses with partial use of information modules already available in the digital educational space;

2) testing the idea of using capabilities of digital educational tools for the automated organization of individual educational trajectories of students on the example of multilevel teaching in physics;

3) approbation of the investigated approach in a real educational process in secondary schools, specialized physics and mathematics lyceums and in technical universities.

The object of the research is methods of intensification and optimization of the remote educational process expanding under the conditions of coronavirus infection, based on the use of machine learning and artificial intelligence technologies.

To solve the set tasks, the following methodology was chosen:

1. Creation of an original electronic support system and opened individualized training and development of electronic educational resources in the form of two subsystems: client (front-end) and server (software and hardware, back-end);

2. Implementation of the electronic part of the project was carried out using the languages: PHP, MySQL, JavaScript, AJAX, HTML, CSS;

3. Carrying out test filling with existing and created using system educational resources on the example of physics;

4. Testing the work of electronic support for individualized training in force majeure conditions of the coronavirus pandemic;
5. Planned testing of the idea of opened individualized education in educational institutions of higher and secondary education and in the self-study system.

Task Assignment and Basic System Requirements

Another serious challenge to Russian teachers from the modern education system was clearly formed in the pre-pandemic period. It consists in the presence of very contradictory requirements for higher education institutions (and, consequently, their teaching staff) through a system of indicators of their effectiveness and success. On the one hand, there is an increasing attention of the founders to the success of students in various Olympiads and competitions at both domestic and international levels. To ensure decent performance in this area, it is obviously necessary to increase the information content, volume and intensity of teaching basic subjects of the physics and mathematics cycle (at least to the level of Russian scientific and educational schools of the 80-ies of the XX century). The latter is quite consistent with the desire of the overwhelming number of teachers. Enhanced programs are also attractive for well-trained and motivated students. On the other hand, the existence of certain restrictions on the number of students who are expelled, and the constantly growing gap in the levels of real performance level of graduates of various secondary educational institutions against the background of the traditional tendency to reduce classroom hours allocated to exact sciences, makes setting the goal of high-quality advanced courses very problematic.

As one of the ways out of this contradictory situation, we can consider the transition to mass individualized education, the fundamental possibility of which at the present stage of development of digital and network technologies ceases to seem utopian (Chirtsov, Nikolsky & Kurasheva, 2019). Such a transition seems feasible without significant innovations in the organization of the educational process, the natural resistance to which on the part of the structures that accompany and control this process, would most likely lead to the loss of attractiveness of the idea of improving the quality of education for those who are now able and want to really ensure its quality in the subject area. It is really feasible to preserve the existing (focused on the average student) educational process in full-time with its addition with electronic resources for those whose objective needs in the volume and level of complexity of the proposed educational material significantly differ from the average. It seems appropriate to provide students with the widest possible range of e-learning resources of

various levels of complexity in order to be able to form a wide set of individual trajectories that best meet the needs in each specific situation.

The problems of tracing and monitoring the progress of students in the educational space in an ideal situation should be solved by them themselves under the guidance of a scientific supervisor. However, the reality is that such patronage is sometimes very formal and the trainee is de facto left without guidance. This is especially true for students whose level differs significantly from the average, both for the worse and for the better. These considerations make it reasonable to supplement the system of individualized education with a backup system for automatically tracing the trajectories of students in the educational space, the results of which should have an exclusively recommendatory status.

Naturally, a necessary component of the organization of mass individualized education is the problem of preparing high-quality electronic content, the volume of which is obviously unrealistic for almost any modern project in the field of education. The latter means that the main part of electronic educational resources can only be produced by a distributed audience of authors who create them on their own initiative, similar to how social networks function and how Wikipedia is filled in (Dounaevsky, 2013).

This development option places high demands on ensuring the maximum comfort of a digital support system for individualized education not only for consumers of educational resources, but, which is more significant at the initial stage, for their creators as well. In today's conditions, the latter means, first of all, minimal regulation of formats, levels, styles and methodological approaches to the submission of material. For its attractiveness, the system must be as simple and transparent as possible, open to the placement of resources in it by the authors themselves on any media (allowing access to it via the Internet). It is highly desirable to supplement it with easy-to-use and flexible automation tools or partial automation of the development of original content. Two such systems for simple on-line creation of interactive computer models and interactive training tests have already been developed and put into operation (Chirtsov, Nikolsky & Mikushev, 2019; Arzamazov, Vlasov, & Chirtsov, 2019).

The regulation on complete transparency of resource allocation by the authors seems to be very controversial and is likely to harm the trainees. However, it should be noted that the system being created and its content is itself an Internet resource and cannot automatically go beyond the restrictive limits officially imposed on any Internet resources. Creating another version of the online catalogue of educational resources is unlikely to cause additional harm to students who already have potential access to all Internet resources. Despite this, the authors of the system do not relieve themselves of the responsibility of additional control of the resources displayed on it. In cases of

attempts to post content that has a clear anti-scientific orientation and / or violates the norms of pedagogical, academic, and universal ethics. The system administrators reserve the right to permanently deprive a number of users of the opportunity to use the system to distribute information and fakes that are harmful to qualified training. Finally, the maximum openness of the system in terms of its content allows the placement of resources containing reviews of posted content, lists of recommended and/or categorically not recommended Internet publications for students. The authors of such reviews have opportunities for fruitful work in the field of fighting for the purity of science and education, which will be very effective if they themselves and their products manage to gain popularity.

No less important is the question of the feasibility of creating another catalogue of educational Internet resources, the number of which is quite large in the Internet, for example (Unified collection of digital educational resources, 2020; A single window for accessing information resources, 2020). However, attempts to use such collections to obtain information on a subject that allows, for example, a student of a technical University to successfully answer the question "Newton's second law" on an exam in mechanics, did not lead to noticeable success in 15 minutes of searching in the listed catalogues. Apparently, the main drawback of the listed resources for a specific subject area is due to attempts to create a single search and access system suitable for the entire repository of various resources, which is not based on any author's course.

This development – a System of Mass Individualized Learning (SMIL) in its form is an electronic catalogue of educational resources on the Internet. However, in reality, it is intended as a kind of symbiosis of electronic multimedia textbooks in physics (and, in the future, in other natural science disciplines) with tools for the authors of original courses to develop, publish and attract additional resources from their colleagues, whose choice is left to the author of the course.

The functionality of the system and its capabilities significantly depend on the status provided to its users. Currently, there are four modes of operation: "Guest", "Trainee", "Teacher", and "Administrator". It seems appropriate to give a brief description of each of them.

Description of the Developed System. "Guest" and "Trainee" Modes

The user interface of the system is an electronic card ("avatar") of the resource that contains the title, list of authors, brief description of subject content, an example image of the working screen and a button, which when pressed opens a new window and runs the selected resource, a specific location of which in the Internet is irrelevant. In addition to the specified fields, which

are completely dependent on the author's desire to fill in (or ignore), the resource avatar contains fields that display the resource's position in the search tree of the generalized course structure (course – section – topic–lecture-question), media type (text, audio lecture, video lecture, task, animation, virtual experiment, and full course, etc.), level of complexity ("Basic requirements for applicants", "Students of physics and mathematics schools and lyceums", "Physics for technical universities", "Physics for classical universities"), and others that (or a combination of them) the system searches. You can search by user-defined keywords. The ability to fill in these features is provided to the authors of the hosted resource in the "hard form" of selecting one of the positions for each of the characteristics from the existing lists related to each other. If a resource corresponds to several positions in the course navigation logic, the SMIL may contain several avatar cards that refer to the same resource, placed in the branches of search trees that correspond to the resource's characteristics. Each of the lists has a field "Outside the classifier", which contains electronic resources of authors who do not want to further clarify the position of their development in the classifier system, or if it is impossible to position the development, or because of incomplete search trees.

The system allows placement of resources both with free access and with access in agreement with the author and/or after payment (provided that the author solves all the problems of ensuring the legality of receiving income). The corresponding information is displayed in a special field located in the same block as the "Status" field, which serves to display official recommendations for using the resource in education (if any).

In addition, to the listed information about the system resources, there are a number of services that provide friendly support for the individual learning process both by the authors of the resources and by the system itself. The author's support is provided by placing links on the avatar cards that provide access to the most recommended resources of higher or lower levels of complexity, as well as to resources of the corresponding level of the card, the study of which (in the author's opinion) should precede working with the selected material. The described mechanism is most convenient when passing linear courses, in often implemented cases of students' trust in their chosen teacher and readiness to follow the path recommended by them, limited only to individual adjustment of the complexity and information saturation of the material being studied. Students who are inclined to take more active actions in tracing their trajectories in the space of educational resources can use the recommendations of their chosen authors, presented in the video provided by the card format with a list of links to similar or close resources selected by the avatar author, as well as active links located directly in the text of the annotation to the resource.

When forming an individual educational trajectory, an alternative to the recommendations of the author of the educational resource can be automatically generated recommendations generated by the system based on the statistics of user transitions to avatars of the following educational resources collected by avatars. Marks of educational resources provided by students, their success in promoting the educational space, and the availability of links to the recommended resource from other authors.

To strengthen the system's feedback with users when generating recommendations for choosing trajectories, it is possible to use a system of built-in interactive training tests, which supports a dialogue with the test subject, during which the trainee is provided with hints along with the ability to correct or supplement the answer. Each training resource can be supplemented with an input and output test or a set of tests. The results of input testing serve as the basis for automatic generation of recommendations for correcting the learning path by adding educational material necessary for the successful development of the selected resource. In turn, input testing of resources that complement the trajectory can serve as a basis for recommendations for further adjustment of the educational trajectory. The results of the output testing serve as a basis for the avatar program's self-assessment of the associated learning resource and the formation of an in-system rating of the student. The latter is necessary for more correct accounting of the marks of resources combined by the system given by training users.

The opportunities provided by SMIL for users with the Guest and Trainee statuses are very close and are reduced to services for searching for resources and accessing them through selected avatar cards. Unlike trainees, Guests are not given the opportunity to pass tests and, as a result, influence their ratings on the rating of resources. Guest status is granted to all system users by default.

System Description. "Teacher" and "Administrator" Modes

The status of a Teacher is provided to the SMIL user at his request by the system Administrator on the basis of the electronic educational resource (or resources) submitted by the applicant. In case of violations of academic ethics or attempts to place resources in the system that harm qualified subject training, the user may be deprived of the status of Teacher.

In addition to the avatars search services available to Guests and trainees and access to their respective resources, Teachers are given the opportunity to create avatar cards for online educational resources (their own and colleagues). It is mandatory to indicate the author and author (s) of the corresponding resource in the card. Authors are also granted the right to edit and destroy their created avatar cards. If the card is destroyed, all links made to it from other

avatars are automatically destroyed and notifications are sent to the authors of the changed avatars.

SMIL allows placing both single avatars-links to an educational resource, and building linear or branched courses and/or sets of courses in the Internet by linking avatars of transitions using the arrows "previous resource", "next resource", "harder" and "easier" and unlimited lists of recommended transitions. The arrow navigation mechanism directs authors to create chains of logically related learning resources, up to the construction of options for completed courses (or their sections) and provides students (if they trust the author) with undoubted convenience.

The most important features of the system are the ability to view the "avatar" cards themselves as equal educational resources and place HTML texts in their resource description fields with automatically added links and control buttons. The latter, obviously, in principle, allows authors to expand the functionality of the system almost indefinitely in relation to the resources they have placed. In particular, these simple features allow authors to easily build their own courses by creating avatar pages containing tables of contents and links to other developments of the author or colleagues. It is also possible to create cards with overviews, reviews, discussions, critical speeches, etc. The "classification code" field allows you to post information about the official recommendation of the resource, provided that a copy of the corresponding document signed by the author is sent to the administration. In the absence of one, the author can request a recommendation from the resource administration. The administration reserves the right to set the "not recommended" attribute in this field with an explanation of the reasons for making such a decision and, of course, preserving the author's right to delete the resource from the system.

Responsibility for the operability of links to resources placed in the system lies with the creators of the corresponding avatar cards, data about which are also registered in the cards.

The most important feature (which is purely recommendatory for the author of the resource within the framework of the development ideology) is the connection of tests that enter this resource and complete its study the decision to pass or ignore them is made by the user (trainee) and does not affect the ability to access the resource itself. In case of a failure to pass the input test, the author has the opportunity to offer the user to get acquainted with the recommended set of resources, mastering the content of which can ensure an adequate perception of the user's chosen development. Similarly, the results of the output test allow the author to provide the student with his recommendations for further completion of the course, in-depth study of the selected section, or, on the contrary, the transition of the student to a simpler level of presentation of the material. The described service provides implicit selection and promotion of the

most successful resources in the system and is the simplest mechanism for forming individual educational trajectories.

Each avatar card of the system automatically keeps an internal record of the number of its visits, calls to the associated resource, the user's working time with the resource, the number and results of testing, the quality of the resource by users from different groups of success in passing tests, and others. These internal characteristics of resources are intended for determining their internal (available to authors) ratings in the system, which, together with the results of testing, will be used by the system to automatically generate variants of individual trajectories. Algorithms and target functions of a self-learning system for automatic tracing of educational trajectories can and should be discussed during this year, which is necessary for the initial content filling of the system.

The project administration takes over the functions of providing users with statuses in the system at their request, and if necessary, changing these statuses. Extensions of branches and sections of search trees in accordance with the availability of resources that are not included in its logic and based on the results of consultations and/or discussions with active authors are also available only to system administrators. The implementation of these features is provided by programs for editing user statuses and structures of academic disciplines.

Conclusion

Initial system filling is underway and will be completed by May 2021. There are already created original courses in classical and relativistic mechanics (2 and 3 level versions), classical electrodynamics (3 and 4 level versions), Optics (3 level version) and microworld physics (2 and 4 level versions). For three months of testing the system functioning, online courses have been developed, according to which training is already underway under the conditions of a massive transition to remote forms.

We would like to invite all teachers who are interested in high-quality teaching of physics, and students who want to get a competitive education in the field of exact sciences to the created resource as users of the posted information and authors-developers of their own original content. Access to the resource is open and without registration via the link http://www.physicsleti.ru/tuteline.

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INFORMĀCIJAS TEHNOLOĢIJU IZMANTOŠANA ATTĀLINĀTĀS SUPERVĪZIJAS PRAKSĒ: DATU DROŠĪBA

Use of Information Technologies in Supervision Remote Practice: Data Security

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Abstract. *Provision of remote services became relevant all over the world, during the 2020 COVID-19 pandemic. Latvian supervisors were also forced to transfer their practice to the digital space as well. COVID-19 pandemic challenges opened a wider range of opportunities for improvement remote practice. Pandemic also highlighted the risks associated with lack of relevant competences. At the global level over the last decade, risks associated with remote counselling summarized in guidelines, providing professionals with examples of best practice. In Latvia, on other hand, such guidelines have not adopted yet.*
This study developed with the aim to find out the awareness of Latvian supervisors about the risks (cyber security) of using information technology and the protection of personal data in the conditions created by the COVID-19 pandemic.
To find out how Latvian supervisors are aware about the risks of using information technology (cyber security) and personal data protection, a survey conducted among Latvian supervisors and organizing an expert panel discussion, scientific strength of the study ensured by data triangulation.
The obtained results allowed to conclude that the COVID-19 pandemic highlighted the need for supervision remote practice, at the same time the research data show that the awareness of Latvian supervisors about the risks of information technology use (cyber security) and personal data protection is medium to low.
The results of the research show that in the education of Latvian supervisors it is necessary to allocate place for the acquisition of information technology (cyber security) risk and personal data protection regulation.
This research emphasizes the importance of several supervisors' competences such as digital knowledge and personal data protection, however further research is needed to find the most effective methods how to improve these competences.
Keywords: *COVID-19 pandemic, Cybersecurity, Personal Data protection, Remote practice, supervision, supervision competences.*

Ievads
Introduction

2020.gadā COVID-19 pandēmijas rezultātā izveidojās apstākļi (ierobežojumi) (Ministru kabinets, 2020, 216A), kad tiešie (klātienes) kontakti ar citām personām tika būtiski ierobežoti vai pat neiespējami, kas, savukārt, radīja unikālu situāciju, kad attālinātā prakse kļuva par vienīgo iespēju nodrošināt supervīziju, proti, sniegt konsultatīvu atbalstu jautājumos, kas saistīti ar darbu un profesionālo darbību (Profesionālās izglītības un nodarbinātības trīspusējās sadarbības apakšpadome (PINTSA), 2019). Attālinātā prakse jeb attālinātā supervīzija tiek īstenota, izmantojot informācijas tehnoloģijas, proti, metožu un instrumentu kopumu – attēlu, teksta, skaņas un informācijas apstrādei, iegūšanai, uzglabāšanai un izplatīšanai ar datoru un telesakaru kombināciju (Nipers, Zīds, & Kuklis, 2012). Attālinātai praksei, izmantojot informācijas tehnoloģijas, būtu jāatbilst tiem pašiem profesionālajiem standartiem, kas ir noteikti klātienes praksei (Joint Task Force for the Development of Telepsychology Guidelines for Psychologists (APA), 2013).

Attālinātā prakse aktualizē vairākus profesionālo zināšanu, prasmju un attieksmju jautājumus – līdzās jau minētajai informācijas tehnoloģiju izmantošanai, supervizoram jāspēj ievērot arī personas datu aizsardzības normas attālinātās prakses procesā, nodrošināt dokumentu apriti normatīvajos aktos paredzētajā kārtībā (PINTSA, 2019). Lūkojoties plašākā kontekstā, jānorāda, ka šīs prasības sasaucas ar Nacionālās attīstības plānu, kurš nosaka, ka nākotnē turpināsies digitalizācijas attīstība, kura kļūšot par vienojošu elementu, īpaši tādās jomās kā inovācijas un zinātne, izglītība un veselības aprūpe (LR Saeima, 2020, 127). Digitālo transformāciju pamatnostādnes arī izvirza digitālo kompetenci kā vienu no mūžizglītības pamatkompetenču daļu un sevī ietver informācijas tehnoloģiju pārliecinātu, kritisku un atbildīgu izmantošanu un darbošanos ar šīm tehnoloģijām mācību un darba vajadzībām (Vides aizsardzības un reģionālās attīstības ministrija (VARAM), 2020). Attiecībā uz supervizora darbu tas nozīmē, ka supervizoram būs jāspēj apgūt un izmantot jaunākās informācijas tehnoloģijas profesionālās darbības veikšanai, kas jau šobrīd ir noteikts supervizora profesijas standartā (PINTSA, 2019).

Svarīgi, lai supervizējamais (supervīzijas klients, pasūtītājs) tiek atbilstoši informēts un izglītots par informācijas tehnoloģiju izmantošanas riskiem attālinātā supervīzijā. It īpaši uzsverot, ka daļai Latvijas supervizoru izglītība tiek iegūta pedagoģijā (Angena & Mārtinsone, 2020), tādējādi supervizoriem, sniedzot konsultatīvu un izglītojošu atbalstu, ne tikai ir jāstrādā atbilstoši profesijas standartā noteiktām kompetencēm (PINTSA, 2019), nodrošinot drošu supervīzijas vidi izmantojot informācijas tehnoloģijas, bet arī jāspēj sniegt atbilstošu informāciju saviem klientiem. Līdz ar to jāspēj "pilnvērtīgi izmantot

digitālās telpas, rīkus un ar to saistīto procesu iespējas, sekmējot sabiedrības spēju efektīvi rīkoties, lai atbildētu mūsdienu izaicinājumiem" (VARAM, 2020).

Izmantojot informācijas tehnoloģijas supervīzijas praksē, speciālistiem ir svarīgi apzināties specifiskos un unikālos riskus, ko rada šo tehnoloģiju izmantošana, jeb kiberdrošības riskus, kuri ir neatņemama informācijas tehnoloģiju izmantošanas sastāvdaļa. Citu (sistēmu, tehnoloģiju, ierīču) kiberdrošības risku starpā īpaši jāizdala cilvēciskais faktors, kas izriet no kompetenču/zināšanu trūkuma (APA, 2013). Līdz šim supervizoru kompetences personas datu aizsardzības un informācijas tehnoloģiju (kiberdrošības) jomā nav pētītas. Tomēr tas ir īpaši aktuāli, ņemot vērā Nacionāla attīstības plāna prioritātes, kuru starpā ir izvirzītas digitālās un karjeras vadības prasmes, mediju un informācijas pratība (Ministru kabinets, 2020, 127).

American Psychological Association vadlīnijas iesaka speciālistiem pirms attālinātās prakses uzsākšanas pārliecināties par attālinātās prakses organizēšanas tiesisko pamatu, kā arī saņemt atbilstošas konsultācijas no datu aizsardzības un/vai tehnoloģiju drošības speciālistiem par attālinātās prakses organizēšanu, kā arī pārskatīt ar attālinātas prakses organizēšanu saistītos lietvedības/grāmatvedības aspektus (piemēram, rēķinu izrakstīšanas kārtību) (APA, 2013).

Vispārīgā datu aizsardzības regula nosaka, ka, "ņemot vērā apstrādes raksturu, apmēru, kontekstu un nolūkus, kā arī dažādas iespējamības un nopietnības pakāpes riskus attiecībā uz fizisku personu tiesībām un brīvībām, pārzinis īsteno atbilstošus tehniskus un organizatoriskus pasākumus, lai nodrošinātu un spētu uzskatāmi parādīt, ka apstrāde notiek saskaņā ar regulu." (Eiropas Parlaments un Padome, 2016, 119). Līdzās normatīvo aktu prasībām personas datu aizsardzības jomā, supervizora profesijas standarts paredz, ka supervizoram jānodrošina savas prakses atbilstību personas datu aizsardzības prasībām, noformējot atbilstošus dokumentus un korekti veicot ar personu datu aizsardzību saistīto dokumentu apriti (PINTSA, 2019). Minētais aktualizē nepieciešamību pēc attālinātās prakses tiesisko pamatu noskaidrošanas uz izzināšanas, it īpaši jautājumos, kas saistīti ar personas datu apstrādes procesu.

Atšķirībā no citām valstīm (piemēram, ASV), šobrīd Latvijā nav specifiska regulējuma (vadlīniju), kas iekļautu visu normatīvo aktu prasības vienotā normatīvā dokumentā un ļautu supervizoriem organizēt savu praksi atbilstoši profesionāliem standartiem un normatīvo aktu prasībām, ka arī līdz šīm netika veikti specifiski pētījumi, kas ļautu apzināties supervizoru izpratni par datu drošību un kopējo attālinatas supervīzijas prakses organizāciju, kas ir svarīgi lai izveidot gan profesionālas darbības vadlīnijas, gan profesionālas apmācības programmas, nodrošinot supervizoru profesionālo izaugsmi un kompetenču attīstību.

Pētījuma **mērķis** bija izzināt Latvijas supervizoru informētību par informācijas tehnoloģiju izmantošanas (kiberdrošības) riskiem un personas datu aizsardzību COVID-19 pandēmijas radītājos apstākļos.

Atbilstoši pētījuma mērķim tika izvirzīti pētījuma **jautājumi**:

1. Kāda ir Latvijas supervizoru informētība par informācijas tehnoloģiju izmantošanas (kiberdrošības) riskiem?
2. Kāda ir Latvijas supervizoru informētība par personas datu aizsardzību?

Metodoloģija
Metodology

Lai sasniegt pētījuma mērķi, tika izvēlēts secīgais izskaidrojošs jaukta tipa dizains. Šī darba īstenošana notika divos posmos – pētījuma sagatavošanas un pētījuma posmā.

Pētījuma sagatavošanas posmā, lai formulētu aptaujas jautājumus, vispirms, izmantojot juridiskās interpretācijas metodes, tika analizētas normatīvo aktu prasības datu aizsardzības jomā (Eiropas Parlaments un Padome, 2016, 119), normatīvo aktu prasības, kuros minēta supervīzija (Prasības sociālo pakalpojumu sniedzējiem (Ministru kabinets, 2017, 126), kā arī supervizora profesijas standarts (PINTSA, 2019). Ar mērķi iegūt plašāku izpratni par attālināto darbu, tika ņemtas vērā arī ar konsultatīvo atbalstu saistīto nozaru vadlīnijas, kas tiek pielietotas ārvalstu praksē, piemēram., ASV Psihologu asociācijas vadlīnijas attālinātai psiholoģiskai konsultēšanai (APA, 2013), piemēram – par rēķinu izrakstīšanas kārtību (minētās vadlīnijas iesaka šifrēt rēķinu saturu), par attālinātas prakses tiesiskā pamata noskaidrošanu pirms uzsākt šāda veida praksi utt., apzinoties, ka minētās vadlīnijas nav saistošas Eiropas savienībā.

Lai definētu aktuālus kiberdrošības riskus, izmantojot tematisko analīzi, tika izpētīti kiberdrošības ekspertu atzinumi un statistika (Verizon, 2019; PwC, 2018; Google/Harris Poll, 2019; Statista, 2017), kā arī informācijas tehnoloģiju un pasaulē atzīti kiberdrošības standarti (International Organization for Standardization, 2018, International Telecommunication Union, 2008). Balstoties uz starptautiski izmantoto incidentu taksonomiju jeb formalizētu veidu, kā apkopo, sadala kategorijās un reprezentē par apdraudējumiem iegūto tehnisko informāciju, tika veidoti aptaujas jautājumi (piemēram, par attālinātā praksē izmantotām ierīcēm un programmnodrošinājumu un to konfigurācijas īpatnībām – izmantotā operētājsistēma, izmantotās paroles, citu lietotāju piekļuves iespējas utt.).

Anketas jautājumi par attālinatas prakses organizēšanu (jautājumi par rēķinu izrakstīšanu, klientu informēšanu un attālinātās prakses dokumentācijas

noformēšanu) tika balstīti uz supervizora profesijas standartā noteiktajām kompetencēm (personas datu aizsardzības un informācijas tehnoloģiju izmantošanas jomā), kā arī no normatīvo aktu izrietošām prasībām, piemēram, Vispārīgas datu aizsardzības regulas ES 2016/679 7.panta pirmās daļas normām, kas nosaka, ka "personas datu apstrāde pamatojas uz piekrišanu un ir jāspēj uzskatāmi parādīt, ka datu subjekts ir piekritis savu personas datu apstrādei", kā arī uz minētā normatīvā akta 32.panta normu prasībām, kas nosaka, ka, "ņemot vērā tehnikas līmeni, īstenošanas izmaksas un apstrādes raksturu, apmēru, kontekstu un nolūkus, jāīsteno atbilstīgus tehniskus un organizatoriskus pasākumus, lai nodrošinātu tādu drošības līmeni, kas atbilst riskam". Pamatojoties uz minēto, tika formulēti aptaujas jautājumi (Eiropas Parlaments un Padome, 2016, 119).

Pētījuma posmu veido divas daļas – kvalitatīvā un kvantitatīvā. Vispirms tiks raksturota kvantitatīvā pētījuma daļa.

Instrumentārijs. Anketa, ko viedo četras daļas – pirmajā daļā ietverti jautājumi par sociāli demogrāfiskajiem rādītājiem – dzimums, vecums, supervīzijas prakses stāžs, bāzes izglītība (4 jautājumi), un jautājumi par supervīzijas praksi, tostarp, kādu supervīzijas veidu praktizē, kas veido supervīzijas klientu loku, cik daudz stundas mēnesī praktizē, kāda ir rēķinu izrakstīšanas kārtība (4 jautājumi); otrajā daļā – jautājumi par supervīzijas attālināto praksi pirms COVID-19 pandēmijas – cik lielu daļu no prakses sastādīja attālinātā prakse, kādu attālinātās prakses veidu izmantoja, kur praktizēja (4 jautājumi); trešajā daļā – jautājumi par supervīzijas attālināto praksi COVID-19 pandēmijas laikā – cik lielu daļu no prakses sastādīja attālinātā prakse, kādu attālinatas prakses veidu izmantoja, kur praktizēja, kas veido klientu loku (grupas, komandas, organizācijas, individuāli klienti) un kādu profesiju pārstāvji veido klientu loku (6 jautājumi); ceturtajā daļā – jautājumi par informācijas tehnoloģiju izmantošanas (kiberdrošības) riskiem (11 jautājumi), un personas datu aizsardzību (10 jautājumi).

Anketā lielākoties tika izmantoti slēgta tipa jautājumi par informācijas tehnoloģiju izmantošanu un personas datu aizsardzību, un jautājumi ar Likerta skalu, kur respondentiem vajadzēja izvērtēt informācijas tehnoloģiju un personas datu aizsardzības jomā izmantotos jēdzienus un informētību par normatīvo aktu saturu (no 1 – nav informēts, līdz 5 – informēts).

Procedūra. Laikā no 2020.gada 4.oktobra līdz 4.decembrim respondentiem – Latvijas Supervizoru apvienības biedriem (ar biedrības valdes locekles piekrišanu) un supervīzijas studentiem no Rīgas Stradiņa universitātes un Biznesa mākslas un tehnoloģiju augstskola "RISEBA" tika nosūtīti e-pasti ar aicinājumu piedalīties pētījumā un lūgumu aizpildīt anketu. Anketēšana notika, izmantojot *Google Forms*. Tās aizpildīšanai nebija laika ierobežojuma, un kopējais anketas aizpildīšanas laiks sastādīja ~15 min. Anketas ievaddaļā tika

sniegta informācija par datu izmantošanas nosacījumiem un konfidencialitāti. Respondentiem tika nodrošināta iespēja vajadzības gadījumā sazināties ar pētījuma autoru (e-pastā).

Dalībnieki. 39 supervizori un supervīzijas studenti, no kuriem 5,1% (n=2) vīrieši un 94,9% (n=37) sievietes, respondentu vecums 45 gadi (kumulatīvi 51,3%). Respondentu supervīzijas prakses stāžs 4 līdz 6 gadi (kumulatīvi 71,8%). Respondentu bāzes izglītība – pedagoģijā 20,5% (n=8); uzņēmējdarbība un finanses 17,9% (n=7), sociālais darbs 17,9% (n=7) u.c. Visbiežāk respondenti 30,8% (n=12) praktizē individuālo un grupu supervīziju lielākā daļa 79,5% (n=31) respondentu praktizē individuālo supervīziju ar privātpersonām, 38,5 % (n=15) praktizē supervīziju mazāk par 8 stundām mēnesī, 35,9% (n=14) praktizē supervīziju no 9 līdz 18 stundām mēnesī. Tikai 7,7% (n=3) praktizē supervīziju 40 un vairāk stundas mēnesī.

Datu apstrāde. Kvantitatīvo datu apstrādei tika pielietota datorprogramma *IBM SPSS Statistics 21.0*. Tika apskatīta aprakstoša statistika (piemēram, procenti). Tā kā dati atbilst nominālai skalai, datu analīzei tika izmantota neparametriska statistika.

Kvalitatīvo pētījuma daļu veidoja supervīzijas nozares ekspertu paneļdiskusija par informētības līmeni par informācijas tehnoloģiju izmantošanas (kiberdrošības) riskiem un personas datu aizsardzību. Paneļdiskusija tika veikta ar mērķi nodrošināt datu triangulāciju. Tajā piedalījās divi eksperti – supervizori ar profesionālās darbības stāžu vairāk nekā 5 gadi. Paneļdiskusijas analīzei tika izmantota tematiskā analīze pēc Braunas un Klārkas (Braun & Clarke, 2006) modeļa. Rezultātu pārskatā ir ietvertas vinjetes no šīs diskusijas.

Rezultātu analīze
Results analysis

Noslēdzoties anketēšanai tika iegūtas 39 pilnīgi aizpildītas anketas, to dati tika analizēti kopā ar ekspertu paneļdiskusijas laikā iegūtiem atzinumiem un tiek pasniegti sintezētā veidā.

Atbildot uz pētījuma jautājumu, kāda ir Latvijas supervizoru informētība par personas datu aizsardzību, konstatēts, ka attālinātās prakses datu apstrādes atbilstības novērtējumu neveica 68,4% (n=26) no respondentiem, 21,1% (n=8) no respondentiem sniedza atbildi, ka nezina, kas ir personas datu pārstrādes atbilstības novērtējums, un 10,5% (n=4) veica atbilstības novērtējumu. Jāmin, ka 7,9% (n=3) konsultējās ar personas datu aizsardzības un/vai tehnoloģiju drošības speciālistiem par attālinātās prakses organizēšanu, 65,8% (n=25) neveica konsultācijas, bet aplūkoja informāciju no publiskiem avotiem un 26,3% (n=10) neveica konsultācijas, jo nesaskatīja tajās vajadzību.

Rēķinu izrakstīšanas kārtību nepārskatīja 84,2% (n=32) no respondentiem, tomēr 15,8% (n=6) norādīja, ka sāka izrakstīt rēķinus elektroniskā formā, pirms COVID-19 pandēmijas to darīja 56,4% (n=22) no respondentiem. Neviens no respondentiem nav izmantojis šifrēšanu, nosūtot rēķinus elektroniski.

Atbildot uz jautājumu par vienošanas noslēgšanu, kur tiktu atrunāti datu apstrādes jautājumi un klientu piekrišanas datu apstrādei pirms uzsākt attālināto praksi, 65,8% (n=25) no respondentiem sniedza atbildi, ka nebija noslēguši rakstveida vienošanos (piemēram, līgumu), kur būtu atrunāti minētie jautājumi.

Respondenti dod priekšroku sinhronai multimediju jeb tiešsaistes attālinātās prakses formai, lielākā daļa no respondentiem (97,4% (n=37)) attālinātā praksē izmantoja *Zoom* platformu, tomēr, pirms izmantot programmnodrošinājumu attālinātā praksē, 63,2% (n=24) no respondentiem nebija noskaidrojuši tā atbilstību normatīvo aktu prasībām personas datu apstrādes jomā, kā arī 44,7% (n=17) nebija iepazinušies ar minētā programmnodrošinājuma privātuma politiku.

Pēc respondentu sniegtajām atbildēm, kas atklāja viņu informētības līmeni par informācijas tehnoloģiju izmantošanas (kiberdrošības) riskiem, var secināt, ka drošības standartos (International Organization for Standardization, 2018) minētās prasības attiecībā uz ierīču izmantošanu netiek ievērotas, un 92,1% (n=35) no respondentiem atbildēja, ka attālinātā praksē izmantoja datoru (tai skaitā portatīvo), ko izmanto arī privātām vajadzībām. Minētais standarts paredz, ka ierīce var būt izmantota gan darbam, gan privātām vajadzībām, ja tiek nodrošināta atbilstoša informācijas aizsargāšana un šifrēšana, tomēr, ņemot vērā, ka 31,6% (n=12) no respondentiem uz jautājumu, kādi autentifikācijas drošības rīki tika izmantoti attālinātā praksē lietotajās ierīcēs, atbildēja, ka neizmantoja nekādus drošības rīkus, un 65,8% (n=25) pēdējā pusgada laikā nemainīja attālinātā praksē izmantoto ierīču paroles, secināms, ka izlasē pastāv būtisks kiberdrošības risks attālinātā praksē izmantoto ierīču aizsardzības jomā. Svarīgi atzīmēt, ka 15,8% (n=6) pieļāva, ka darbam izmantotās ierīces izmanto arī ģimenes locekļi (piemēram, dzīvesbiedrs, laulātais, bērni), kas rada papildu riskus drošībai.

Operētājsistēmas izvēle ietekmē arī drošības standartu piemērošanu, jo katrs programmnodrošinājuma ražotājs veido savu drošības politiku. Pasaulē populārāko operētājsistēmu – *Windows*, izmanto 57,9% (n=22) no respondentiem. *Windows* ražotājs iesaka mainīt paroli kaut vienreiz laika posmā no 30 līdz 90 dienām (*Hicock,* 2016), tas nozīmē, ka pusgada laikā lietotājam būtu jāmaina parole no 2 līdz 6 reizēm, atkarībā no izvēlētajiem drošības iestatījumiem. Tikai 2,6% (n=1) no respondentiem pēdējā pusgada laikā mainījuši paroli 2 līdz 4 reizes, un jau minētie 65,8% attālinātā praksē izmantoto ierīču paroles nemainīja vispār. Ņemot vērā, ka pēc drošības ekspertu atzinuma 81% no visiem kiberdrošības incidentiem ir saistīts ar vājo un/vai kompromitēto

paroļu izmantošanu (*Verizon,* 2019), minētais norāda, ka supervizoriem pastāv iespēja tikt pakļautiem kiberdrošības riskiem tieši novecojušo paroļu dēļ. Minēto risku pastiprina fakts, ka 28,9% (n=11) no respondentiem norādīja, ka attālinātā praksē izmantoto servisu/ierīču paroles sakrīt ar kādu no privātām vajadzībām izmantotām parolēm, kas neatbilst ISO/IEC 27001:2018 drošības standarta prasībām (International Organization for Standardization, 2018).

Tika konstatēts, ka starp supervizoriem ir zems izpratnes līmenis par kiberuzbrukumu riskiem, piemēram, sociālā inženieringa jēdzienu (kas ir viens no svarīgākajiem informācijas tehnoloģiju izmantošanas (kiberdrošības) riskiem) (*Granger,* 2001), tikai 7,6% (n=3) minēto jēdzienu izprot pilnīgi, bet 61,5% (n=24) no respondentiem sniedza atbildi, ka pilnībā neizprot jēdziena "sociālais inženierings" būtību. Līdzīga situācija novērojama arī ar jēdzienu "pikšķerēšana" (*phishing*) – 50% (n=19) no respondentiem atbildēja, ka pilnībā neizprot minēto jēdzienu, un 17,9% (n=7) sniedza atbildi, ka pilnībā to izprot. Paneļdiskusijas eksperti nespēja sniegt minēto jēdzienu definīcijas, kā arī, mēģinot izskaidrot jēdzienu saturisko tvērumu saviem vārdiem, nesniedza precīzas, pārliecinošas atbildes, piemēram, par jēdzienu "sociālais inženierings": "[..]tas droši vien saistīts ar sociālo tīklu veidošanu[..]", par pikšķerēšanu: "[..]zinu, ka tas ar drošību saistīts, kad kāds mēģina… nu lai mani dati nenokļūst nekur, paliek konfidenciāli[..]".

Personas datu apstrādes jomā konstatējams, ka supervizoru informētības līmenis ir zems/vidējs – 36,8% (n=14) atbildēja, ka pilnībā izprot tādus jēdzienus kā "datu subjekta tiesības", 50% (n=19) sniedza atbildi, ka pilnībā izprot jēdzienu "datu subjekta piekrišana", un 71% (n=24) no respondentiem atbildēja, ka pilnībā izprot jēdzienu "informēta piekrišana". Atzīmējams, ka Vispārīga datu aizsardzības regula un tās saturs ir labi pazīstams, un vairāk pazīstams, nekā nepazīstams attiecīgi 34,2% (n=13) un 36,8% (n=14) no respondentiem. Paneļdiskusijā intervētie eksperti atzīmēja, ka normatīvos aktus pārzina vāji, bet atzīst, ka tādas zināšanas būtu nepieciešamas: "Seminārā par datu aizsardzību stāstīja par datu aizsardzību, bet tas nebija ar supervīziju saistīts [..]", "[..]jā, vadlīniju tiešām nav, bet būtu labi, ka tādas būtu, par citu nozaru vadlīnijām es neko nezinu[..]".

Gandrīz puse no respondentiem 47,4% (n=18) neapsprieda ar saviem klientiem attālinātā praksē izmantoto informācijas tehnoloģiju (kiberdrošības) riskus. Vienlaikus atzīmējams, ka 81,6% (n=31), uzsākot attālināto praksi, nebija pierādāmi vienojošies ar saviem klientiem par attālinātās supervīzijas sesijas fiksācijas nosacījumiem, tikai 23,7% (n=9) atspējoja ieraksta funkciju izmantotā programmnodrošinājumā, lai nepieļautu nesankcionēto attālinātās supervīzijas sesijā notiekošā ierakstīšanu/fiksāciju/saglabāšanu, bet 31,6% (n=12) nebija aizdomājušies par tādu nepieciešamību.

Attālinātas supervīzijas sesiju fiksācijas nolūku ar klientiem pierādāmi (sarakstē) apsprieda 7,9% (n=3) no respondentiem. Piebilstams, ka 94,7% (n=36) no respondentiem apgalvoja, ka sesiju ieraksti netika veikti, tomēr tikai 23,7% (n=9) atspējoja ieraksta funkciju izmantotajā programmā. Paneļdiskusijas ekspertu intervijās arī tika atzīmēti dokumentācijas trūkumi: "[..]izmantoju to līgumu, ko piedāvā pasūtītājs, jo bieži vien strādāju ar organizācijām[..]"; "[..]man ir līgums, tur ir atrunāti konfidencialitātes principi… tas, ka neizpaudīšu informāciju[..]".

Anketas nobeigumā respondenti sniedza atbildi uz jautājumu, kādam supervīzijas veidam sniegs priekšroku turpmāk, kur 26,3% (n=10) sniedza atbildi, ka viņiem nav īpašas nozīmes, un tikai 10,5% (n=4) dos priekšroku attālinātai supervīzijas praksei, pārējie (63,2% (n=24)) respondenti izvēlēsies klātienes supervīziju. Minēto apstiprināja arī eksperti, raksturojot savu attālināto praksi: "[..]attālināti strādāt šobrīd ir vajadzība, man patīk kaut to pirmo sesiju klātienē organizēt – ļoti svarīgi redzēt cilvēkus, kamerā tikai galvas redzu[..]"; "[..]attālināto darbu uzveru viegli, citas iespējas šobrīd nav, bet darbu ir jādara[..]".

Vērtējot pētījuma rezultātus, jāņem vērā pētījuma ierobežojumi, proti anketēšanā iesaistījās neliels respondentu skaits, kas savukārt neļauj vispārināt datus, tomēr iegūtie dati raksturo noteiktas tendences. Svarīgi norādīt, ka pētījumā iegūtie dati atbilst Latvijas iedzīvotāju informētības līmenim par informācijas tehnoloģiju izmantošanas riskiem, ņemot vērā pirms pieciem gadiem Eiropas komisijas ekspertu novērojums par stabilu ikgadējo pozitīvo tendenci informētības līmeņa pieaugumā (European Commission, 2015).

Raugoties uz pētījuma rezultātiem no supervīzijas klienta puses, konstatējams, ka klients tiek nepietiekami informēts par informācijas tehnoloģiju izmantošanas (kiberdrošības) riskiem supervīzijas attālinātā praksē. Līdz ar to supervīzijas klientiem var rasties grūtības realizēt Vispārīgā datu aizsardzības regulā viņiem noteiktās tiesības. Pētījuma rezultāti norāda uz nepieciešamību nodrošināt supervizorus ar minimālām normatīvo aktu prasībām un atbilstošu dokumentu kopumu (piemēram, privātuma politikas paraugs), kā arī ir supervizoru profesionālām apvienībām ir ieteicams aktualizēt diskusiju par profesionālo vadlīniju izveidošanu un ieviešanu praksē.

Ņemot vērā minēto, būtu nepieciešams pilnveidot supervizoru izglītības programmas, piemēram, papildinot programmas ar mācību saturu, kur fokuss būtu vērsts uz topošo supervizoru izglītošanu kiberdrošības un personas datu aizsardzības jomās, tādējādi nodrošinot supervizoru izglītību atbilstoši profesijas standartā noteiktajām kompetencēm. Ieteicams veicināt esošo supervizoru informētību par informācijas tehnoloģiju izmantošanas riskiem un personas datu apstrādi, nodrošinot tiem pieejamu un skaidru informāciju par minētiem attālinātās prakses aspektiem un to uzlabošanas iespējām, piemēram, informējot

supervizorus par nepieciešamību nošķirt darba un privātām vajadzībām izmantotās ierīces, sniegt informāciju par konfidenciālās informācijas šifrēšanas iespējām, būtu svarīgi informēt supervizorus par paroļu un drošības iestatījumu regulāra pārskata svarīgumu un nepieciešamību (piemēram, sniedzot informāciju par to, kā pārbaudīt izmantoto paroļu drošumu).

Ņemot vērā, ka aptaujas rezultāti parāda, ka supervizori mēdz iegūt informāciju pašizglītības ceļā, kā arī mēdz dalīties ar informāciju ar saviem klientiem, tai pašā laikā nemēdz vērsties pie attiecīgo nozaru speciālistiem pēc konsultācijas, profesionālām organizācijām ieteicams fokusēties uz īsu, kodolīgu informācijas avotu veidošanu (piemēram, infografika).

Secinājumi
Conclusions

Kopumā secināms, ka izvirzītais pētījuma mērķis noskaidrot Latvijas supervizoru informētību par informācijas tehnoloģiju izmantošanas (kiberdrošības) riskiem un personas datu aizsardzību, COVID-19 pandēmijas radītājos apstākļos ir sasniegts, iegūtos rezultātus attiecinot uz konkrēto izlases kopumu.

COVID-19 pandēmija aktualizēja nepieciešamību pēc attālinātās prakses. Tomēr secināms, ka pašas attālinātās prakses organizēšanas tiesiskais pamats un dokumentācijas noformēšana ir joma, kurā nākotnē nepieciešams veikt atbilstošus uzlabojumus profesionālo standartu un vadlīniju līmenī, kā arī supervizoru un supervīzijas studentu izglītības un profesionālo kompetenču pilnveides līmenī.

Aptaujātie supervizori un studenti, kopumā uz aptaujas laiku bija vāji informēti par informācijas tehnoloģiju izmantošanas (kiberdrošības) riskiem un savā attālinātajā praksē izmantoja tikai pēc noklusējuma pieņemtos drošības pasākumus. Saskatāms, ka supervizoriem pietrūka izpratnes par specifiskiem informācijas tehnoloģiju izmantošanas (kiberdrošības) riskiem, līdz ar to supervizoru vidū pastāv risks kļūt par specifisku, tieši uz attālināto praksi vērsto kiberuzbrukumu upuriem, kā arī ciest no kiberuzbrukumiem, kas balstās uz nedrošu/novecojušu/kompromitēto paroļu izmantošanu.

Ņemams vērā, ka informācijas tehnoloģiju joma strauji attīstās un pilnveidojas, līdz ar to ir nepieciešami tālāki pētījumi šajā jomā, lai objektīvi noteiktu izmaiņas Latvijas supervizoru informētībā par informācijas tehnoloģiju izmantošanas (kiberdrošības) riskiem un personas datu aizsardzību.

Summary

In general, it can be concluded that the aim of the study, to find out the awareness of Latvian supervisors about the risks of information technology use (cyber security) and personal data protection in the conditions of COVID-19 pandemic, has been achieved by applying the obtained results to the sample. Provision of remote services became relevant all over the world, during the 2020 COVID-19 pandemic. Latvian supervisors were also forced to transfer their practice to the digital space as well. COVID-19 pandemic challenges opened a wider range of opportunities for improvement remote practice.

The COVID-19 pandemic highlighted the need for remote practice. However, it can be concluded that the legal basis for the organization of the remote practice itself and the preparation of documentation is an area where, in the future, appropriate improvements need to be made, at the level of professional standards and guidelines.

The surveyed supervisors and students, in general, were poorly informed about the risks of using information technology (cyber security) at the time of the survey and used only general security measures in their remote practice. It can be seen that supervisors lacked a sufficient understanding of the specific risks of the use of information technology (cybersecurity), thus there is a risk among supervisors to become victims of specific attacks aimed at remote practices, as well as to suffer from cyber-attacks based on insecure / outdated / compromised passwords. however further research is needed to find the most effective methods how to improve these competences.

The obtained results allowed to conclude that the COVID-19 pandemic highlighted the need for supervision remote practice, at the same time the research data show that the awareness of Latvian supervisors about the risks of information technology use (cyber security) and personal data protection is medium to low.

The results of the research show that in the education of Latvian supervisors it is necessary to allocate place for the acquisition of information technology (cyber security) risk and personal data protection regulation.

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EVOLUTIONARY ALGORITHMS LEARNING METHODS IN STUDENT EDUCATION

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Abstract. *Teaching experience shows that during educational process student perceive graphical information better than analytical relationships. As a possible solution, there could be the use of package Matlab in realization of different algorithms for IT studies. Students are very interested in modern data mining methods, such as artificial neural networks, fuzzy logic, clustering and evolution methods. Series of research were carried out in order to demonstrate the suitability of the Matlab for the purpose of visualization of various simulation models of some data mining disciplines – particularly genetic algorithms. Nowadays the possibilities of evolutionary algorithms are widely used in many optimization and classification tasks. There are four paradigms in the world of evolutionary algorithms: evolutionary programming, evolution strategies, genetic algorithms and genetic programming. This paper analyses present-day approaches of genetic algorithms and genetic programming and examines the possibilities of genetic programming that will be used in further research. Genetic algorithm learning methods are often undeservedly forgotten, although the implementation of their algorithms is relatively strong and can be implemented even for students. In the research part of the study the modelling capabilities in data mining studies were demonstrated based on genetic algorithms and real examples. We assume that students already have prior knowledge of genetic algorithms.*
Keywords: data analysis, evolutionary algorithms, genetic algorithms, modelling, teaching.

Introduction

Evolutionary algorithms (EA) are population-based metaheuristic optimization algorithms that use biology-inspired mechanisms like mutation, crossover, natural selection, and survival of the fittest in order to refine a set of solution candidates iteratively (Koza, 1992, Weise, 2009).

All EA have three features in common:

1. They use a population of potential solutions to the problem that is to be solved.
2. They judge the quality of these solutions with an objective function and base the selection of surviving solutions on this quality measure.

3.   They have a reproduction stage in which new solutions are constructed that inherit traits from current solutions.

Three basic mechanisms drive natural evolution: reproduction, mutation and selection. These mechanisms act on the chromosomes containing the genetic information of the individual, rather than on the individual. Reproduction is the process how new individuals are introduced into population. During reproduction, recombination or crossover occurs, transmitting to the offspring chromosomes that are common of both parent's genetic information. Mutation introduces small changes into the inherited chromosomes. The fittest individuals are those best adapted to their environment, which thus survive and reproduce.

In EA the term chromosome typically refers to a candidate solution to a problem, often encoded as a bit string. The "genes" are either single bits or short blocks of adjacent bits that encode a particular element of the candidate solution (e.g., in the context of multiparameter function optimization the bits encoding a particular parameter might be considered to be a gene). An allele in a bit string is either 0 or 1; for larger alphabets more alleles are possible at each locus. Crossover typically consists of exchanging genetic material between two single chromosome parents. Mutation consists of flipping the bit at a randomly chosen locus (or, for larger alphabets, replacing the symbol at a randomly chosen locus with a randomly chosen new symbol) (Mitchell, 1999).

The basic cycle of EA is shown in Figure 1 (Introduction, 2011).
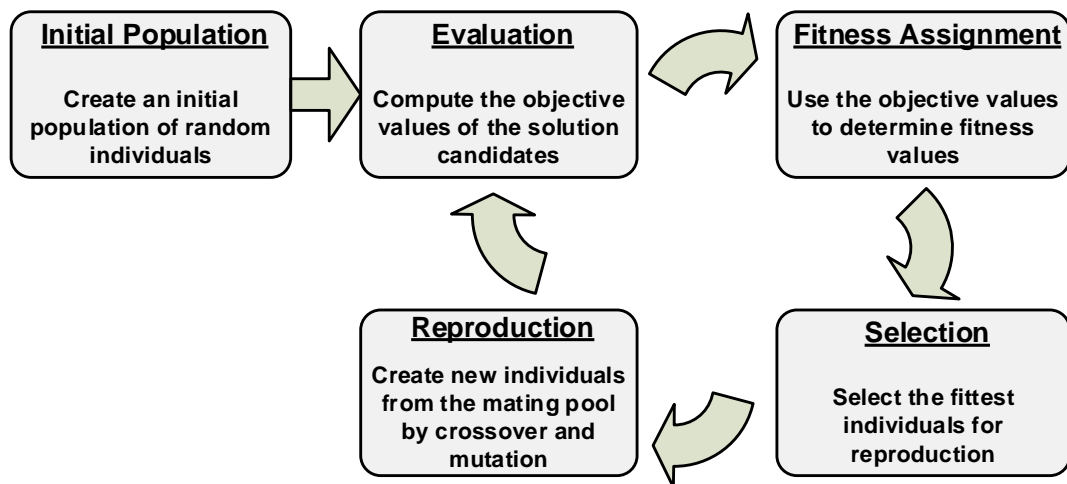
*Figure1 **The Basic Cycle of EA** (Introduction, 2011)*

There are several different types of EA (Weise, 2009). These include:
- evolutionary programming (EP), which focuses on optimizing continuous functions without recombination;
- evolutionary strategies (ES), which focuses on optimizing continuous functions with recombination;

- genetic algorithms (GAs), which focuses on optimizing general combinatorial problems;
- genetic programming (GP), which evolve programs.

The Significance of Genetic Programming

Genetic programming is an automated methodology inspired by biological evolution to find computer programs that best perform a user-defined task. It is therefore a particular machine learning technique that uses an evolutionary algorithm to optimize a population of computer programs according to a fitness function determined by a program's ability to perform a given computational task (Goldberg, 1988, Koza, 1992, Mitchell, 1999).

Genetic programming is a methodology for automatically generating computer programs. Rather than writing programs explicitly, GP applies natural selection and genetic recombination to evolve programs that solve a given problem. GP is founded on the premise that computer programs can be represented as tree structures, as shown in Figure 2 (Haupt, R. & Haupt, S., 2004).
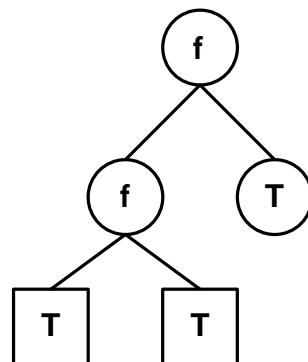
*Figure 2 **Tree Structure Example** (Haupt, R. & Haupt, S., 2004)*

The functions (f) operate on terminals (T) to produce a result. Functions are operations that take one or more arguments. They can be arithmetic (+, *, /), mathematical (sin, cos), Boolean (and, or, not), conditional (if-then-else), looping (for, repeat). Terminals are operations that take no arguments but return a value (variables or constant values).

The main difference between GP and GA is the representation of the solution. GP creates computer programs in the scheme computer languages as the solution. A GA creates a string of numbers that represent the solution. GP consists of the following four steps:

1) Generate an initial population of random compositions of the functions and terminals of the problem (computer programs);

2) Execute each program in the population and assign it a fitness value according to how well it solves the problem;
3) Create a new population of computer programs;
4) The best computer program that appeared in any generation, the best-so-far solution, is designated as the result of genetic programming (Weise, 2009).

GP difference significantly from other evolutionary algorithms in the implementation of the operators of crossover and mutation.

Mutation is performed by randomly selecting a node in an individual tree structure and removing that node along with any sub-tree that may exist below it. A new sub-tree is then generated randomly and "grafted in" at the position where the original node was removed. Example of sub-tree mutation is illustrated in Figure 3 (Introduction, 2011; Buontempo, 2019).
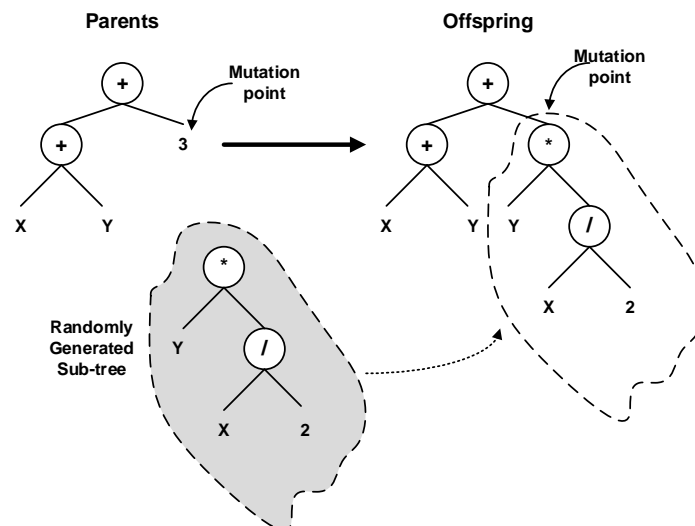
*Figure 3 **An Example of Sub-tree Mutation** (Buontempo, 2019)*

Crossover involves selecting two individuals from the previous generation and selecting a node at random in each of them. The selected nodes, along with any sub-trees that exist below them, are exchanged between the two individuals.

There is no guarantee that GP will find an optimal solution, but a well thought out set of functions with a reasonable fitness test will usually produce good results (Mitchell, 1999, Karr & Freeman, 1999).

Decision Tree Representation for GP

Decision trees and decision rules are data mining methodologies applied in many applications as a powerful solution to classification problems. In general,

classification is a process of learning a function that maps a data item into one of several predefined classes.

A decision tree representation would be able to correctly handle both numerical and categorical values. Numerical variables and values should only be compared to numerical values or variables and only be used in numerical functions. Similarly, categorical variables and values should only be compared to categorical variables or values. This is a problem for the standard GP operators (crossover, mutation and initialization) which assume that the output of any node can be used as the input of any other node. This is called the closure property of GP which ensures that only syntactically valid trees are created.

A solution to the closure property problem of GP is to use strongly typed genetic programming. Strongly typed GP uses special initialization, mutation and crossover operators. These special operators make sure that each generated tree is syntactically correct even if tree-nodes of different data types are used. Because of these special operators an extensive function set consisting of arithmetic $(+, -, \times, /)$, comparison $(\leq, >)$ and logical operators (and, or, if) can be used.

Another strongly typed GP representation was introduced in (Bot & Langdon, 2000). This linear classification GP algorithm uses a representation for oblique decision trees. An example tree can be seen in Figure 4.
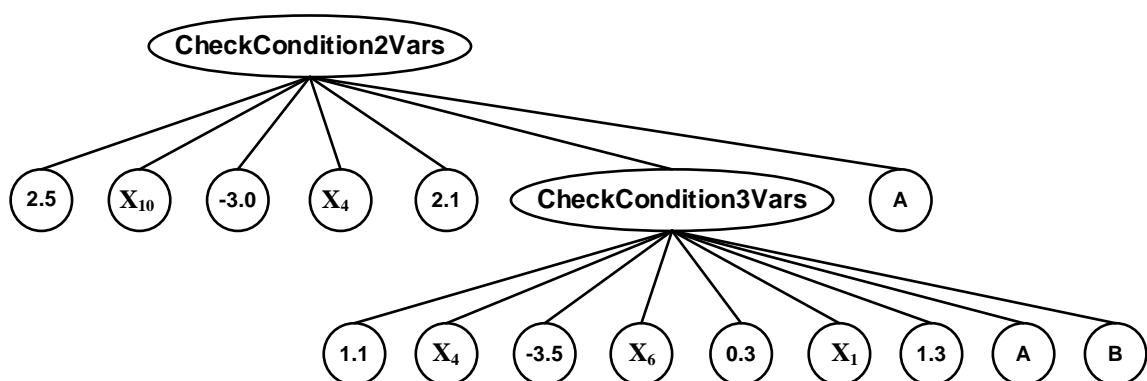
Figure 4 **Example Decision Tree and Its Representation in the GP** *(Bot & Langdon, 2000)*

The leftmost children of function nodes (in this case *CheckCondition2Vars* and *CheckCondition3Vars*) are weights and variables for a linear combination. The rightmost children are other function nodes or target classes (in this case A or B). Function node *CheckCondition2Vars* is evaluated as: if $2.5x10 - 3.0x4 \leq 2.1$ then evaluate the *CheckCondition3Vars* node in a similar way; otherwise the final classification is A and the evaluation of the decision tree on this particular case is finished.

In 1998 a new representation was introduced (Hemert, 1998) - atomic representation booleanizes all attribute values in the terminal set using atoms. Each atom is syntactically a predicate of the form (variable operator constant)

where operator is a comparison operator (e.g., ≤ and > for continuous attributes, = for nominal or Boolean attributes). Since the leaf nodes always return a Boolean value (true or false) the function set consists of Boolean functions (e.g., and, or) and possibly a decision-making function (if − then − else) (Hemert, 1998). An example of a decision tree using the atomic representation can be seen in Figure 5. Input variables are booleanized using atoms in the leaf nodes. The internal nodes consist of Boolean functions and possibly a decision-making function.
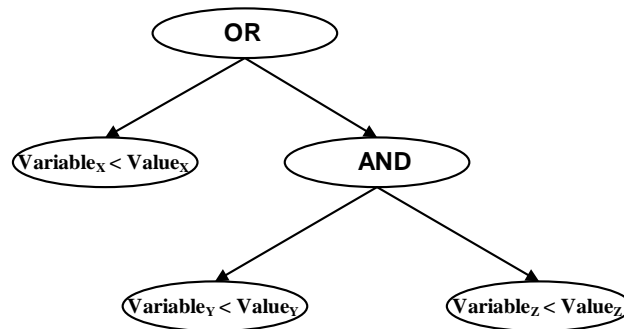
Figure 5 **An Example of a Decision Tree Using an Atomic Representation** *(Hemert, 1998)*

In conclusion there is many different possibilities for the representation of decision trees.

Experimental Part

A function was selected to illustrate GA operation f(x)=x2*sin(x) with minimum: f (-8.0962) =-63.635 for -10≤x≤10 (see Fig. 6). Best cost=-63.635 and best solution=-8.0962.
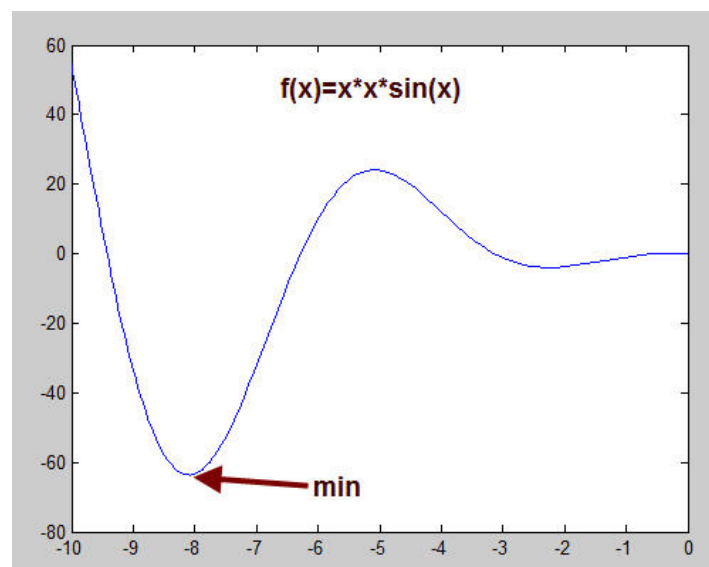
Figure 6 **Test Function f(x)=x^2*sin(x)**

The aim of the experiment was to find the minimum of the function with the help of GA (Grabusts, 2009).The effect of three parameters on the quality of optimization was studied:

1. population size;
2. mutation rate;
3. number of bits in parameters.

In the first experiment, the initial parameters were as follows: mutation rate=0.15 and number of bits=8. In all cases, the number of iterations was 100.

Population size was varied from 2 to 128. Figure 7 shows that the minimum of the function is stably reached in cases when the population size is 8,10,12,14,16. The vertical line shows the optimal population size = 8, the value of which was used below. It was found that further increase in population size does not significantly affect the quality of optimization. Figure 8 shows the cost changes in the iteration process at optimal population size = 8.
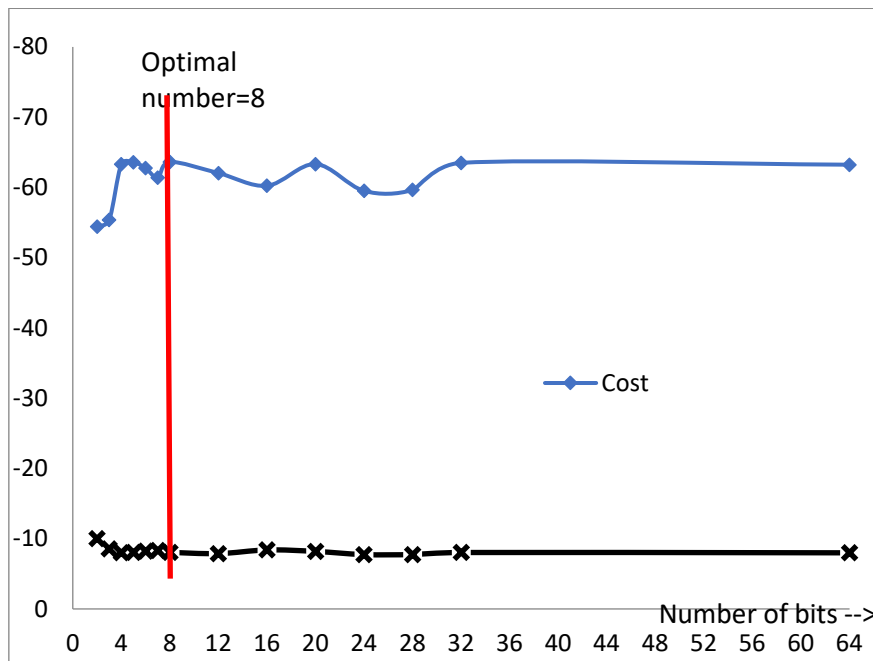
*Figure 7 **Dependence of Cost on Population Size***

The mutation rate was ranged from 0.05 to 1.5. The minimum of the function is stably reached in cases when the mutation rate is from 0.15 to 0.5. The vertical line shows the optimal mutation rate = 0.15 (Fig. 9). It was found that further increase of the mutation rate does not give the optimal result.
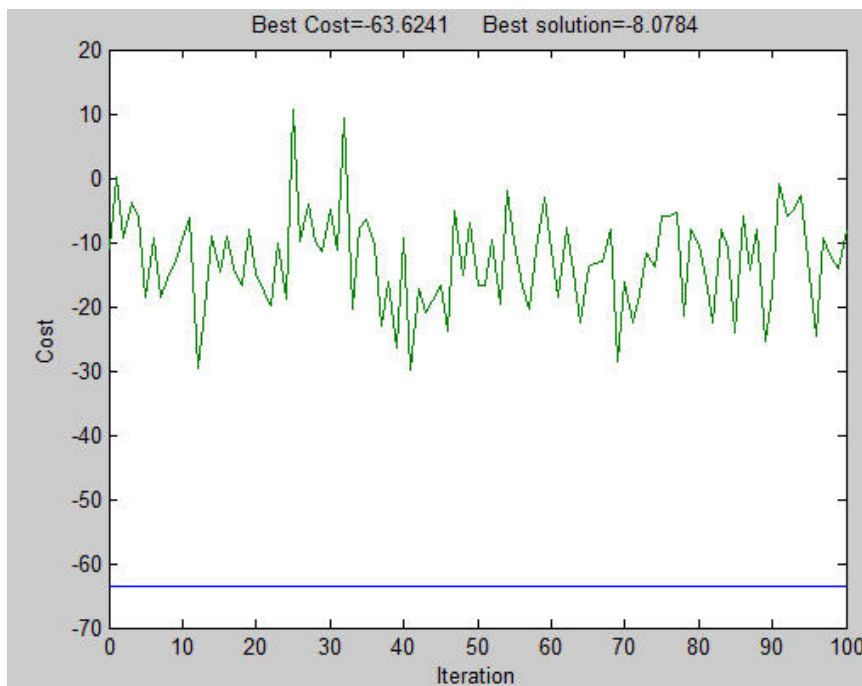
Figure 8 **Best Solution When Population Size=8**
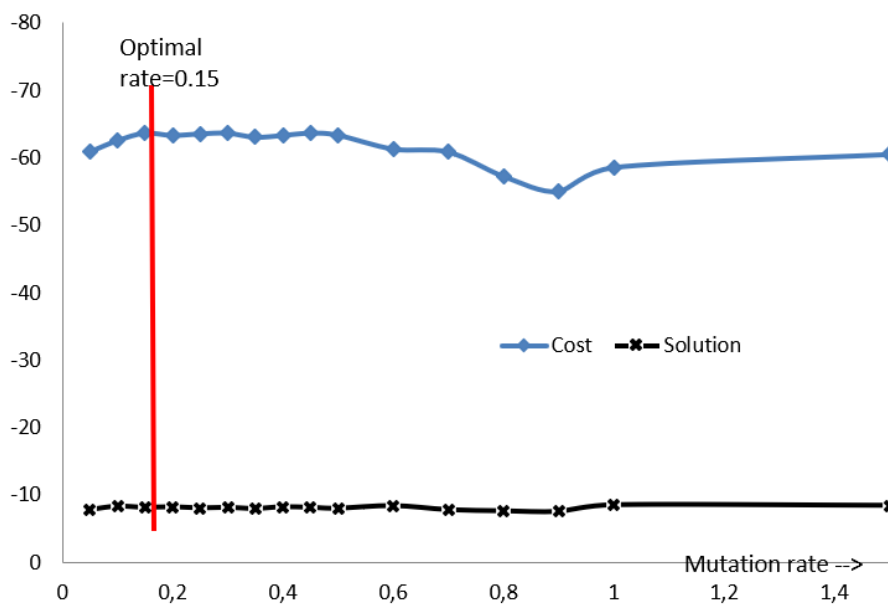
Figure 9 **Dependence of Cost on Mutation Rate =0.15**

The experiments clearly demonstrate the usefulness of GA in solving various optimization tasks for educational research (Grabusts, 2009).

Conclusions

The term GP has two possible meanings. First, it is used to subsume all evolutionary algorithms that have tree data structures as genotypes. Second, it can also be defined as the set of all evolutionary algorithms that breed programs, algorithms, and similar constructs (Gupta & Sinha, 2020).

The main difference between GA and GP is the representation of the solution. GA creates a string of numbers that represent the solution. GP creates computer programs in the scheme computer languages as the solution and individuals are represented as trees.

The main advantage of GP is that it performs a global search for a model, contrary to the local greedy search of most traditional machine learning algorithms. To design the decision tree using GP, everyone is defined as a decision tree, which represents both the genotype and the phenotype.

The methodology investigated in the work will be used in further scientific research for student's investigations that will deal with design the decision tree using genetic programming.

This paper analyses present-day approaches of GA and GP and examines the possibilities of GP that will be used in further student's research. GA learning methods are often undeservedly forgotten, although the implementation of their algorithms is relatively strong and can be implemented even for students in this future scientific research.

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INTEGRATING ONLINE TEACHING ENGLISH AS A FOREIGN LANGUAGE

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Abstract. *Online education/e-learning has been increasingly adopted globally as it has served as the only tool accessible for teachers and students to maintain undisrupted learning during the coronavirus outbreak. The relevance of the article is determined by the need to define effective ways to implement online education in foreign language classes to produce a positive effect on the learning outcome. The purpose of the article is to present ways of providing English-as-a-foreign-language learners with an online course designed in the learning management system Moodle and aimed at enhancing students' foreign language skills. The work uses a logical method (theoretical), the study of the experience of educational organizations and personal pedagogical experience at Pskov Branch of the Academy of Federal Penal Service of Russia (empirical). The study described the diversity of Moodle structure particular tasks, its assessment procedure and present military students' feedback about the impact of the course on their foreign language acquisition, developing learners' autonomy and soft skills. It explored what problems English-as-a-foreign-language learners had with their English language learning and what support they needed to gain the maximum benefits from the online learning environment. The outcome of the online education was a substantial increase in the learners' autonomy and an integrative development of foreign language skills and soft skills.*
Keywords*: e-learning, foreign language skills, Moodle, online education, soft skills.*

Introduction

In line with the global challenge of the 21st century in the form of Covid-19 pandemic higher education institutions and schools around the world face the challenges of carrying forward teaching activities completely online. This paper presents a case study of the process of transmission from face-to-face learning model to quality e-learning within a short period time. Having implemented e-learning into language education context, language teachers of the Faculty of Law of Pskov Branch of the Academy of Federal Penal Service of Russia designed an online course based on the Moodle platform. A set of interactive tasks, quizzes, mid-term and final tests, polls, using various web-services and digital educational tools have been developed and integrated in the EFL education process.

The current research work is aimed at providing an in-depth look at the

situation of EFL teaching and learning in the Russian context during the Covid-19 pandemic by analyzing the impact of the online English course on the military students' foreign language acquisition, developing learners' autonomy and soft skills.

In this study, a survey was conducted in an individualized exchange format to collect data in order to answer the research questions: What problems English-as-a-foreign-language learners had with their English language learning, what support they needed to gain the maximum benefits from the online learning environment, what methods, technologies and digital tools have been crucial in building up of the learners' autonomy and an integrative development of their foreign language skills and soft skills.

Literature Review

In the digital area of the modern world traditional lecture-based education has given way to popular and effectively applied learning models: Computer-Assisted Language Learning (CALL), flipped/blended learning (Bergmann & Sams, 2012), Mobile-Assisted Language Learning (MALL) (Andujar, Salaberri-Ramiro, & Martínez, 2020). The role of digital devices like computers, smartphones, tablets or Personal Digital Assistants (PDAs) applied to foreign language learning imply a number of advantages: providing learning environment to study anytime and anywhere as you like besides the classroom; facilitating real and virtual human interaction; building up language skills and soft skills concerned with abilities to make research and study on your own; developing higher learner autonomy, enhancing students' participation and motivation in educational process.

In fact, electronic learning (e-learning) relies on the models like The Computer Assisted Language Learning (CALL) and is a key component of courses offered by educational institutions worldwide nowadays. E-learning refers to a distance learning process which involves many aspects of the information society (Kakoty, Lal, & Sarma, 2011). Although e-learning does sometimes refer to blended learning, or a combination of online and face-to-face teaching, it is generally seen as the specific development of distance education using information and communication technologies (ICT) to deliver education to remote learners (Vaona et al., 2018). E-learning is a pedagogical tool which promotes more individualized, active and cooperative learning. Knowledge is no longer transferred from an authority but constructed within an open, changing and dialogic context, enabling the development of the collective intelligence (Levy, 2000). It was found that a huge array of resources can be of help for teachers and learners to gain their knowledge in an open context of virtual learning environment (VLE). The open schools (e.g. India's National Institute of

Open Schooling; the New Zealand Correspondence School) and open universities (e.g. The UK Open University; Athabasca University, Canada) can provide the variety of high-quality available courses and greater flexibility in the use of time and resources to help students get back on track (Daniel, 2020). Furthermore, teachers discuss the advantages of incorporating digital educational tools such as web-services: Quizlet, Learning Apps, Wiser.me, WordSift to the educational process, which provide students with means to master professional English and operate it successfully in future professional activity while communicating and collaborating with foreign colleagues (Perevalova, Resenchuk, & Tunyova, 2020). Additionally, researchers have proven positive students' learning experience and technological acceptance of a blended learning model through mobile devices (Andujar et al., 2020; Yu, Ally, & Tsinakos, 2017; Hsieh, Wu, & Marek, 2017). It was noted that social platforms like Facebook, Twitter, Whatsapp, YouTube, and Instagram have become the refuge of teachers and students during the last years. However, there are many educational platforms like Moodle which bring the same services to the learners but in an academic setting. Current surveys also point out that in vocational schools, ICTs (electronic courses within the Moodle platform in particular) could be used for activating and facilitating teaching and learning, saving time, and promoting individualized student-centered learning when compared with traditional teaching (Shamim & Raihan, 2016).

Moodle LMS is one of the best known virtual learning environments used at European universities that enables teachers to provide both Face-to-Face (FtF) teaching and online learning. One of the benefits of VLE is that it affords students to access the course material at any time, which especially suits part-time students who are motivated by the instant feedback provided by online assessments. VLE includes a number of various tools, such as email, chat, discussion boards, etc. It also involves testing through specially designed tasks (Bielousová, 2020).

It was found that many online teaching platforms, techniques, and novel approaches are widely accessible to students who undoubtedly benefit from the fast acquisition of knowledge and information (Huang, Chen, & Lin, 2009; Boćković, Gajić, & Tomić, 2014; Bielousová, 2020). Furthermore, the results of the latest research (Bielousová, 2020; Bilotserkovets & Gubina, 2019) demonstrate that applying e-learning technologies into the process of teaching languages has proven to be successful, as they contribute to the development of special language competencies within the context of special disciplines.

Nevertheless, relevant research concerned with the integration of e-learning in educational process shows that virtual learning environment encounters a lot of negative attitudes on the part of students (Bilotserkovets & Gubina, 2019; Zhang, 2019).

As S. Zhang noted, self-regulated learning (SRL) is especially important in blended/flipped learning environments (Zhang, 2019). Furthermore, e-learning environment is based on the concept of self-regulated learning and is considered to be a set of proactive processes that students use to acquire learning skills, such as setting goals, selecting and using strategies, self-monitoring effectiveness of learning, and self-evaluating the learning outcomes. Therefore, SRL plays a critical role in students' learning and is key to the question of how students become masters of their own learning (Zimmerman, 2008). In the study of the use of SRL in a specific language learning context (Zhang, 2019) is concluded that the students had different problems in flipped/blended learning environments, and they would maximally benefit from online education if they had the opportunity to learn and incorporate SRL strategies such as goal-setting, planning, monitoring, and self-reflecting to facilitate their learning and improve their acquisition of the language.

Based on the research, despite the fact that implementation of e-learning model has not always proved its effectiveness clearly, the researchers involved in e-learning consider e-learning model to be the right way for further investigation to be done in the field. Thus, our study of virtual e-learning environment is aimed at defining and testing possibilities of the academic platform Moodle and other digital tools to develop and improve learners' special language competencies and soft skills, help them structure their learning environments to reduce distractions and reflect upon every step of the learning process in order to improve their SRL continuously.

Methodology

To analyse the effectiveness of the implemented online course of English, a set of research methods has been used, including: 1) theoretical analysis of pedagogical, socio-psychological, scientific-methodological and special professsional literature on the problem of research; 2) empirical questioning, testing and pedagogical experimenting. This method is used to determine the current state of foreign language communicative skills formation of future lawyers, and to verify the effectiveness of the online course introduced in the educational process; 3) methods of mathematical statistics. This uses statistical data processing for displaying information and for processing pedagogical experiment data and visual demonstration of experimental results. A sample of 20 first-year military students from Pskov Branch of the Academy of Federal Penal Service of Russia, the Faculty of Law was investigated with an opinion poll regarding their perception about the problems that the transition of the entire teaching-learning activity in the online environment raised for them. The pedagogical experiment took place in the period since February 2020 till June 2020.

Research Results

The aim of the online course is to prepare military students to be ready for daily and professional communication in English at B1 and B2 level in accordance with the Common European Framework of Reference for Languages and the Federal State Educational Standards for Higher Education for the program 40.03.01 Law (Qualification (degree) bachelor).

As there is no Face-to-Face mode of learning, students face a new challenge in the form of virtual learning environment, where they start learning with a teacher giving stimuli, recommendations and comments on their work via chat or forum in Moodle or WhatsApp. To make this start easier, we introduced a questionnaire to find out the students' attitude towards the prospect of studying English at the Law faculty of Pskov Branch of the Academy, asked students to list in what spheres they could use English and also tested their level of English.

Having analysed military students' responses, we could infer that they were motivated to learn English intensively, since they understood clearly that the English language acquisition was required for successful communication and it would be useful in further professional practices. However, only 20% of the respondents stated that they referred to linguistic dictionaries and reference books in learning English, while 25% read authentic texts and listened to podcasts during training, which is not an optimistic fact.

The second part of the survey contained questions about the problems which students faced in English language learning and about the self-regulative strategies in learning.

Having analysed the students' answers, we found out that 70% of the students had problems with grammar patterns and 90% with listening part and, as they felt frustrated, 50% of the students postponed the task and 10% of the students neglected the task as it was too difficult for them.

Thus, the first stage of the experiment demonstrated that the problems of foreign language communicative competence forming and self-regulative strategies development had to be addressed in the online course.

As we had to stop off-line education and proceed with an online course in Moodle, we conducted an experiment in two groups of first-year military students majoring in Law. In an experimental group (N=20) new informative and communicative technologies, project method and case-study technology were used while the other students (N=18) had e-learning classes based on the traditional methods of teaching. The pre-test on English in both groups showed the foreign language communicative competence formation of first-year students was mostly of the medium and low levels.

The experiment lasted for a term. For the experiment we have chosen the following themes: "Government system of the English-speaking countries",

"International cooperation of the police", "Alternative Sanctions". All the military students studied the same themes. The purpose of the experiment was the integrative development of the learners' English language skills and soft skills which correspond with the foreign language communicative competence and synchronous development of their self-regulative strategies which was reflected in methodological structure of the online course and its contents.

The materials on the Moodle were grouped by themes and divided into three blocks: regulative, training and assessment/score. The regulative block contained syllabus of the course with detailed description of the aim and structure of training, internet resources and e-books, assessment criteria, examination requirements, news. The training block had a thematic structure of modules which included the name of the theme, theoretical multimedia presentations and videos, a variety of learning tasks with deadlines, exercises, projects, case-studies with applied references on the internet resources (sites, videos, texts), tests, quizzes. The assessment/score block was an effective tool to see how well the students progressed in their studies.

While speaking was one of the most difficult aspects of English to be improved within the online course in the Moodle, we decided to use WhatsApp for oral communication with students. It was both group work and individual sessions with each of the students.

Taking into consideration that e-learning implies students' autonomous learning, we have specified technologies that would emphasise military students' ability to accumulate knowledge through discourse, discussion, sharing of perspectives and sources, analysis of resources from multiple sources, and teacher's feedback. Having analysed numerous pedagogical technologies, we came to the conclusion that the use of information and communication technologies, integrative technologies like project method and case-study technology would enable learners to become participants of their quasi professional activity, enhance in-job training of future lawyers.

The education process of teaching English as a foreign language is content-based and relies on different teaching methods. One of the most effective tools for legal education is the technology of case-study which implies the design of learning cases/problem issues, tasks which are offered to students to be solved within the educational process of a certain subject. Case-study technology and project method are known to be integrative technologies which should be used in classes of English at the final stage of studying a theme as they require student's independent work and sufficient knowledge in the area of studies to be able to conduct autonomous research and analyse information.

While studying the theme "Alternative Sanctions" students were provided with texts, exercises and tests in Moodle. The next home assignment was to read the script of the video "Judiciary Now: You be the Judge - Sentencing Scenario

for Students" on the site youtube.com, study the vocabulary and complete a few tasks to check the understanding of the video content. The subsequent step after the discussion of the script via WhatsApp and chat in Moodle was watching a video. As watching video followed reading for details and discussion of the problematic issues, it caused no difficulties for the students and was enjoyed by them.

Then the students were offered some practical cases, related to certain moral and ethical issues: murder, committed by a teenager and continuous teenager's abuse, assault and battery, committed by his mother, murder, committed in the heat of passion and so on. To be ready for the discussion of the given practical cases in class, the students were divided into two groups- those who were for traditional long-term sentences and those who were for alternative sanctions. Both groups were asked to give comments on the crimes and propose proper sanctions for offenders. At the class the first group was asked to present their views on one of the issues and provide their arguments. The second group was to follow it and provide their counter arguments. As soon as the arguments were downloaded into the chat/forum system, discussion via WhatsApp took place where the students debated and had a real talk on the matter.

The teacher's role was limited to providing help in case of misunderstanding, correcting if there were errors in communication and commenting on the rules of communication, if needed, summing up and reflexing at the end of the class.

Practical cases concerned with the theme: Government system of the English language countries were represented by biographies of different people. To solve the case one needed to analyse the provided information about notable candidates to run for president and choose the appropriate person. Students had to write their ideas and argumentation for a candidate in chat/forum. Then communication was switched into group talk via WhatsApp format where students could express their arguments and listen to each other. The teacher's role was to help students in their talk, read the chat and give comments and correct students' speech and messages.

Another innovative technology aimed at developing person's talents and abilities is the project method. The project work on the theme "International police cooperation" implied autonomous students' analysis of different types of crime which are investigated by the international police force like Interpol. The students were asked to make research in the provided web resources and make a short presentation of a certain type of crime and the police activities to stop and prevent it. As a result of this work students could share their multimedia presentations, peer review them and choose the most original and interesting one.

The introduction of modern forms of Edutainment which is the combination of education and entertainment into the e-learning system is a prerequisite of successful education as it helps to create a comfortable background in the process of learning, turning it into action, mock role play in which not only a teacher takes part, but all the students participate in it. This is what edutainment is. Therefore, apart from project method and case-study technology, we used Quizlet, an entertaining learning resource which creates interactive learning tasks.

To see the results of the experiment and assess the formation of the foreign language communicative competence in its four aspects (writing, speaking, vocabulary, grammar), experimental and control groups of students were offered sets of 10 questions (tests, communication tasks) for each selected aspect. The level of the foreign language communicative competence, achieved by the military students, was measured on a 10-point scale. Accordingly, the intermediate score is a reflection of the number of correctly completed tasks within each of the aspects of the foreign language task. The final score was formed as a grade-point average (it is also the calculated grade-point average in our case, since the authors considered the contribution of each of the aspects to be equivalent). The results of the experiment are presented in Tables 1-2.

Table 1 **The Measurement Results on the Themes**

Foreign language aspects	"Government system of the English speaking countries"		"Alternative sanctions"		"International police cooperation"	
	Control Group	Experimental Group	Control Group	Experimental Group	Control Group	Experimental Group
Writing	8,8	9,6	8,5	9,5	8,4	9,5
Speaking	7,5	9,1	7,2	9,2	7,9	9,4
Grammar	8,6	9,6	8,4	9,3	8,5	9,5
Vocabulary	8,4	9,1	8,6	9,7	8,3	9,4
Final Score	8,3	9,3	8,2	9,4	8,3	9,4

Table 2 **Summary of the Experiment Results**

Themes	Grade-point average of the control group	Grade-point average of the experimental group
"Government system of the English speaking countries"	8,3	9,3
"Alternative sanctions"	8,2	9,4
"International police cooperation"	8,3	9,4
Final Score	8,3	9,4

While observing students' work in Moodle on different cases, projects, quizlet tasks, we noticed that students demonstrated higher activity in virtual classes, which indicated an increase in motivation and interest. The level of readiness for virtual classes had increased. As feedback, we used a survey in the form of a questionnaire: 1. Were you interested in the material presented in the form of case-study, project work, quizlet? 2. How useful is this experience of learning with the help of case-study technology, project method, quizlet? 3. What did you personally get from learning based on the case-study technology, project method, quizlet? 4. What difficulties did you have during your studies based on the case-study technology, project method, quizlet? Students were asked to give answers on a five-point scale, where "5" – the highest degree of interest, etc.,"1" – the lowest degree. For ease of analysis, the data were transferred to a dichotomous scale: 4-5 points – a high level of interest, etc., 1-3 points – a low level of the interest. The results of survey indicate a high level of interest in the case-study technology, project method and quizlet. All respondents of the experiment expressed the firm belief that the experience they received would be of help in their future studies and professional life.

Reflecting on the problems which the students had in e-learning, they noted that it was difficult to organize their own studies as there were no face-to-face classes, but thinking about disadvantages of not completed home assignments and low academic grades and thanks to the teacher's emotional support and feedback forced them to change their strategy of learning: military students have learnt to be more self-organized and thoughtful about time management, plan studies and keep moving and achieving results, they have also tried to be more cooperative working in a team. Such soft skills as self organisation and cooperation were of great help to the learners and were developed in e-learning environment synchronously with the foreign language competence.

Comparing the level of foreign language communicative competence in both groups, the higher level of the foreign language communicative competence was formed in the experimental group. Thus, we have come to the conclusion that e-learning environment, based on the concepts of Edutainment, Self-Regulative Strategies of learning, communicative approach and in-job training can be effectively applied in foreign language teaching.

Conclusions

Integrating online teaching English as a foreign language into the educational process has become a challenging task for both teachers and students as both groups had to adopt to a new virtual learning environment.

E-learning environment, based on the concepts of Edutainment, Self-

Regulative Strategies of learning, communicative approach and in-job training, has proven to be effective in foreign language teaching.

Purposeful inclusion of Edutainment technology resources in the e-learning environment as a motivational component allowed to increase the motivation of students to study in a distance format, which directly affected the formation of military students' foreign language communicative competence and soft skills.

A set of interactive academic tasks and the limited time for their fulfillment accompanied by the teacher's feedback on the students' academic progress and the warm and friendly atmosphere created by the teacher's stimuli contributed to effective and continuous development of military students' self-regulative strategies and formation of the communicative competence.

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FEATURES OF THE USE OF ICT IN SPEECH THERAPY PRACTICE OF PRESCHOOL INSTITUTIONS

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Abstract. *Today, an important part of work in a preschool institution is working with children with disabilities in the development of speech. Since the formation of speech skills in children at this age has a number of features and requires attention for further socialization and self-realization of the child.*
That is why in the article we analyze the state of modern psychological and pedagogical research on the feasibility and prospects of using information and communication technologies in the practice of speech therapist, in particular, in preschool educational institutions. As part of a study conducted based on the work of speech therapists in a preschool institution and a private educational organization – a speech club, we established that information and communication technologies are able to provide computerisation and high efficiency of the process of the development and speech correction of children with speech impairments. Obstacles to the introduction of such technologies into the practice of speech therapy are identified and ways to overcome obstacles and difficulties in solving the problems of computerisation of the speech therapy process are presented.
We have proved the increase of effectiveness of the speech therapy process as a result of remote interaction of a speech therapist with teachers, parents and the public using ICT.
Keywords: *information and communication technologies, preschool education, speech therapy.*

Introduction

In the modern world, it is difficult to imagine a sphere where information and communication technologies are not used. Digitalization and computerisation have become an integral part of all processes of human life, in all areas of development. In addition, these modern concepts have influenced one of the most «stable» systems – education.

Teachers should not only master the technical means of learning and start using technology to organize the learning process. They need to integrate technology into all teaching processes. In each lessons they should be used a

demonstration of materials on the technical means. Some exercises children can perform by using gadgets. Some parts of the work in the classroom they can carry over and do online.

However, in our research we did not focus on educational issues, but turned to the issues of the gradual introduction of ICT into the corrective processes of accompanying logopedic support of children with disabilities, in particular children with speech disorders.

In addition, since we have to provide logopedic services as early as possible, our main issues are addressed in the case of speech therapists in pre-school education. The priority areas for improving the quality of speech therapy services in the practice of preschool educational institutions are:

- Awareness of perception, principally the acquisition of new skills teaching speech therapy that meets today.
- Readiness to use information and communication technologies as an auxiliary developing therapeutic, learning and educational resource.

Based on current trends, we identified the following problems for research:

- Identify obstacles to the implementation of ICT in the practice of speech therapy.
- Identify the main ways to overcome obstacles and difficulties in solving the problems of computerization of speech therapy process.
- Present the results of increasing the efficiency of using ICT in speech therapy practice of preschool institutions.

The object of our research – speech therapy practice of preschool institutions.

The aim of the research is to analyze the increase in the effectiveness of the speech therapy, and a result of the remote interaction of a speech therapist with teachers, parents and the public using information and communication technologies.

The main research methods: study and analysis of current research, exchange of experience on the use of ICT in speech therapy practice work in preschools; interviews and research in practice of the experience of using remote cooperation of a speech therapist with teachers, parents and the public to increase the effectiveness of these processes.

Methodology of Research
General Background of Research

Today, an important part of work in a preschool institution is working with children with disabilities in the development of speech. Since the formation of

speech skills in children at this age has a number of features and requires attention for further socialization and self-realization of the child.

That is why in the article we analyze the state of modern psychological and pedagogical research on the feasibility and prospects of using ICT in the practice of speech therapist, in particular, in preschool educational institutions.

In our research, conducted with speech therapists in preschools and private organization LogoClub™, we established that information and communication technologies are able to provide information and high efficiency of correctional development of children with speech disorders. Identified barriers to introduction of technology in the practice of speech therapy activities and our thinking about ways to overcome obstacles and difficulties in solving the problems of informatization process of correction.

The Theoretical Background

Problems of computerisation of education require comprehensive fundamental research on the processes of creating and using ICT tools. This is due to the rapid development of technology, the emergence of not only new electronic tools and resources, but also new technology platforms, tools that change the understanding of the infrastructure of the organization of the learning process and its information content (Shyshkina, 2012).

Firstly, under the computerisation of education in modern society, it is customary to consider a set of interrelated organizational and legal, socio-economic, educational, methodological, scientific, technical, production and management processes. These processes are aimed at satisfying the information, computing, telecommunication needs (and other needs associated with the implementation of ICT) of the participants in the educational process. And also for those who manage and provide these processes, including their scientific and methodological support and development (Bykov, 2010). Thus, we can indicate that the issue of computerisation of the correction process, namely, speech therapy activities, is also an integral part of the modernization of education in preschool institutions.

Secondly, as practice shows, many speech therapists, despite the possibilities and advantages of using ICTs, continue to rely on traditional methods of speech development in children, including in matters of interaction with parents, other specialists, and the public. Most often, conducting individual conversations, speaking at parent meetings, collecting and sharing data through notebooks of joint observations (Korol, 2016). This significantly reduces the role of the family and others in the formation of the «correct» speech in the child and creates barriers to quality communication.

Thirdly, it is a matter of professional competence of a speech therapist. In part, the issues of organizing speech therapy work can be attributed to the issues of inclusive education – working with children with special educational needs. So, according to Kolosova, Khilya, Sarancha (2019), communicating with children with disabilities on the principles of humanism, tolerance and partnership forms specialists' own approaches to cooperation, reflection and empathy. It also affects the development of personal qualities and professional skills, enriching the cognitive-informational and value-personal sphere of speech therapist.

At the same time, for our research, an important element of high-quality work on the formation of the correct speech of the child is work with parents and carriers. Since these are the «first» teachers and role models, which form the image of the child's self-realization in life.

The work of a speech therapist in this direction makes it possible:

- systematize, think through a focused set of work for a speech therapist and all related interactions;
- create quality support for the teaching staff in the correction processes for the diagnosis, correction and prevention of speech disorders in preschool children;
- create the necessary conditions for interaction with parents to improve the results of corrective developmental activities and increase the «level of tolerance» of society (Korol, 2018).
- For the pre-school educational institution, an important stage in computerisation is the successful creation of a unified information environment in accordance with the following conditions (Tsymbaliuk, 2012):
- providing computers of all blocks of the information space;
- development of motivation for the use of information systems by each of the performers in their area of work;
- providing advanced training in the field of information technology for all employees;
- distribution of the total volume of implementing information;
- organization of a local network in the institution;
- multimedia office equipment;
- providing free access to the Internet;
- organization of the exchange of experience in the preschool institution.

However, at the same time, we need to note that it is rather difficult to fulfill the above conditions immediately and in full. Thus, the speech therapist's willingness to attract and implement ICT in his practice becomes an important element, especially with regard to the introduction of promising technologies

such as cloud computing, adaptive information and communication networks, virtual and mobile training, etc. (Shyshkina, 2012). So, to work directly with the parents of a child with speech disorders, you can use:

- the Internet, which allows «active» parents to independently find the necessary information in various information sources (on websites, blogs, etc.), as well as establish personal contacts;
- email – provides the opportunity to correspond with a speech therapist, ask questions and receive answers to them, discuss current problems and organizational issues;
- social networks – provide various ways of exchanging information, in particular correspondence (as well as chat), watching videos and images, listening to audio recordings, etc.;
- videoconferences (video bridge; video seminar; webinar; Skype connection) – allow you to «gather» at the appointed time in the virtual classroom and work in much the same way as during a regular seminar or training, perform tasks of a speech therapist and ask each other questions;
- online consultations – provide an opportunity to ask and receive answers to questions, discuss current problems in real time;
- thematic blog – provides access to a selection of information materials that are regularly updated by a specialist – the author of the blog;
- forum – provides an opportunity to discuss a specific issue by sending messages, read and respond to messages from participants;
- SMS messages – create opportunities for informing on a specific occasion (Bielienka, Derevianko, Kudykina, 2012; Khilya, 2018; Korol, 2016; Sadova, 2012).

All the proposed mechanisms of cooperation allow you to «start» the mechanisms of empathy. That is, include empathy among the participants, reflection, which provide family members with awareness of their own preferences and personality characteristics (Lazarenko, Khilya, Kolomiiets, 2017).

Sample of Research

We have proved the effectiveness of the process of corrective development as a result of remote interaction of a speech therapist with teachers, parents and the public using information and communication technologies.

Problems of the research:
1. To identify barriers to the implementation of ICT in speech therapy practice.
2. To outline the main ways to overcome obstacles and difficulties in solving the problems of computerisation of the correctional development process.
3. Present the results of improving the effectiveness of the correctional development process using ICT.

Results of the Research

The results of the pedagogical experiment presented in this paper are part of a research that was conducted in 2017-2018. That also was the basis for further development and is being implemented in the Vinnytsia region (15 districts and the city of Vinnytsia) of the next stage of the research, which continues to this day.

We selected 20 speech therapists from preschool educational institutions of the city of Vinnitsa and Vinnitsa region. The experience of each of them was at least 5 years. All of them underwent interviews as part of joint training and advanced training. Thanks to this, we were able to determine that individual consultations, individual meetings with parents of children and parent-teacher meetings occupy more than 80% of the time allocated for a speech therapist. Which quite strongly influences the formation of the «policy» of ICT in the correctional development work with children with varying degrees of speech impairment. During the interview, it was revealed that in the process of interaction with the parents of a child with speech impairments, speech therapists use the capabilities of ICT at a fairly low level (Table 1).

The survey of participants showed that among the biggest *problems in the organization of communication in the correctional development process using ICT* are the following:
- Parents prejudice to the quality and effectiveness of such cooperation – 19 people;
- Lack of skills of ICT use in speech therapists, in some cases even basic – 16 people;
- Lack of quality Internet or gadgets that could provide such interaction (both speech therapists and parents of children) – 4 people.

We have chosen only the main «excuses» for the introduction of ICT in the practice of working with children with speech disorders. It is possible to note separately among answers*: «Parents do not trust gadgets to children», «The Internet is only a toy», «It is better to work in an office where you see the child and what she does»*, but all of them are somehow connected with the main ones.

Table 1 **The Results of an Interview with Speech Therapists on the Use of ICT in the Process of Organizing Interaction with Parents to Improve the Results of Corrective Developmental Classes**

№	Type of interaction using ICT	Percentage of respondents using speech therapy practice				Comment
		Before training		After training		
		Use	Do not use	Use	Do not use	
1.	Internet	4	16	18	2	Redirect to YouTube channels, handout sites
2.	Email	19	1	20	-	For organizing joint events
3.	Social networks	11	9	15	5	For organizing joint events
4.	Video conferencing	-	20	19	1	-
5.	Online consultation	-	20	18	2	-
6.	Thematic Blog	1	19	18	2	-
7.	Forum	3	17	20	-	Mostly professional in Viber or local «talkers»
8.	SMS messages	20	-	20	-	-

To overcome these problems, we have *proposed* to use two next steps:
- Conducting an information campaign on social networks for parents and professionals, which included the organization of live broadcasts and working meetings with the coach on Instagram, and their distribution on the Internet;
- Training of specialists on the peculiarities of the use of ICT in their work.

Based on the feedback on the results of the information campaign and training, we were able to note that speech therapists were able to improve the quality of the correction process and effectively use ICT in their daily practice.

We also presented a comparison of the use of appropriate ICT tools by speech therapists after training (Table 1). What is important, in our opinion, since during the courses the features of their use were disclosed in more detail, as well as a number of non-standard technical solutions with the participation of programmers and IT specialists. The results have partially changed for the better, however, the workload of the main responsibilities and the time frame at the moment negatively affected the results of the repeated interview, since the data have changed insignificantly. However, in accordance with the plan for

conducting this training, after three months a follow-up interview is planned, the results of which will work for the long term.

Thus, in our opinion, in preschool educational institutions, educators and methodologists should use such forms of work with speech therapists that are aimed at improving their qualifications and skills with the involvement of specialists. And, also such forms of work during which teachers in practice will be able to test the options for using ICT. Among such events can be noted: weeks of pedagogical excellence; master classes; pedagogical workshops and mentoring; workshops; work in pairs; thematic workshops; sharing best practices (Bielienka et al., 2012).

Conclusions

1. As a result of the research, we identified and described a number of obstacles to the implementation of ICT in speech therapy practice, which mainly concern the readiness and understanding of the mechanisms for using individual technologies. We also examined the issues of appropriate training of specialists to overcome obstacles and difficulties in solving the problems of computerisation of the process of correctional development, and, also identified positive trends that directly affect the correctional-developing component of speech therapy classes.
2. We were also partially able to present the results of preliminary testing of advanced training of speech therapists to increase the effectiveness of the process of correctional development of the child with speech disorders using ICT.
3. Since the selection of speech therapists for interviewing was quite limited in the framework of the training (20 respondents), we believe that it is necessary to continue the analysis of the situation with the introduction of ICT in the work of specialists in this area, as well as the need for appropriate training courses for speech therapists practicing more than five years.

Thus, we came to the conclusion that the issues of studying and finalizing the features of the use of ICT in the speech therapy practice of preschool institutions need to continue to be studied and developed in accordance with modern trends.

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DEVELOPMENT OF STUDENTS' COMMUNICATIVE CULTURE VIA ONLINE FOREIGN LANGUAGE INTERACTION

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Abstract. *The article focuses on the use of digital technologies in the foreign language learning process and the formation of students' communicative culture via online interaction. The issue discussed in this paper is very urgent because nowadays digital technologies are viewed as a comprehensive means of teaching a foreign language in a higher educational institution. General cultural competency and communicative culture, particularly, are considered as an integrative quality of a specialist concerning his potential for self-realization in his future career. In this regard, the actual problem is the methodically correct organisation of the educational process for students' cultural development on the basis of digital technologies. The research is aimed at the theoretical substantiation of pedagogical effectiveness of the organization of online training in foreign language communication as a condition for the formation of the communicative culture of undergraduate students as well as the generalization of the results of experimental training. To verify the productivity of digital resources in foreign language training and cultural development of university students the authors conducted a pedagogical experiment using theoretical and empirical methods of scientific research. The results of the experiment proved the effectiveness of online teaching in mastering communicative culture components.*
Keywords: *communicative culture, digital technologies, foreign language training, non-linguistic students.*

Introduction

Modern tertiary education is aimed not only at training a highly professional specialist but also at developing his personality, unveiling his potential, growing his self-awareness, searching for the ways of his self-realization. Communicative culture is one of the most important aspects of

students' self-realisation. The pedagogical community is currently paying special attention to the problem of forming communication culture. Modern requirements for the student's personality presuppose mastering a high level of communicative culture, which allows for effective communication in a multicultural world. The issue is also topical due to the need to create an information-subject environment and to form information literacy as a key competence of a university graduate.

However, we have to admit the fact that the level of communicative culture of the majority of non-linguistic undergraduates leaves much to be desired.

In this regard, the use of Internet services and electronic educational resources, in our opinion, provides an intensification of the language training of students, improves its quality, promotes the involvement of students in foreign language communication in their familiar information environment and contributes to the formation of productive communication skills and information literacy.

The goal of our study is to identify the effectiveness of the organization of online training in foreign language communication as a condition for the formation of the communicative culture of undergraduate students as well as to generalize the experience of integrating information and communication technologies into foreign language teaching of undergraduate students of Pskov State University.

The object of the research is the process of foreign language training of students of non-linguistic areas. The subject of the study is online teaching as a tool for the development of communicative culture of undergraduate students of non-linguistic training areas.

To substantiate the relevance of this research, the theoretical and empirical methods were used. As for theoretical research methods used, an analysis of the scientific and pedagogical literature on the problem, system analysis, and synthesis were used.

Practical realization of using information and communication technologies (ICT) in online foreign language communication was implemented within the framework of the pedagogical experiment. So, the empirical part of the study was to generalize the experience of developing speech skills and culture of communication while integrating ICT into the process of teaching a foreign language, as well as to organize, conduct, process and interpret the results of experimental training using methods of observation, interviewing, testing and analysis of the products of students' speech activity.

The Theoretical Background

According to the Federal State Educational Standards (Pravitelstvo RF, 2019), a university graduate has to master a certain number of professional and general cultural competences among which developing the culture of communication is a priority. If the formation of professional competency is in the focus of the training programs in fundamental sciences and subjects of specialization, the task of mastering communicative culture is accomplished first of all by virtue of humanistic education.

Among all the humanities disciplines taught at the university, it is foreign language education that does much to develop communicative culture of a student, the explanation being contained in the significance of communicative aspects of the process.

To identify the essence of the concept of "communicative culture", we analyzed the scientific and pedagogical literature on the research topic. This analysis shows that an impressive body of works has already been formed in the scientific and educational resources, in which scientists from various academic fields are engaged in the study of communication problems: philosophy, psychology, sociology, psycholinguistics, pedagogy. This fact emphasizes the importance and urgency of the problems of developing communicative culture. The modern scientific and pedagogical information field presents various approaches to the interpretation of the concept of "communicative culture": methodical, through world outlook, psychological, sociological, environmental, culture-logical and others approaches (Burton & Dimbleby, 1990; Klementsova, 2019; Kostikova, Prishvina, Ilyushina, Fedotova, & Belogurov, 2018).

Content analysis of the definition of "communicative culture" allows us to state that there is no single definition of this term, since this concept has a wide connotation. The most universal, in our opinion, is the definition of communicative culture as one of the components of personality culture, characterized by the presence of 1) a set of knowledge, skills and abilities of verbal communication, the ability to operate with them in a relevant way, using their mental, personal and physical qualities to solve communication problems; 2) systems of norms, values and patterns of behavior adopted in society, which allow the individual to effectively perform the comprehensive tasks of business and intercultural communication. It is this interpretation that we have chosen as the basis for our study.

It should be emphasized that all scientists agree that communicative culture is a part of the basic culture of an individual, ensuring his or her readiness for self-determination in life, the establishment of harmonious relations with the surrounding reality and within him- and herself. It is noted that the problem of the formation of the communicative culture of a graduate of a higher school is

extremely relevant in connection with the modern requirements for the personality of a future specialist, who should be characterized by the ability to develop their own lines of behavior, while showing such qualities as empathy and tolerance (Klets, Malysheva, Presnyakova, & Starovoitova, 2020; Riemer, 2007).

A culturally advanced specialist is characterized by such abilities as thinking clearly, building oral or written speech logically, participating in business and professional communication efficiently, i.e. in making presentations, taking part in discussions, defending his or her point of view, reading and translating texts in one of the foreign languages, etc. (Klopf, 2001; Polyakova, 2015).

A wide range of abilities and skills, the formation of which characterizes a highly cultured person, gives rise to the need to find an effective means that will successfully influence the development of students' communicative culture.

The teachers faced the problem of finding effective electronic educational resources, which could be used as tools for the development of communicative culture in the process of foreign language online learning. The task was burdened with the necessity to develop students' communicative culture in a new educational environment of spring and autumn 2020 as they had never experienced the situation of distance learning only.

The analysis of the scientific and methodological literature on the problems of online teaching shows that an impressive body of works has already been formed in the scientific and educational resources in which the authors developed teaching methods for speech activities and culture classes through certain Internet tools and revealed the effectiveness of its use in the educational process (Hogan-Brun, & Whittle, 1998; Katermina, 2019).

However, based on a study of scientific sources, it was revealed that there is an insufficient number of publications devoted to generalizing the experience of using various digital resources in the system of teaching a foreign language to students of non-language areas of training. In the context of this study, the authors aim to test various educational online platforms and identify their productivity for the development of students' speech skills and communicative culture.

Research Methodology

Within the framework of this research, the authors created the concept of the communicative culture formation of undergraduate students of non-linguistic areas as a condition for their personal development and improvement of universal cultural competencies. We also described educational computer

platforms that we used in the distance teaching process to intensify students' speech culture.

The following functions of communicative culture were distinguished: human-creative - familiarizing with language and speech; the transfer of social experience - assimilation of established rules of communication; regulatory - training and education; value - the formation of a linguistic picture of the world and value attitudes; sign - language as a sign system. These functions are very relevant while observing the dynamics of students' communicative culture development. We also identified the structural components of students' communicative culture: cognitive, emotional and strong-willed, motivational and behavioral. These characteristics are described by such parameters as qualities, knowledge and skills. These components and their parameters are relevant to the purpose of our study. The above mentioned components and their characteristics are summarized in Table 1.

Table1 Communicative Culture Components

Communicative culture components	Required parameters
cognitive	– knowledge of the rules and regulations of communication; – knowledge of the characteristics of personality perception in communication; – perceptual skills; – attention, thinking and memory; – development of speech;
emotional and strong-willed	– ability to emotionally volitional regulation of behavior; – sense of responsibility; – empathy and attraction; – mastering expressive and affective speech means;
motivational	– conscious goals of communication; – formed system of attitudes and value orientations; – the degree of development of communicative interests and needs;
behavioral	– communication skills; – conflict-free interactions; – communication styles (verbal and non-verbal). – compliance with ethical standards.

Depending on the degree of formation of the structural components of communicative culture (cognitive, emotional and strong-willed, motivational and behavioral), as we have already noted, we determined the levels of its formation, namely: high, medium and low.

At the high level the qualities are constantly manifested, the student has perfect knowledge in the field of communication culture, has the necessary skills.

At the average level the qualities are not always observed, the criteria are expressed, but they are limited and insufficiently effective in various activities.

At the low level qualities appear rarely or do not appear; necessary knowledge and skills are lacking.

The effectiveness of the use of online educational platforms and ICT technologies in the process of teaching a foreign language and developing students' communicative culture was identified during the experimental work lasted for two semesters (from March 2020 to January 2021) in the academic environment of Pskov State University. In order to test the hypothesis put forward, we conducted an experimental training that covered 96 undergraduate students of non-linguistic areas of training.

As stated earlier, communicative culture of students was investigated in terms of online interaction during distance English language teaching. The training was organized on the basis of the educational platform Moodle, the platform Zoom for teleconferencing, as well as using Internet services, the linguistic and social environment Speaky, educational sites such as British Council, Easy Place Learning, Ted Talks, Web Quest, etc.

Moodle is considered to be the most widely used e-learning platform in academic institutions of Russia. It is successfully employed by Pskov State University and became one of the basic educational platforms for students to learn since the COVID-19 pandemic in 2020.

The Learning Management System (LMS) Moodle is a platform which lets the teachers create quality online courses, provides support to students and assesses the results of their work. For students, it is a personalized learning environment with a set of learner-centred tools.

Zoom as a cloud platform for audio and video conferencing was used by English teachers in combination with Google classroom and Google documents. As the authors' experience shows, Zoom is a convenient digital tool for study, but the teachers should work hard so that the students do not feel the lack of face-to-face teaching. Here some pair and group activities are described:

1. The teacher sets up session rooms in Zoom and divides students into small groups. Each pair is given a task. While the students are working, the teacher visits each room to control the process.
2. Using Google Drive class folder, the teacher creates documents with tasks and distributes them among the students. The students work with their document in pairs. They can make a plan together, brainstorm the statement or write down answers to the questions.

The tasks' difficulty depends on the students' level of language. If the students are of intermediate and upper-intermediate levels, they can be offered participation in debates. This is the scheme of online debates: 1. Introducing students to the problem (text in Google doc, Zoom screen presentation with videos and images). 2. Statement of thesis and antithesis. 3. Giving general rules (Google doc). 4. Student's work in session halls, preparing their arguments. 5. Performance of each team. 6. Other groups write opinions in chat while the speakers present their opinions. 7. The results are summarized in the evaluation matrix (Google slides).

It should be noted that we are based on the Bring Your Own Devices (BYOD) concept in teaching foreign languages with ICT. Let us consider this notion in more detail. BYOD is a global concept commonly used to mean permitting employees or students to bring personally owned mobile devices (laptops, netbooks, tablets, smartphones, etc.) to their workplace or educational institution and to use them to access corporate, institutional and other information, applications and services (Boettcher & Conrad, 2016).

*Table 2 **Authentic Digital Resources for Practicing IT English***

Type of the resource	Name of the resource	Digital resource
Magazines	Mac Tech	https://www.mactech.com/
	CustomPC	https://custompc.raspberrypi.org/
	eWeek	https://www.eweek.com/
Podcasts	iOSBytes	https://sur.ly/o/iosbytes.codeschool.com/
	Android Developers Backstage	https://player.fm/
	Talk Python To Me	https://talkpython.fm/
YouTube channels	CNET	https://www.youtube.com/user/CNETTV
	Linus Tech Tips	https://www.youtube.com/user/LinusTech Tip
	The Verge	https://www.youtube.com/user/TheVerge
Blogs	Top Flight Computers	https://www.topflightpc.com/blog/
	Velocity Micro Blog	https://www.velocitymicro.com/blog/
	Tom's Hardware	https://www.tomshardware.com
Forums	DevShed	https://www.webmasterworld.com/devshed/
	Stack Overflow	https://stackoverflow.com/
Websites	TechRepublic	https://www.techrepublic.com/
	ToolBox	https://www.toolbox.com/tech/
	BBC News Tech	https://www.bbc.com/news/technology

The students use their mobile devices for doing their homework and working online in Zoom. They are offered a number of applications helpful in

learning English, links of online monolingual dictionaries and language corpuses. Also, the students are given a range of links with their professional content that they use doing their projects and research, preparing their speeches and presentations.

The given example represents the usage of BYOD techniques within the Bachelor course "English in the Sphere of Professional Communication (Bachelor degree in Information Technologies)" (Table 2).

The instructions are given to students to explain how the BYOD policy is being introduced in class and at home. Let us consider the example of the BYOD-driven lesson layout (Table 3).

Table 3 **The BYOD-driven Lesson Layout**

Topic: HTML
1. Warming up: Look through Apple official website [https://www.apple.com/] and say what you find useful or needless, attractive or odd.
2. Give the definitions to the terms: HTML, SGML, DOM, HTTP, HTTPS. Use Longman Online Dictionary [https://www.ldoceonline.com/], if necessary.
3. Some basic vocabulary practice (matching/gap-filling): Internet service provider, web browser, web hosting service, domain name, web server capacity, proxy server, malwares, viruses, etc.
4. Group work: Read the article "The best browser 2020" by Carrie Marshal [https://www.techradar.com/best/browser] and put five questions to other groups in class to check students' understanding of the article.
5. Group work: Scan the article "7 simple steps to creating a website" [https://longtailpro.com/7-simple-steps-to-creating-a-website/] and make your own plan of the website you are going to create with your group for a new technology company.
6. Individual homework: follow the link [https://www.w3schools.com/html/default.asp]. Watch HTML tutorial, test yourself with exercises, do HTML Quiz test.
7. Group homework: after expanding your knowledge doing individual homework, continue working on the project you have started in class. Create a website for a customer.

It should be noted that digital education gives the teachers an enormous number of techniques and tools but, at the same time, the teacher must work hard to overcome the lack of face-to-face interaction. Online lessons performed on digital platforms help to develop productive speaking activities only if they are well planned and pursue a definite goal.

Research Results

Let us consider the course of experimental training and analyse its main results in detail. The pedagogical experiment included two stages:

1) ascertaining and 2) forming. At the ascertaining stage we developed a technology for the formation of communicative culture, which had a four-part structure and included the following components: diagnostic, substantive, technological and reflective. At each of them, the teacher and students performed certain functions. Besides, didactic and methodological possibilities of using ICT technologies as a means of developing students' communicative culture in foreign language classes were identified. At the forming stage the proper online teaching based on digital technologies was performed.

A questionnaire survey on the subject of communicative culture formation was conducted among the students at both stages of the experiment. Testing was carried out using the questionnaire proposed by L.Michelson (Ilyin, 2013). All questions of the questionnaire are divided into several types of communicative situations: situations in which a reaction to positive statements from a partner is required, situations requiring a negative assessment and reaction to it, situations requiring empathy and tolerance, conversation situations, discussions, requests. These groups of questions correlate with the corresponding components of the structure of communicative culture (cognitive, emotional and strong-willed, motivational and behavioral). It should be emphasized that the components of communicative culture are inextricably linked, therefore, elements of various components can interact within the framework of one issue.

At the initial stage of training, the average indicator of the level of communicative culture formation was approximately 51%. At the final stage of training, based on a questionnaire of students and an expert assessment of teachers, the increase in the four components of communicative culture was, on average, approximately 15 percent (Figure 1).
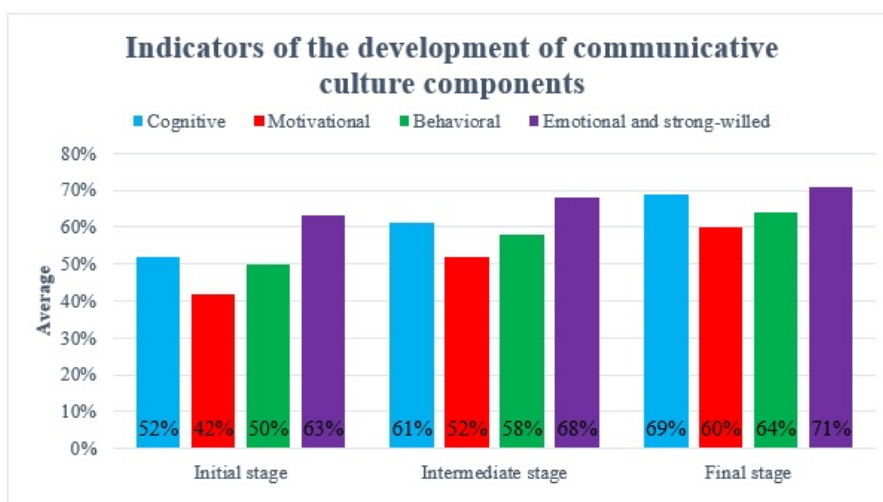
Figure 1 **The Results of Evaluating the Development of Communicative Culture Components (based on students' testing)**

Based on the empirical data obtained, we were convinced that in all academic groups there was a transition of the majority of students from low to intermediate and higher levels. On the basis of a reflexive assessment of their speech activity, students identified the prospects for improving communication skills and speech strategies.

In general, there was a positive attitude of students to the used online learning methodology. The data of the conducted pedagogical experiment revealed significant positive speech skills' transformation and confirmed the effectiveness of the use of ICT in language training of non-linguistic students.

As a result, students became more confident, engaged and motivated. They developed their language skills that are the main components of foreign language communicative competence: 1) writing (essays, reports, texting); 2) reading (texts, articles, messages); 3) listening (recordings, podcasts, news); 4) speaking (recording their speeches, giving presentations, filling the gaps in the video with dialogues). The statistical analysis of the experimental data confirmed the correctness of the hypothesis put forward in the study about the effectiveness of online learning in the development of students' communicative culture. Thus, the conducted research allowed to achieve the main objectives.

Conclusion

Communicative culture is gradually becoming the leading component of the current social transformations in society. The development of communicative culture is an important priority in the professional training of a future specialist who is expected to be able to carry out effective interaction in the process of joint production activities and establish the necessary business, interpersonal and intercultural relations based on cooperation, mutual respect and support.

In the educational practice of higher education, the discipline "Foreign language" has a significant development resource for students' communicative culture, since mastering a foreign language involves a wide and varied use of interdisciplinary connections.

The study undertaken here advocates the effectiveness of online foreign language interaction in developing communicative skills and culture of university students.

Thus, teaching English with the use of infocommunication technologies and multimedia systems had a positive effect on improving the communication culture and contributed to the improvement of the foreign language communicative competence of students as the goal of language training at the university. We can state that online education is ecologically friendly, convenient, enjoyable and modern.

We consider the conducted research to be quite important, since it expands the understanding of the possibilities of online teaching English at a university. The materials of this study can be tested in the practice of teachers in determining the content, means and mechanisms of the formation of the communicative culture of students.

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APPLICATION OF MACHINE LEARNING FOR REMOTE ELECTRONICS EXPERIMENTS AS THE MEAN OF INDENTIFICATION

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Abstract. *We are increasingly faced with automated solutions that create a dynamic and constantly evolving scientific and technical environment, with new challenges in finding more accurate and efficient solutions for identification. This article introduces a machine learning application that allows you to automatically recognize and identify learners in a distance learning experiment without being explicitly programmed. Experimental methods and components have been transferred to a distance learning laboratory environment. A conceptual model of an electronics laboratory has been developed for remote experiments using identification methods. This article focuses on machine learning using the LabVIEW package, which can access data and use it for self-study. The article presents the application of machine learning software LabVIEW National Instruments and NI ELVIS hardware simulators for electronic laboratory remote experiments and perspectives in the educational process.*
Keywords: *machine learning; LabVIEW; remote laboratory.*

Introduction

The purpose of this article is to explore the potential of learning technologies and show how laboratories can develop a new level of quality. The current trend is to use measurement tools developed using virtual device technology for educational purposes (Ertugrul, 2000). Sources of recent research emphasize that there is an increasing need for learning that allows students to construct knowledge themselves through vigorous activity, and not just participate in the transfer of information. Practice shows that it is best to retain knowledge based

on personal work experience. A source of such experience can be both theoretical and practical experiments conducted in the laboratory of electronics. There is a lack of tools that allow students to solve problems, problems, or observe a phenomenon through experimentation. The software in this software environment is developed visually and does not require detailed programming knowledge from the developer. Electronic experiment is seen as a component of blended learning - the environment, where you can learn from remote workplaces, independently of carrying out laboratory work. Experimentation becomes an instrument in which knowledge is acquired by experiments. It should be possible to perform them independently, for which mechanisms of control of identification and by means of machine learning are introduced. The aim of the study is to create a object of identification that identifies a student in remote electronics experiments. Machine learning algorithms are used to record the automatic identification process. The machine learning program that allows you to automatically recognize the students in the experiment in distance learning. In case of incorrect identification, fuses are introduced to obtain stop frame of the video. We use standard LabVIEW/ Analytics and Machine Learning Toolkit machine learning methods for identification. It is a software add-on for LabVIEW that provides training machine learning models. You can use these models to discover patterns in large amounts of data with anomaly detection and classification, and clustering algorithms. Additionally, these models can recognize patterns in new data. Learning, like artificial intelligence, covers such a broad range of processes that it is difficult to define precisely. Machine learning usually refers to the changes in systems that perform tasks associated with artificial intelligence (AI) such tasks involve planning, recognition, control, diagnosis, prediction, etc. The changes might be either enhancements to already performing systems or non-empirical synthesis of new systems. Different learning mechanisms might be employed depending on which subsystem is being changed.

Methodology

Now this is a hot topic that is widely discussed all over the world. The E-lab is perceived as a component of blended learning - an environment where you can study from remote workplaces, independently carry out laboratory work (Bonk, Graham, 2012). Lack of electronic tools that would allow students to solve problems, problems or observe a phenomenon, through experiments, input or selection of input data. The application of the experimental method in modern distance learning systems is only one of the important reasons for the development of remote electronics laboratories for practical and laboratory work, which is especially important now because of the COVID-19 pandemic (Gamage et al., 2020). The biggest benefit of such a remote experiment is that the student can

access the experiment anytime, anywhere. If the student has to conduct the experiment on his or her own, an identification problem arises, or he or she performs the experiment on his or her own. We need to create a plug-in to the experiment, which will allow to identify the student. We are faced with automated solutions, new challenges in the search for more accurate and efficient solutions. These tasks require deeper theoretical and practical knowledge, special equipment and artificial intelligence algorithms. Using machine learning, we can automate the identification process by receiving reports or a student independently performing an experiment using image identification via a webcam using machine learning (Relf, 2003). The structure of the electronics experiment system presented in Figure 1.
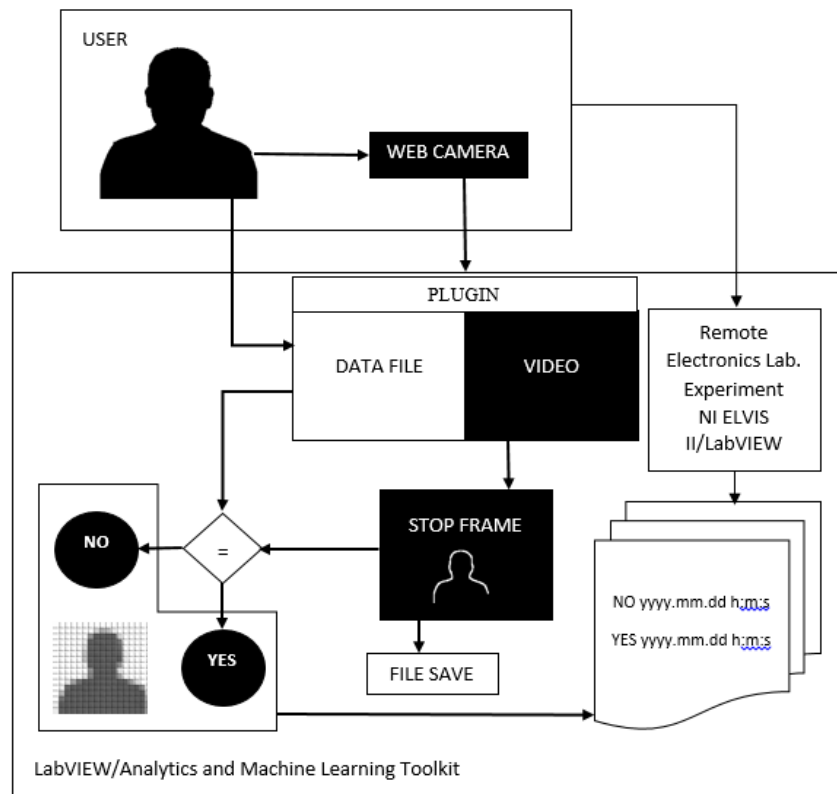
*Figure 1 **Block Diagram for the System***

The basic idea is to create an identity using devices and software packages that can help implement this control. Application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed (Nguyen et al., 2019) Machine learning focuses on the development of computer programs that can access data and use it learn for themselves. It is based on the universal training device NI ELVIS II (National Instruments Educational Laboratory Virtual Instrumentation suite),

which is used in conjunction with LabVIEW (Laboratory Virtual Instrumentation Engineering Workbench) and specialized instruments Analytics and Machine Learning Toolkit (National Instruments Corporation, 2018). NI ELVIS II also allows full automation of reporting over a computer network, and security measures prevent duplication. A key novelty is to uncover the potential of teaching technologies to provide a level of quality for classical electronics laboratory experiments (Ursutiu, Cotfas, Samoila, Zamfira & Auer, 2004).

The NI ELVIS II connects through a mounting plate that connects the experimental electronics circuitry through the appropriate data and power inputs (Borodin, Batovrin & Romanov, 2009).

The operation of the system is illustrated in Figure 2.
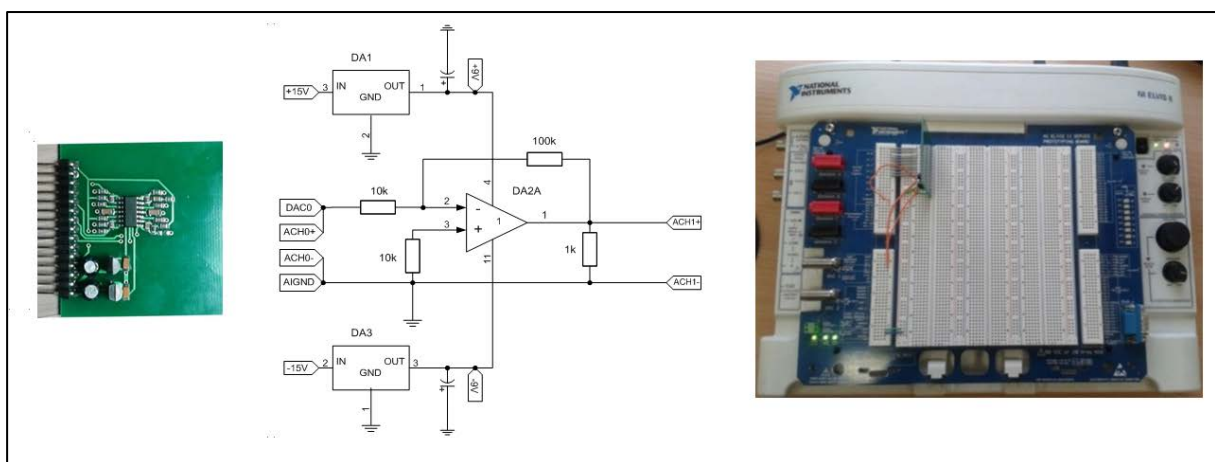
Figure 2 **The System of the Electronics Experiments**

A significant novelty is that this is not a virtual laboratory based on the software, but a real experiment with a remote-controlled electronics. The developed simplified conceptual model of the electronics laboratory is suitable for remote experimentation and demonstration (Kozic, Macerauskas & Sakalys, 2016).

Research Results

The use of the advanced NI ELVIS II ensures the modernity of teaching methods and acquired knowledge. The LabVIEW package allows you to create a remote control system that allows you to remotely control the front panel of a program, a circuit connected to the NI ELVIS II device, using a web browser. The essence of the whole idea is to create a remote control that can be connected to an NI ELVIS II device connected to a server computer, which will allow you to perform the assigned tasks. This login option will allow the customer to log in

from anywhere and perform specified tasks using their web browser. This is an excellent example of the development of modern technology that allows you to achieve excellent results. This ability to connect to tasks allows you to choose a location, saving time and space. Using NI ELVIS II and LabVIEW training tools, electronic experiments can be performed remotely and allow full automation of reporting over a computer network, while using identification tools allows write-offs to be avoided.
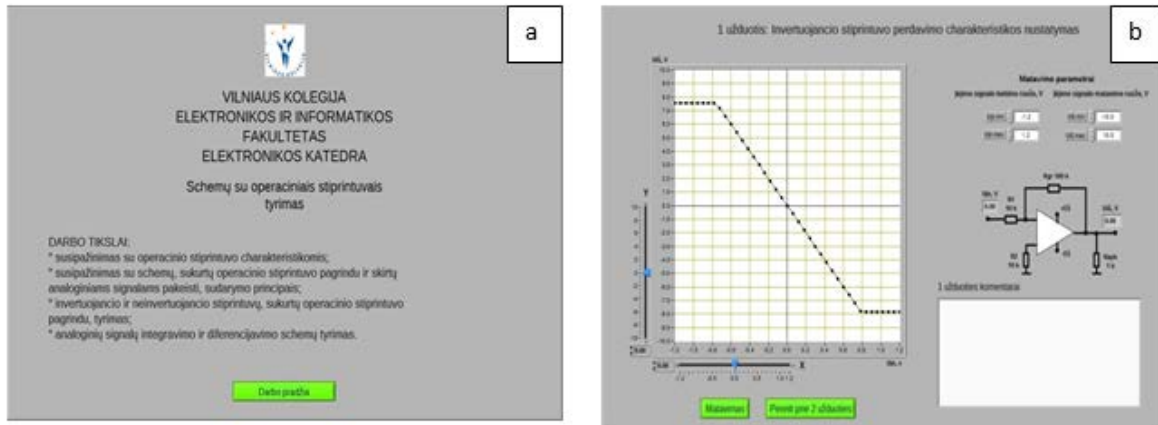
Figure 3 **Primary Electronics Experiment Task Window (a) and Primary Task Pages - LabVIEW**

The LabVIEW package allows you to create a remote control system that allows you to remotely control the front panel of a program, a circuit connected to the NI ELVIS II device, using a web browser. Remote control is based on local network use via VPN with identification codes issued to students who first connect to the VPN and then to the task. To control the electronics experiment via a browser, you must first save the application data to the server computer. To do this, use the LabVIEW function of the *Web Publishing Tool*. The generated web address is recorded in the web browser of the students that has the Run-Time Engine add-in installed. After saving, an image of the experiment appears. What changes will be made to the interface window displayed in the client browser will simultaneously occur on the server computer in the LabVIEW interface window (Salzmann, Gillet & Huguenin, 2000). In other words, a virtual tunnel is created. By connecting a local IP address to an external one, you can connect in the router settings even outside the local network. It is also possible to track who connected to the server, which traffic data is at work, if you want clients/students that can be stopped or deleted (see. Figure 4).
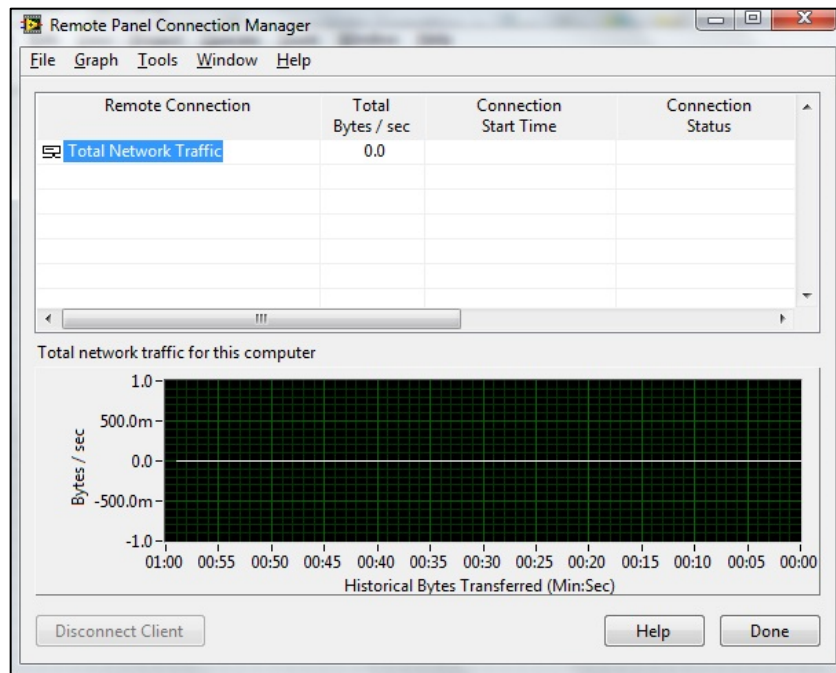
Figure 4 **Traffic Monitoring and Control Window**

In this window (see Fig. 4) you can see when the work started, what is the status of the connection and data traffic visually. This is a handy tool that is very useful when more than one customer is logged in, or when several want to log in. From the server side, you can control who is connecting and you can see who is waiting in your queue to connect.

While this is a great system for expanding standard learning opportunities. It, like all systems, has its drawbacks. Students can log into the system with their own identification codes, but others can complete the assignments and control of the system through the Remote Panel Connection Manager is not possible for 24 hours.

Thus, the goal is to use the principles of automation to monitor and train the system to identify students using machine learning algorithms (LabVIEW/ Analytics and Machine Learning Toolkit), therefore a plugin is used (see Fig. 5).

Shortcomings were found after the experiment was performed and the inaccurate results of identification were received. False messages are believed to be received due to identification mismatch using standard machine learning algorithms using LabVIEW/ Analytics and Machine Learning Toolkit. Therefore, the plugin has a stop frame every time. Thus, you can always view the file and, in case of doubt, determine whether the assignment was completed by the student.
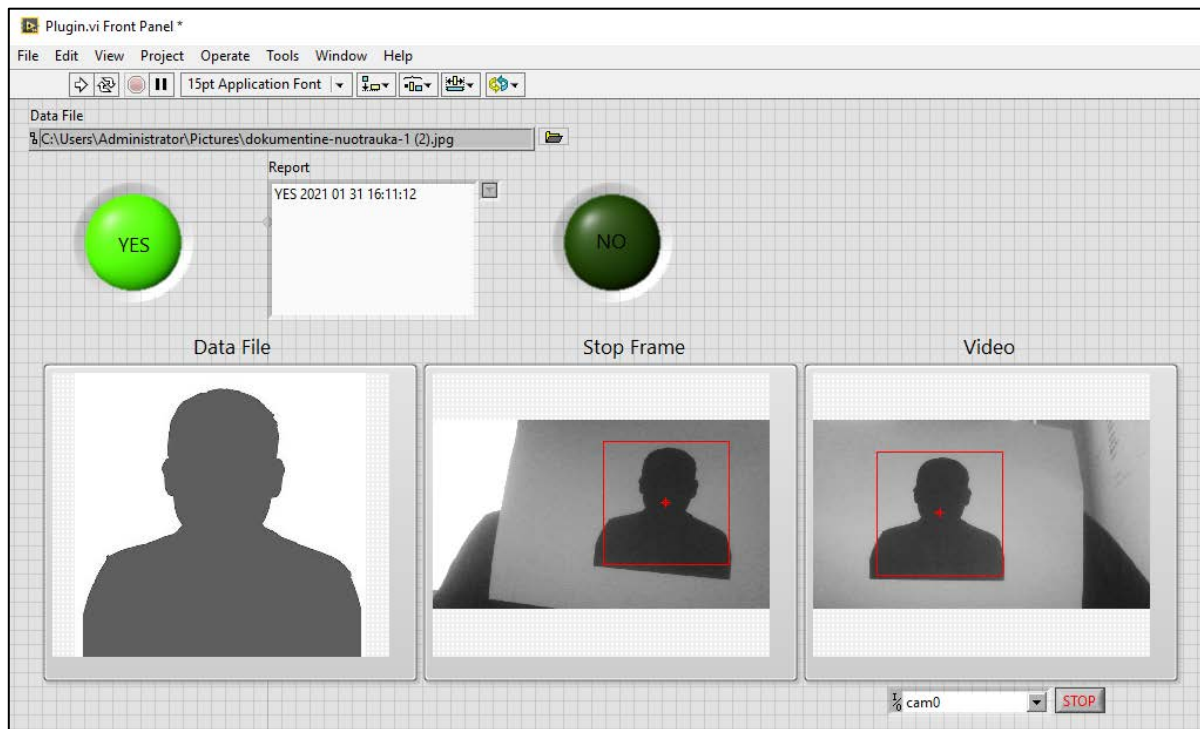
Figure 5 **Example Identification via Plug LabVIEW**

Conclusions

The essence of the experiment is that the use of LabVIEW/NI ELVIS technologies allows you to easily create any measuring complexes, adapt them to training programs. In terms of enhancing the quality of teaching, the biggest benefit of such an experiment is that the student can access the lab anytime, anywhere. Despite the fact that students log in with their own code, they are constantly identified or the task is completed independently. Application of machine learning for remote electronics experiments as a means of identification, the following conclusions can be made:

- Identifying the student for laboratory electronics experiments makes it easier to identify the student doing the assignment on his own.
- Algorithms of machine learning LabVIEW allow you to capture and control the process automatically, which would be difficult for a person for 24 hours.
- Performing such remote electronics experiments increases student motivation because tasks can be done remotely.

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KNOWLEDGE MANAGEMENT IN ARTIFICIAL INTELLIGENCE BASED AUTOMATED E-MATERIAL FORMATTING TOOL

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Abstract. *Knowledge is a critical resource for scientific, academical and technological development. In a time of fast development and growth of a massive amount of information and big data, knowledge management (KM) has a crucial role in creating knowledge from data and information. Knowledge management discipline increases its popularity among other fast-developing disciplines as Artificial Intelligence (AI). It is important to understand how fields of science and technological research and development and knowledge management integrate into each other, cooperate, and support each other. Likewise, understanding theoretical bases in the practical use of knowledge management are crucial for learning and development use. The theoretical part of the publication shortly represents knowledge management theoretical basis. It is followed by a description of the case - artificial intelligence based automated e-material formatting tool development and research accompanying the development of the tool. The result part of the publication systematically represents knowledge management aspects in the case study. There are included knowledge management aspects as components of knowledge management definition, types, theories, approaches and methods in the case study. Thereby, the publication shows the cooperation of disciplines through the scope of the case study and could be used as a sample in the study process to understand and show knowledge management and knowledge management aspects in the research and development process.*
Keywords: *artificial intelligence, automated formatting tool, e-material formatting, knowledge management.*

Introduction

Knowledge management (KM) is not one single discipline. It is an integration of numerous activities and fields of study (Newman, Conrad, 2000). KM discipline increases its popularity among other fast-developing disciplines as Artificial Intelligence (AI) because knowledge is a critical resource for scientific, academical and technological development.

In two ways, knowledge has been differentiated from data and information. Knowledge is at the top of the hierarchy, with facts in the centre and data at the

bottom, according to a more simplistic view (Becerra-Fernandez, Sabherwal, 2010).

In a time of fast development and a huge amount of information and big data, knowledge management (KM) has a crucial role in creating knowledge from data and information.

Theoretical insight of KM basis is shortly represented in the next chapter of the paper. It shows theoretical bases of KM and whose practical use, like in research or development process. It is crucial for the learning process and development use. It allows understanding which methods, approaches, tools, mechanisms, systems and technologies, and other support aspects could and should be used for achieving the goals of development and research.

The case description is presented in the chapter after the literature review. It is a description of artificial intelligence (AI) based automated e-material formatting tool and its development process. It is a practical example of a case study of tool development and research to create KM elements and tool and research cooperation sample.

Literature Review

Knowledge management (KM) is the process of an organisation's knowledge and information is created, shared, used, and managed (Girard, Girard, 2015) or individualized (Becerra-Fernandez, Sabherwal, 2010). Knowledge management (KM) refers to a multidisciplinary approach (UNC, 2007). In simplest terms, it would be doing whatever it takes to get the best out of information capital and knowledge resources (Becerra-Fernandez, Sabherwal, 2010).

Knowledge types. Declarative knowledge is defined as "knowing what," while procedural knowledge is defined as "knowing how" (Becerra-Fernandez, Sabherwal, 2010). Two types of knowledge are usually defined namely explicit and tacit knowledge (KMT, 2018). Tacit knowledge is action-oriented (procedural) knowledge that is usually acquired without direct help from others (rather by role modelling), and that allows individuals to achieve goals that they personally value (Staudinger, Dörner, 2007). Explicit knowledge (also expressive knowledge) is the knowledge that can be readily articulated, codified, accessed, and verbalised (Definition, n.d.). Many people have the general information, which can be easily transferred from one person to another - it is general knowledge procession. A small number of people only holds specific knowledge, and it is difficult to pass, as well as expensive to transfer (Becerra-Fernandez, Sabherwal, 2010).

Knowledge locations or reservoirs. Knowledge can be found in a variety of places – locations or reservoirs. People and communities or groups are among them, as are artefacts or objects such as procedures, technologies, and

repositories, as well as organisational entities such as organizational units, associations, organisations and inter-organizational networks (Becerra-Fernandez, Sabherwal, 2010).

Knowledge management depends on broad aspects: Knowledge management solutions and foundations and knowledge management processes and subprocesses. KM solutions are made up of two parts: knowledge management processes and knowledge management systems. KM strategies are based on three foundations: knowledge management mechanisms, knowledge management technologies, and knowledge management infrastructure (Becerra-Fernandez, Sabherwal, 2010).

The ways in which particular aspects of KM (discovery, capture, sharing, and application of knowledge) can be achieved are referred to as KM solutions. KM processes and KM networks are examples of KM solutions. The large organisational aspects that sustain KM in the short and long term are known as KM foundations. They include knowledge management infrastructure, knowledge management processes, and knowledge management technologies (Becerra-Fernandez, Sabherwal, 2010).

KM processes are the broad processes that aid in the discovery, capture, sharing, and application of knowledge. KM systems and seven distinct types of KM subprocesses - combination, socialisation, externalisation, internalisation, exchange, direction, routines - support these four KM processes.

Either, the four KM processes are supported by KM systems, which are the combination of technologies and frameworks built to support them. Likewise, KM infrastructure supports KM mechanisms and technologies (Becerra-Fernandez, Sabherwal, 2010).

KM infrastructure components are organisational culture, organisational structure, IT infrastructure, common knowledge, physical environment (Becerra-Fernandez, Sabherwal, 2010). KM mechanisms are defined as the formal and informal mechanisms for sharing, integrating, interpreting, and applying know-what, know-how, and know-why embedded in individuals, groups, and other sources of knowledge (Zanjani, Mehregan, 2009). KM technologies are IT that can be used to facilitate KM and focus on KM rather than information processing (Becerra-Fernandez, Sabherwal, 2010). AI technologies are one of those who support KM.

Case Description: Artificial Intelligence Based Automatic E-material Formatting Tool

The correct and appropriate parameters for e-material text formatting could improve users reading comfort and ocular health. That can be achieved with the automatised e-material formatting tool. This tool can improve the comfort of

using e-material in the learning and study process and decrease near workload and reach a reduction of ocular tension. And the goal with the best results could be reached by adapting text formatting for individual needs in addition to appropriate standard parameters.

Primary recommendations for e-material formatting guidelines of the most important typographic aspects were developed for the target group without reading difficulties and without any significant vision problems. A wider overview has presented in previous publications (Mackare, Jansone 2017a; Mackare, Jansone, 2017b; Mackare, Jansone, 2018; Mackare, Jansone, Zigunovs, 2018).

Recommendations of e-material formatting parameters have been developed based on theoretical base and practical research. The theoretical base includes theoretical research on different important processes in human as people development stages of cognitive and visual development, physiological and psychological development, perception, reading, understanding and memory abilities, physiological and psychological capabilities as well as changes in visual system during humans life. To learn more about the habits and subjective preference of users, a practical study was carried out (Mackare, Jansone, 2019b).

After experimental testing of recommendations, those are incorporated in methodology (Mackare, 2021a). Recommendations and methodologies are used for tool development (Mackare, 2021b).

Secondary, the development of pre-development technical documentation has been done before the development of the tool. That includes tool idea and concept, analysis of similar tools, tool development plan, tool using scenario and case description.

The automated e-material formatting tool idea and its working concept are represented in Fig.1. Developers describe the tool and its working process as it is represented further: The tool receives the raw text (1). The document is being transferred through a tool and is being formatted during the formatting process using formatting software (2) and personalised requirements and parameters (3). All specifications as requirements, parameters, criteria, conditions, technological solution, programming, and database are included in formatting software. Requirements include – user needs, personalised formatting, formatting recommendations. After the formatting process, a person gets the formatted and personalised document (4). All data - users' data, users' responses, criteria, requirement, formatting recommendations, users' accumulated data, data accumulated after the machine learning process - should be stored in the database (5). The database serves as both a storage and an active operation. Data is extracted from the database by formatting software (A). It is data for software improvement and a personalised approach to formatting. The formatted and personalised document gives data to the database (B). Users accumulate data after

using personalised document – reading time, eye movements, memorising abilities, user satisfaction, a decrease of complaints and subjective issues, improvement of ocular functions. Data transport (C) is the connection between the database and the specifications and requirements – personalised requirements and formatting information (Mackare, Jansone, Mackars, 2020b). A wider overview has presented in previous publications (Zigunovs, Mackare, Jansone, 2018; Mackare, Jansone, Zigunovs, 2018; Mackare, Jansone, 2019a; Mackare, Jansone, Konarevs, 2019).

| Login | Raw document before | Document formatting | Adapted document after formatting | Database |
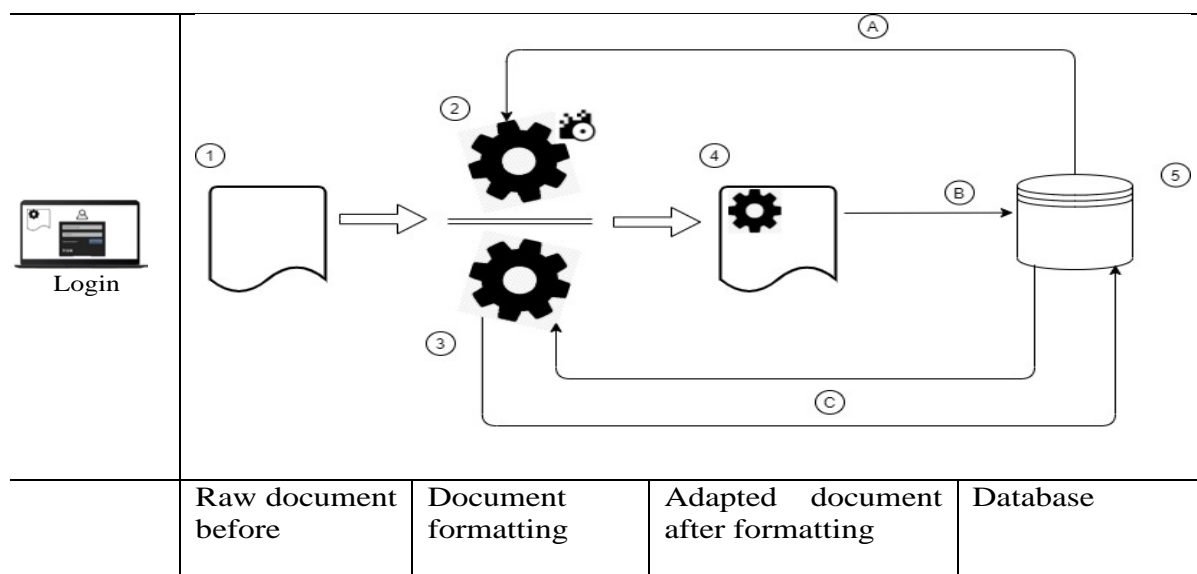
*Figure 1 **The Application Concept** (Mackare, Jansone, Mackars, 2020b)*

Thirdly, development of the tool. Includes research of technical solutions, prototype development, testing, changing and improvement of the prototype, AI aspects and ML incorporation in the prototype.

Prototype 1.0 development. The first developed version of the prototype of the tool gives an overview of the tool. It shows how the tool works to follow implemented working schemes in the development process, represents relationships between the main edges of the tool and the collaboration process of the tool with the user, material, and database as well as collaboration between these main edges (Zigunovs, Mackare, Jansone, 2018). A more in-depth overview of the application prototype was previously written (Zigunovs, Mackare, Jansone, 2018; Mackare, Jansone, Zigunovs, 2018; Mackare, Jansone, 2019a; Mackare, Jansone, Konarevs, 2019).

Conducted preliminary usability testing of tools prototype 1.0. (Mackare, Jansone, Mackars, 2020a).

The tools prototype 2.0 development is focused on improvements of the developed tool. The prototype 2.0 development focus is to make the tool accessible and workable on all the most popular formats of e-materials, primary,

MsWord and PDF. For that reason, PHP7.3 programming language has been used as it is chosen suitable for the purpose of the tool and educational environments. Work on the visual appearance of the tool has been done. A more detailed description of the application prototype is published in previous publications (Mackare, Jansone, Mackars, 2020a; Mackare, Jansone, Mackars, 2020b).

AI aspects and ML incorporation in prototype - tool works by using several AI approaches and elements: the connectionist approach, machine learning, Natural Language Processing, perceptron, decision tree graphs, rule-based system, classification, and clustering. It is quite hard to separate each element as they make a tight synergy to reach the best outcome. In tool is a combination of analytical AI and human-inspired AI as it is using learning based on experience to create future decisions and make a decision. AI use in the tool is important for user-centred approach and personalisation as it is connected with the aim of AI to solve problems (Mackare, Jansone, 2019c; Mackare, Jansone, Mackars, 2020c).

Finally, the approbation of tool and final documentation and sharing with results and knowledge must be done. This part is still in progress.

Methodology

Descriptive analysis of theoretical sources – theoretical materials about knowledge management (KM).

Case study and content analysis - authors materials as artificial intelligence (AI) based automated e-material formatting tool development and previous research accompanying the tool analysis development based on KM aspects described in the theoretical part.

Case Study Results: Representation of Knowledge Management Aspects in Research and Tool Development

Representation of Knowledge Management definition elements in research
Expansive KM definition contains nine vital elements: coordinated and directed creation of knowledge, accumulation of knowledge, identification of knowledge, application of knowledge, development of knowledge, deepening of knowledge, popularisation of knowledge, dissemination of knowledge and use of knowledge.

During fool research and development pass through different stages and is possible to follow different KM stages and found a wide range of examples of knowledge and KM aspects in it.

Similar elements in scientific research have been found. Examples of those elements in tool development and research have been shown. It is represented in Table 1. Representation of the Different Types of Knowledge in research.

Table 1 **Representation of Knowledge Management Definition Elements in Research**

Knowledge Management	Scientific research	Tool development and research
Coordinated and directed creation of knowledge	The systematic Research process is oriented on results; data collecting process	-Literature research -User research -Statistical research -Research-based tool development
Accumulation of knowledge	Data collecting and storage process	-Literature research -User research -Patient data record research -Database -User feedback -Machine Learning
Identification of knowledge	Literature research; data analysis; interpretation of data	-Literature research -Data analysis -Data interpretation
Application of knowledge	The experimental part of the research	-Development of a tool -Usability testing -Approbation of tool
Development of knowledge	Data analysis; results; interpretation of results	-Data analysis -Data interpretation and result representation
Deepening of knowledge	Results; new theories	-Result representation -Use of previous developments as usability testing and feedback for improvement of the prototype -AI component incorporation in tool
Popularisation of knowledge Dissemination of knowledge	Report writing; present findings; to disseminate the results of research activities in the form of training, publications or knowledge transfer	-Recommendations and methodology -Technical documentation -Publications -Presentations and oral reports -Conference and discussions -Report writing -Doctoral thesis
Use of knowledge	Previous research data, information, and knowledge used in current research: all from current research – use in further research	-Knowledge use from literature research and user research to recommendation development -Recommendation use for methodology development -Recommendation and methodology used for tool development -Artificial Intelligence and Machine Learning -Suggestions for future steps -Future research

During literature research and development of formatting recommendations and methodology was used declarative knowledge as it was based on facts and relationships among variable from previous methodologies, formatting suggestions and research reports. The same knowledge type is a description of requirements and tools idea, development list of necessary parameters, and concept creation - as there is clear understandability of what needs to be created at the end.

The tool development as creating technical tasks, working schemes, searching for a technical solution, programming, writing of technical documentation is procedural knowledge as those are steps and actions to desired (or undesired) outcomes. The same is developed a prototype and usability testing of the tool as it gives the overview of the tools work, relationships between main edges and the collaboration process with the user, material, and database.

In the development of automatic e-material formatting, the tool has been used both explicit knowledge and tacit knowledge. The result of development also is a process of explicit knowledge creation as an e-material formatting methodology and formatting tool as a computer program. However, as the tool is based on Artificial Intelligence components as Machine Learning, it incorporates experience-based decisions, which result in tacit knowledge as well. It is possible to tell what developed tool based on AI convert explicit knowledge into tacit during the machine learning process.

Theoretically, the tool's tacit knowledge can be converted into explicit knowledge if it will be possible to incorporate this knowledge in the methodology for e-material formatting by formalising that knowledge. It could be one of the future research points: to find tools and methods to convert AI-based tools' created knowledge as individualised e-material formatting to values that could be systematised and described in the user-centred methodology.

The developed methodology for e-material formatting is general knowledge as everyone with a basic understanding of text formatting can understand and use it. So, it could be possessed by many individuals and transferred easily and quickly across individuals.

Technology-specific knowledge is deep knowledge about a specific area – automated e-material formatting. It includes knowledge about the developed tool and techniques that are used to made e-material formatting on several different levels and be the user-centric - more individual approach of formatting to solve existing problems of e-material formatting and their effect on users.

AI tools generated formatting suggestions are context-specific knowledge as they refer to a specific user and current situation. This specific knowledge cannot be acquired through AI's formal training by using only standard ML approaches from training-sample use. Instead, those must be obtained from within a specific

context. That is obtained not only from groups responses but based on the context of individual user needs and preferences, as well as feedbacks.

Actually, it may be called context-and-technology-specific knowledge, as, based on the theoretical bases of KM, there is a need simultaneously involves both - rich scientific knowledge and an understanding of the particular context - for correct and smooth work of the tool and high achievements in results.

There has been used a broad range of different knowledge types in research and tool development.
Representation of the Different Types of Knowledge storage and Intellectual capital in research

For most parts of the development and research process are used data, information, and existing knowledge and skills. To reach all needed knowledge in research and development, different locations of knowledge have been used.

Knowledge location or reservoirs used in tool development and research are represented in Table 2. Those are supplemented with related knowledge capital and type of knowledge.

Table 2 **Representation of the Different Types of Knowledge Storage and Intellectual Capital in Research**

Knowledge location or reservoirs	Knowledge capital	Type of Knowledge
People	Human capital	
User research	Data for knowledge	Tacit
Usability testing		
User feedback		
Development team	Knowledge and skills	Tacit and explicit
Artefacts	Structural capital	
Previous research, documentation, recommendation, methodologies, statistical data	Data and information for knowledge and knowledge	Explicit
Research of similar tools		
Database of tool		

Representation of Knowledge Management foundation in research

Broad research requires a lot of data, information, knowledge, and skills. At the same time, it needs supporting mechanisms and technologies that supports and promotes both research and development. It resonates with KM.

The four knowledge management processes and related four KM systems are supplemented with seven relevant subprocesses, and examples of KM Associated Mechanisms and Technologies in the development of tool and research are represented in Table 3.

Table 3 **KM Processes and Subprocesses and KM systems, and KM Associated Mechanisms and Technologies in Research**

KM Processes	KM Systems	KM Subprocesses	KM Mechanisms in research	KM Technologies in research
Knowledge Discovery	Knowledge Discovery systems	Combination	- Documentation - Development team's collaborative creation of documentation	- Database of tool - Web-based access to data - Data-mining for data obtaining - Repositories of information - Web portals for research purpose and usability testing
		Socialisation	- Conferences - Cooperative projects	- Video-conferencing - e-mail
Knowledge Capture	Knowledge Capture systems	Externalisation	- Prototypes - Models	- Best practices
		Internalisation	- Learning by doing	- AI-based knowledge acquisition
Knowledge Sharing	Knowledge Sharing systems	Socialisation	See above	See above
		Exchange	- Manuals - Presentation	- Web-based access to data - Database - Repositories of information
Knowledge Application	Knowledge Application systems	Direction	- Support group	- Case-based reasoning systems
		Routines	- Work practices - Standards	- Management information systems

Conclusions

Publication systematically represents knowledge management aspects from the theoretical point of view and description of the case study - artificial intelligence based automated e-material formatting tool development and research accompanying the development of the tool. Knowledge management aspects examples follow it in the case study object.

There are included knowledge management aspects as components of knowledge management definition, types of knowledge, knowledge storage,

Intellectual capitals, knowledge management processes and related subprocesses, knowledge management systems, knowledge management associated mechanisms and technologies used in the case study.

Analysis of tool development and research shown through knowledge management aspects demonstrated that type of knowledge, tools and sources have been used and what type of knowledge have been created. At the same time, the research and development of the tool used as an example are extensive than could see a broad use of knowledge management aspects.

It allows concluding what knowledge management and research cooperates. On the one hand, knowledge management support research. On the other hand, research provides knowledge management with several elements as data and information for knowledge creation, knowledge for use and creation of new knowledge, and development of new knowledge management and knowledge management processes support technologies.

Research shows that AI is a support technology for knowledge management, as well as knowledge management is a support approach for AI-based tool development.

Thereby, the publication shows both discipline cooperation and could be used as a sample in the study process to understand knowledge management and knowledge management aspects in research and development through the case study.

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RESEARCH OF POWER GENERATOR PROTOTYPE DEVELOPMENT AND INTEGRATION INTO AUTONOMOUS ROBOTIC SYSTEMS

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Abstract. *The aim of the research is to perform experimental research based on patented technology to improve the efficiency and applicability of the patented invention in the power supply circuits of autonomous robotic systems in order to improve electricity utilization and regeneration rates, ensuring longer autonomous operation of the robotic system. The article reviews the technologies of electricity generation and aspects of their practical application. Described research methodology and research stand. Presented the results and conclusions of the performed simulation tests of the prototype electrodynamic parameters. Proposals made for the integration of research results into the students practical educational process.*
Keywords: *robotic system, electricity generator, regeneration.*

Introduction

Our team is very young: it was formed in the first half of the year 2020. Members of the team - both teachers and students – are united by the idea to explore opportunities of creation of a generator for autonomic robotic systems. One of such systems accessible for research and not too complicated in the beginning can be an electric car. This system is partly autonomic in the aspect of its control; however, its electric circuit is fully autonomic.

The base of this research is a patented idea (the Patent No. LT-6714B; the Application No. 2019-065) (V. Matutis & M. Matutis, 2020). The patented invention was created upon striving to increase the distance covered by an electric car after a single charging its battery at a stationary charging station. The goal of the invention is use of a mobile electric power generator based on an environmentally friendly technology in combination with wind power (both

kinetic and potential energy of air mass formed on movement of the car) that is equipped with a compensatory mechanism of a simple design (in principle, it is a component of an electric car involved in charging the battery during the car's movement). The mock-up of a wind turbine is presented in Fig.1 below.

Analyzing of analogous ideas shows that a majority of them do not achieve the efficiency required for practical application, because the losses exceed the expected level on a certain stage (phase) and the possible efficiency becomes negative (that means losses). So, the team agreed to analyze each phase and to carry out practical measurements on a test stand for searching the best efficiency for each of this phase; if possible, computer modelling media shall be applied or created for up-and-coming studies.
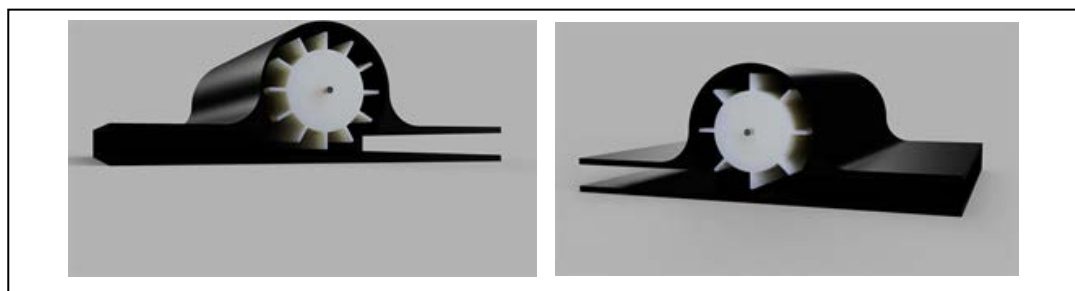
Figure 1 **Wind Turbine Layout View**

To achieve the efficiency of a generator for electric cars that can provide a practical benefit, an integrated approach (Matutis, 2008) is required, because it involves mechanics, electromechanics, electronics and some other areas of practical physics. On movement of an electric car, transformation of air flow around it into electric power required for charging the accumulator is one of the possible versions. Use of air flow power is analyzed in studies related to practical application of wind power systems where it is tried to use kinetic energy of air flow to the maximum possible extent. It was decided to carry out a practical analysis of this aspect in the first phase. The key problem of the said phase was a need to establish the number of wings of a chosen wind turbine that would ensure the best efficiency. The chosen geometric design of the turbine (Fig.1) is the simplest and is sensitive to environmental impact to the minimum extent. The design of the wings is simple as well; however, it ensures positive efficiency (in mechanical aspect) because of the relevant ratio of force levers.

However, the most interesting and uncertain factor remains use of air flow efficiency depending on the number of turbine wings. Such a formulation of the run of the study enabled starting to create a laboratory stand upon applying the available means and involving students in the works. It was planned to print a majority of details for the mock-up by 3D printers – these works were useful for developing skills of the students in design and manufacture, improved their

figurative thinking and their abilities to convey it. In addition, they included modelling, programming and practical manufacturing educative activities. The short involvement of students in the project was highly beneficial both for them and for the total process of education at the College.

While talking about the consequences of a long-term involvement in such a project and the benefit provided, it should be remembered that the essence of the study was integrated approach, i.e. complexity. In this multi-phase study, almost each phase was related to a new area, such as mechanics, electromechanics, electronics and so on. In addition, each of the said areas was bound with other ones, so maintenance of the positive efficiency on transfer from one phase to another required to understand the interaction of the said areas and their integrity and to take them into consideration. In the process of education, this predetermines the general mastering of the conception of the surrounding world's integrity that is very important for our young generation to survive in the period tormented by crises and to create the future for themselves and their children...

Talking about the methodology of the study, the most effective and simple (in the aspect related to the design of the stand) way to find an answer to the put question would probably be measuring the behavior of the turbine at constant air flow and variable number of turbine wings. For the said purpose, a large number of rotors of different configurations (with different numbers of wings) (Fig.1) shall be made using the available 3D printers. Upon taking into account later aspects of practical application, it would be purposeful to measure two parameters – the starting point when the turbine starts its movement (rotation) and the torque developed by the rotating turbine in its internal cavity. Measurements of the torque can be carried out on gradual increasing the load and observing the turbine rotational speed. Such a curve was drawn at the constant air flow (that remains the same on any changes of the turbine rotor's configuration or in absence of them) and describes a turbine with a certain number of wings. If we suppose that varying the number of wings causes changes of the turbine characteristics, these measurements will enable entering the relevant data to the programmed computer simulator and providing more detailed clarification of the results of practical measurements through their abstraction.

The opportunity of involvement in discussions on the run of the said study, designing of the stand, carrying out the measurements, presentation & analysis of the results, their transfer to the simulation medium, summarizing the results and presenting the conclusions provides to students of our Faculty a totality of practical skills required in the future professional activities of electronic engineers.

The Review of the Theoretical Framework

While speaking about wind power engineering, the wind power potential is usually analyzed; however, not the total power of moving air flow is technologically transferred into the power useful for the consumer.

In this analysis, wind is described as horizontal movement of air mass that is caused by the temperature difference on the surface of the Earth, because the Sun does not warm the surface of the Earth and the air of the atmosphere to the same extent. Cold air is heavier – in the atmosphere, it moves downward, thus forming high pressure zones. Warm air is easier, and it moves upwards in the atmosphere, thus forming low pressure zones. Air moves from a high-pressure zone to a low-pressure zone until the pressures become the same. Although wind is identified a renewable source of energy, it (because of its origin) is a phenomenon formed by the solar radiation. On analyzing the vertical section of the atmosphere, winds are divided to geostrophic winds and surface winds (Kytra, 2006). A geostrophic wind is formed on the height over 1 km; a wind formed on a lower height is a surface wind. In a layer of a surface wind, a zone of wind with the height up to 100 m may be found, because movement of air masses in the said zone is strongly affected by the roughness of the surface, i.e. inequalities of the surface of the Earth, buildings, plantations et cetera. It is natural that obstacles reduce the speed of the wind, so a higher speed of wind is observed in open territories, over oceans and seas. Close to obstacles, the windward and downwind zones are observed; they express themselves by the wind turbulence and its speed decrease.

The speed v is the key characteristic usable in wind power engineering analysis. According to the theory of classical mechanics, kinetic energy E of air flow (air mass) movement (Augulis, Jotautis, & Rutkuniene, 2012), shall be expressed as follows:

$$E = \frac{1}{2}mv^2;$$
(1)

here: v – the wind speed, m/s;
m – the air mass, kg.

The air mass moving through the wind wheel can be expressed as follows (Boyle, 2012):

$$m = \rho V = \rho Al = \rho Avt;$$
(2)

here: ρ – air density, kg/m³;
V – air volume, m³;
A – area, m²;

l – length, m;
v – wind speed, m/s;
t – time, s.
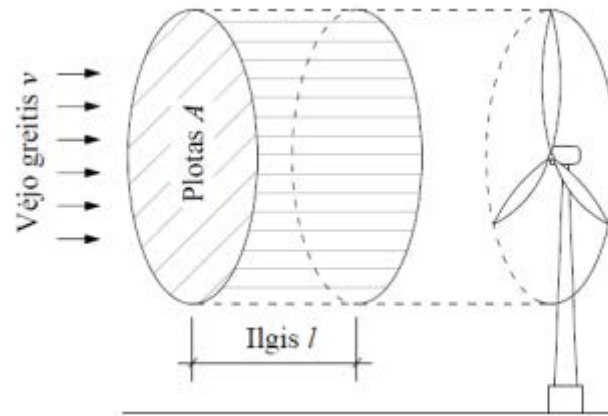
Figure 2 **The Scheme of the Air Mass Moving through the Wind Wheel** *(Boyle, 2012)*

So, the formula (1) may be expressed as follows (Mukund, 2006)

$$E = \frac{1}{2}mv^2 = \frac{1}{2}(\rho A v t)v^2 = \frac{1}{2}\rho A t v^3 \,.$$

(3)

Power P of air mass or air flow shall be expressed as power change per time unit (Mukund, 2006):

$$P = \frac{E}{t} = \frac{\frac{1}{2}\rho A t v^3}{t} = \frac{1}{2}\rho A v^3 \,.$$

(4)

We can see from the formula (3) that the maximum theoretical power of wind stream directly depends on the third degree of the value of the wind speed, so the wind speed is a key parameter usable for establishing techno-economical characteristics of wind.

The primary technological equipment that contacts with the air flow is the wind wheel. The power P_{m_in}, i. e. the power obtained from the air flow per time unit, can be calculated according to the formula (1) upon taking into account that power obtained by the wind wheel from the air flow depends on the difference between the wind speed before the wind wheel (v) and the wind speed behind the wind wheel (v_0) (Mukund, 2006):

(5)

$$P_{m\_in} = \frac{1}{2}\frac{m}{t}\left(v^2 - v_0^2\right) = \frac{1}{2}G\left(v^2 - v_0^2\right);$$

here: v – the wind speed before the wind wheel, m/s;
v0 – the wind speed behind the wind wheel, m/s;

G – the mass air flow, kg/s.

According to the formula (2), the mass air flow G may be expressed as an arithmetical average of the wind speed before the wind wheel and the wind speed behind the wind wheel (Mukund, 2006):

(6)

$$G = \rho A \frac{v + v_0}{2};$$

then:

$$P_{m\_in} = \frac{1}{2}\left(\rho A \frac{v + v_0}{2}\right) \cdot (v^2 - v_0^2) = \frac{1}{2}\rho A v^3 \frac{\left(1 + \frac{v_0}{v}\right) \cdot \left(1 - \left(\frac{v_0}{v}\right)^2\right)}{2}.$$

(7)

The last member in the formula (7) singles out the ratio between the wind speed before the wind wheel and the wind speed behind the wind wheel, thus describing the property of the wind wheel to adopt useful kinetic wind energy, and this non-dimensional value is referred to as the efficiency of the wind wheel, or the wind wheel's power factor c_p:

$$c_p = \frac{\left(1 + \frac{v_0}{v}\right) \cdot \left(1 - \left(\frac{v_0}{v}\right)^2\right)}{2};$$

(8)

then:

$$P_{m\_in} = \frac{1}{2}\rho A v^3 c_p.$$

(9)

The maximum power factor cp of an ideal wind wheel equals to 0.593 and takes place when the wind speed behind the wind wheel is suspended upon the ratio 2/3, as compared to the wind speed before the wind wheel. This law was formulated and proved by German scientist Albert Betz in 1919. A. Betz published the results of his study in 1920 in the paper „Das Maximum der theoretisch möglichen Ausnützung des Windes durch Windmotoren" („The theoretical limit of power of a wind turbine using the wind energy to the maximum extent") (Betz, 1920), and since the said time, A. Betz's law has not been replaced or altered or proved otherwise A. Betz's law describes the maximum power transformation of a certain operating point; however, on operation of a wind turbine, other losses appear as well too.

Designs of wind wheels can be various; their technical propertied and the ones related to wind power transformation differ as well.

The Methodology of the Research

As it was mentioned above, designs of wind wheels vary, and our team had chosen one of them - the version of a turbine (Fig. 1). As a stand for tests, we can use an elementary analogue of a wind tunnel. The wind flow is generated by a fan; on its way, a prototype of a turbine is placed; in addition, one air flow meter is placed before the turbine and the second air flow meter – at the air flow output. As it was mentioned earlier, we measure two parameters: the starting point when the turbine starts moving (rotating) and the torque developed by the rotating turbine in its internal cavity. Torque measurements can be carried out on a gradual increasing the load and observing the rotational speed of the turbine. Such a curve drawn for a constant air flow (that remains the same after a change of the turbine rotor configuration) would describe a turbine with a certain number of wings. For this purpose, we print rotors of different configurations (with different numbers of wings) and then carry out the measurements at a constant air flow upon varying the number of turbine wings.

The practical measurements seem to be simple; however, the restrictions applicable both to the process of studies and the practical training prevented us at present from presentation of the collected data and their analysis. For the same reason, the main question raised for this stage of the research remained unanswered: what number of wings is most efficient for such a turbine configuration. So, it was decided to present the computer simulation of the wind tunnel only. Because it also considerably affects the educational activities of the students and can be fully integrated in the process of education.

The simulations used Autodesk® CFD 7 (Autodesk CFD, 2021) software to turn a 3D CAD workstation into a fully interactive liquid and gas test bench, thermal test rig, or wind tunnel. 3D layouts become interactive, at no cost to prototypes, revealing critical engineering information that is difficult to obtain through physical testing. Change the design of the model and we will see the same change in Autodesk® CFD right away. This software has been used in combination with Autodesk Fusion 360 6 (Autodesk Fusion, 2021), which is 3D and 2D modeling software with a fairly user-friendly environment that allows you to use it comfortably without much challenge. It is a powerful program that allows you to create complex and large-scale layouts. Thanks to Fusion 360's ability to import layouts of required materials directly from the manufacturer's catalogs, it is possible to save time by designing less significant components (bolts, nuts, profiles, etc.) and use that time to implement the basic layout. Also, the ability to simulate moving parts of the device (albeit limited) allows for a better

understanding of the performance, durability of the final layout, and the anticipation and improvement of potential engineering mismatches.
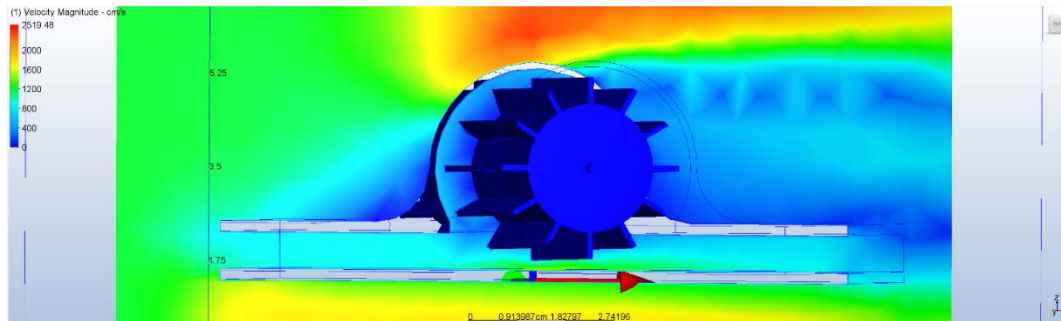
*Figure 3 **The Turbine in the Wind Tunnel Simulation***

The initial situation of the wind tunnel is presented in Fig.3 above. The chosen design of the wind turbine appeared to be not very effective. As one can see from the image of the simulation, a very weak air flow moves through the turbine wings and our goal is to achieve the maximum possible efficiency. The colored scale in the left part of the Figure indicates the intensity of the air flow in colors. The colored distribution presented in the Figure shows where air flows are most intensive. So, it can be presumed that an improvement of the design of the turbine body upon preserving the existing chosen geometry of the turbine is required.
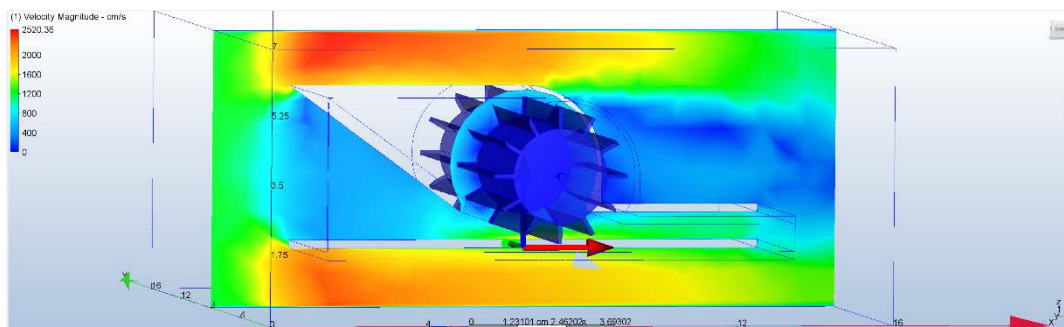
*Figure 4 **The Corrected Turbine in the Wind Tunnel Simulation***

It was decided to broaden the air inlet and to repeat a simulation once more. The repeated simulation is presented in Fig.4 above; it can be seen, that now, the intensity of the air flow through the wings grows considerably.

In such a way, step by step, we plan to fix coherently the maximum efficiency on each phase of the study and – after integrated coordination and summation of all phases – we hope to obtain a practically applicable electric generator for electric cars that enables to increase the distance coverable by a car

after a single charging its battery at a stationary charging station. As it was mentioned earlier, an electric car may be considered a certain autonomic robotic system, so in a broader sense it is the first step towards creation of a generator for autonomic robotic systems.

In such a way, the methodology of the study, applicable methods and the strategy of the run of the experimental research chosen by our team can be defined.

The Results of the Study and the Conclusions

The result of this first phase of the study is an obvious improvement of the turbine body upon applying the results of computer simulation only. However, it is only a technical achievement. In summary, the very important social role of this phase in the training process is that the youth starts taking an interest in research activities and practical application of technological solutions important for the total community that guide towards environmental conservation and protection as well as care about each other. It will help our new generation, in addition to developing the sense of social responsibility and understanding, to observe and adopt the inevitability of integrity. In the higher education process, integration of such studies is undoubtedly a very useful and promising tool.

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INFORMATION AND COMMUNICATION TECHNOLOGY: CASE FOR TERTIARY EDUCATION IN TERMS OF SMART ECONOMICS

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Abstract. *This research analyses information and communication technology as an effective tool and infrastructural basis for tertiary education development. The paper aimed to determine common roadmap of ICT implementation into national educational system taking into account variable factors of smart economics, global digitalisation and conditions of the international environment. Sufficient evidence of European countries' willingness to ICT transformation is illustrated. A subsidiary objective of this research involves the building of a logical model outlining correlation between tertiary education and level of ICT access by the example of some European member states and Ukraine. Statistical data were based on variable indicators describing ICT infrastructure, education effectiveness and economics. The methodology of statistical methods and GAP-analysis was applied. This allowed revealing complex recommendations for the transformation of education into a smart education. The research highlights key considerations and important trends in the development of European education under the digitalisation.*
Keywords: *information and communication technology, tertiary education, European education, ICT access, digital education, smart economy.*

Introduction

There are no doubts, humanity lives in an era of the Digital Millennium since "informatization" and "digitalization" directly relates to the way of doing business and even our lifestyle. The information flaw has grown rapidly for the past few

years while our biological ability to recognize all this big data remains the same. In this context, modern communication requires technological solutions so long as they are capable to transmit the information despite the distance, data volume and another barriers.

This imperative is quite topical for education because educational process involves active communication, informational exchange, delivering of a new knowledge and its creation. Thus, modern information society and educational environment are simply unimageable without widespread application of information and communication technology (ICT).

At least several reasons for this process could be distinguished.

Firstly, while global knowledge is constantly being updated, the introduction of ICT into education significantly accelerates the transfer of accumulated knowledge not only from person to person, but also from generation to generation.

Secondly, advanced ICT improves the quality of educational process and contributes to successful social adaptation in terms of ongoing informational changes and industrial progress.

Thirdly, integration of ICT is the calling of a digital era. The necessity of digitalization is particularly relevant for the tertiary education because higher educational institutions co-exist within a competitive and innovative framework. Thus, they should keep pace with the time and create intellectual potential of the nation. This crucial mission is completely impossible without comprehensive informatization and cooperation in the field of knowledge transfer.

We have to admit an accurate statement given by Director-General of UNESCO Federico Mayor in early 2000. He pointed out that new information technologies should contribute to creating a better world in which everyone will benefit from the achievements of education, science, culture and communication (Daniel, 2001). These days information and communication are strategically vital for the development of various spheres of human activity, including education.

The primary aim of this research is to determine a common roadmap of ICT implementation into tertiary education taking into account variable factors of smart economics, global digitalization and conditions of the international environment. A subsidiary purpose involves the analysis of European countries' willingness to ICT transformation. From another hand, the study is intended to describe a logical model outlining correlation between tertiary education and level of ICT access by the example of some European member states and Ukraine.

Literature Review

Over the past decade the concept of digital education has gained considerable acclaim among the scientists and practitioners. Thus, information and

communication technology is analyzed in terms of its practical application in educational process.

Besides, the strategy of ICT integration meets the requirements of the Fourth Sustainable Development Goal, proclaimed by the lead United Nations Organization for education. In general, this Goal ensures inclusive and equitable education, promotes lifelong learning opportunities for all. In particular, it argues for the transformation of education and puts the idea of digital-based approach to the world educational system. In addition, UNESCO encourage countries' awareness about the role and opportunities of ICT in education. This vision was described in Incheon Declaration devoted to global education strategy to 2030 (UNESCO, 2017).

We have to admit a profound research of European professors (García-Peñalvo et al., 2017) that described ICT as a key element in educational and knowledge management processes. They pointed out the idea of the learning ecosystem that became very important because of the gap between advances in technology and current teaching methods.

Significant possibilities of ICT for education are illustrated in the paper (Orishev, 2020) claiming for irreversible change of education system under new technologies. Some scientists propose the concept of emerging technologies as a new reality for blended learning (Dziuban et al., 2018). Moreover, blended learning widely uses ICT and will forces technological adaptation in higher education in the next years (Becker et al., 2017)

In addition, authors agree in stating that ICT improves the quality of education since encourages the new forms of learning. For instance, the following new form were represented by the scientists (Raja & Nagasubramani, 2018): creative learning, integrative learning and evaluative learning.

No doubt, these tendencies open wide opportunities for ICT implementation into the tertiary education.

Methodology

In general, we accomplished a complex analysis of the problem based on the empirical method of scientific research. Statistic and econometric tools were applied for better describing trends, dynamics of criteria and coherences between them. Data collection implied statistical processing of information synthesised from the official open Internet resources such as Eurostat (2019) and other World-statistics given in the different analytical reports. We also used elements of deductive and inductive methods, logic approaches, methods of prospective and retrospective analysis in order to arrange analytic conclusions, to describe a logical model of tertiary education in the context of digitalization and ICT implementation.

Results of the research methodology will be outlined below.

Research Results
Global Outlook of ICT Performance and Education Development

Taking into account global digitalization, data explosion and comparatively simple access to innovation, present-day tertiary education could not operate effectively without information and communication technology, that significantly improves at least two main educational processes: transfer of knowledge and multilateral communication between all educational stakeholders and participants.

Broadly speaking information and communications technology (ICT) includes the special infrastructure and variable computing elements. In contrast to informational technology, ICT is generally used to describe a broader and more comprehensive understanding of a digital environment since its scope is more extensive (Tatnall, 2020). Moreover, it refers to all technological fields, namely telecommunications, media, programming, artificial intelligence, information systems, network-based systems, audiovisual techniques, monitoring etc.

Thus, ICT considerably improves, enrich and even transform educational process for the better. However, the main problem is how to provide an explanation of the role such technology could play and how ICT could be integrated into the tertiary institutions. While in theory the opportunities of ICT are quite understandable, in practice there are some problems with ICT's infrastructure, funding and overall development.

ICT market has grown considerably for the past decade. Furthermore, this market is very attractive for the investment and could be considered as one of the most long-standing digital market these days (Figure 1).
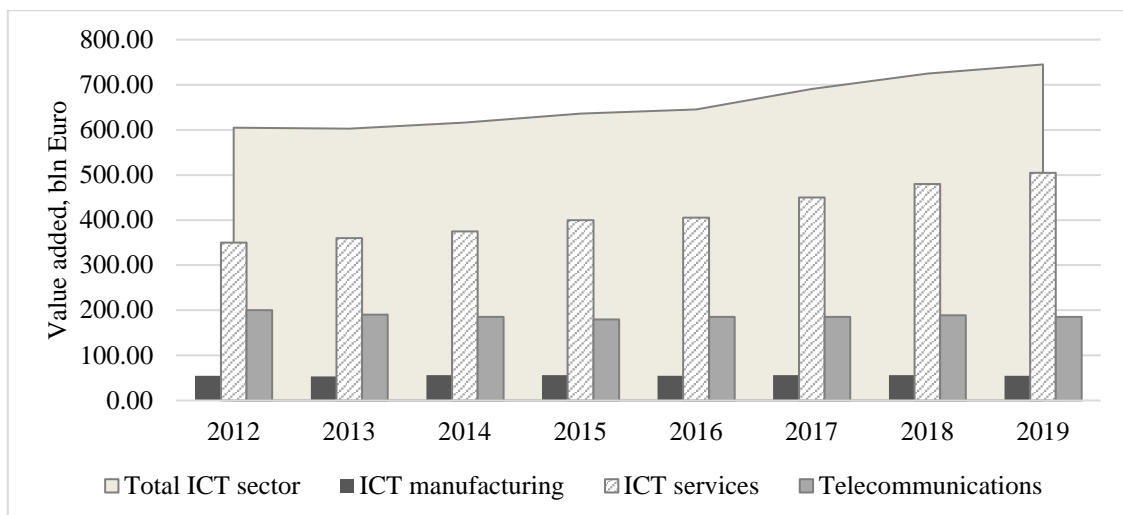
Figure 1 ***Global Value Added Made by ICT Sector***
(composed on the basis of European Commission, 2020)

For the last 7 years global value added by ICT sector has gone up to almost 500 bln Euro. The diagram illustrates total increase in the range of 20% (100 bln Euro). This significant growth results from the rapid development of ICT services (4,5 % in 2019). Eventually, value added of ICT services continue to rise in 2020 due to the sharp growth in demand for information technology under global lockdown. It is noteworthy, that the level of technological ICT production and telecommunication remains stable in comparison with ICT services.

To be more specific, ICT affords very significant opportunities for the development of tertiary education, namely automatisation of the learning process, application of digital technologies and virtual reality, access to the big data and the latest scientific information, global internet, distance learning and communication, smart equipment (tablets, interactive boards) etc.

On the other hand, implementation of all these benefits depends on country's readiness to the digital transformation in educational sphere. This relates to the following criteria: low level of university infrastructure and logistics, the general level of digitalization, index of innovation, research and development activities, as well as the general level of digital competencies of both students and lecturers.

These technical factors restrict the development of educational systems. Besides, the main barrier relates to reluctance of some universities to transform their old system in order with new digital standards and student's needs. In addition, ICT introduction may be inhibited due to pure economic performance. There are no doubts, educational ICT projects imply large funding. While ICT services are comparatively affordable for the universities, ITC infrastructure and special hardware could be very expensive.
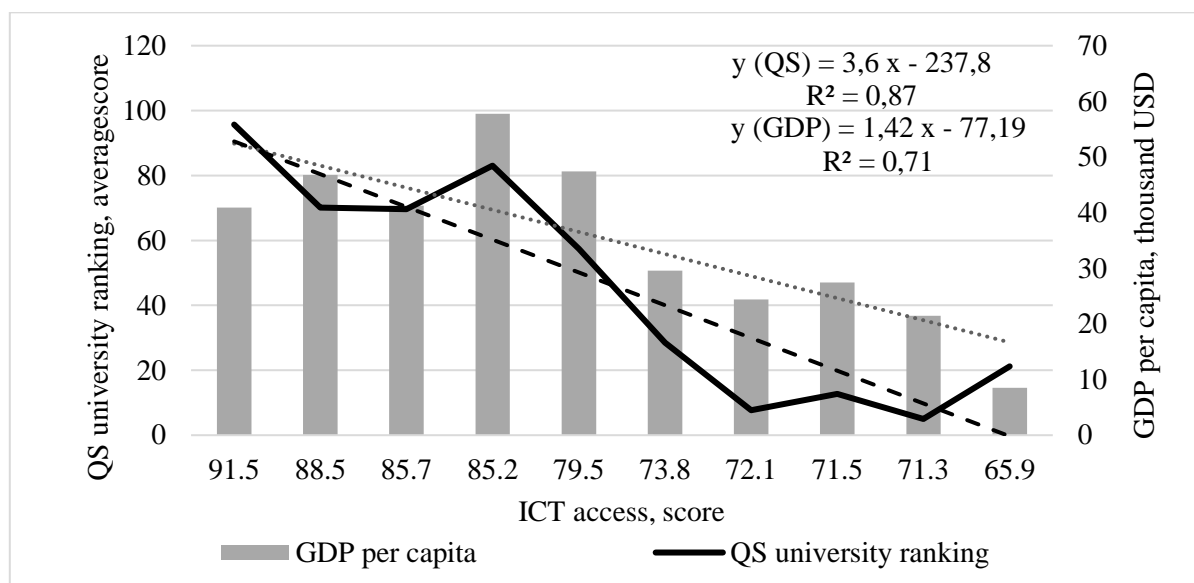
*Figure 2 **Linkages between ICT Access, University Ranking and GDP per Capita**
(authors' calculations based on Global innovation index report by Dutta et al., 2020)*

The analysis confirms that the development of ICT impacts both the national economy and national education (Figure 2). This correlation was illustrated on the basis of compiled data from some European member states and Ukraine.

The obtained trend models allow delineating at least two correlations:

1) A high level of GDP per capita is followed by a sufficiently high access to ICT infrastructure. We may set a hypothesis that modern domestic production is grounded on the digital basis and mostly depends on information technologies, that proves the evidence of Industry 4.0.

2) Diagram illustrates the fact, that ICT access accelerates universities development. Thus, countries with highly developed tertiary education also have a good access to ICT services and hardware. This level could be evaluated by the average score of the TOP national universities given by QS World University ranking (Mussard & James 2018).

To be more specific, these conclusions could be drawn as follows. According to the research, the ICT score above 80 points could be considered as strong position for upper middle- and high-income countries (European Commission, 2020). At the same time, level of national universities in advanced economies is differentiated as: QS average score above 70 points (strong level, advanced university), 50-70 (good position), 20-50 (low middle, but satisfactory level). However, some universities in developing countries gets above 20 points and this score illustrates comparatively high development of national tertiary education. Thus, in order to ensure ICT access above 80 points, the level of GDP per capita should be above 30 thousand dollars. Indeed, such growth of GDP and ICT access will encourage the development of higher education. We can expect average growth of universities up to 50 points according to the QS assessment.

The outlined results led us to investigate the system "Information and communication technology ↔ tertiary education ↔ economics" in the context of European countries. The variable indicators were arranged due to this purpose (Table 1).

The table represents a wide range of technical, social and economics indicators relevant for European member states and Ukraine. The analysis allows establishing crucial and minor gaps in the level of ICT, education and general economic outcomes of the countries (Figure 3).

Despite strong common correlation between ICT and education (Figure 2), there are some essential differences identified during the gap-analysis. The first diagram (Figure 3a) illustrates comparatively strong position in all ICT indicators for high income economies (United Kingdom, Germany, France, Denmark and Switzerland). Romania, Latvia, Bulgaria and Poland show a delay compared to leading countries. However, the level of government online services and e-participation increases steadily in Poland and Bulgaria.

The biggest negative gaps were established for the level of ICT use and government online services in Ukraine. We have to admit, that Ukraine is the one country in Europe classified as lower middle-income economy. On the contrary to Ukraine's underdevelopment in ICT sphere, its education illustrates very promising perspective (Figure 3b).

Table 1 **The System of Indicators for ICT and Tertiary Education**
(authors' arrangement based on Global innovation index report by Dutta et al., 2020)

Indicator	United Kingdom	Denmark	France	Germany	Switzerland	Poland	Bulgaria	Latvia	Romania	Ukraine
Income level	*high*	*high*	*high*	*high*	*high*	*high*	*Upper middle*	*high*	*Upper middle*	*Lower middle*
ICT place in world ranking / score	1/ 93,6	3/ 92,4	6/ 90,8	15/ 88,5	21/ 85,8	30/ 81,1	44/ 76,2	55/ 70,8	60/ 69,1	82/ 58,8
Tertiary education place in world ranking / score	15/ 51,3	26/ 45,3	24/ 45,4	6/ 56,1	18/ 49,4	51/ 37,9	54/ 37,4	30/ 44,5	43/ 39,8	32/ 43,9
Population, mn	67,5	5,8	65,1	83,5	8,6	37,9	7	1,9	19,4	44
GDP per capita, thou. USD	40,88	47,4	41,23	46,76	57,79	29,59	21,472	27,42	24,4	8,53
Tertiary education indicators										
Expenditure on education, %GDP	5,5	7,6	5,3	4,8	5,1	4,6	4,1	4,7	3	5,4
Graduates in science&engineering, %	26,3	21	25,6	35,6	24,9	22,9	20,5	20,9	28,8	25,3
Inbound mobility, %	17,9	10,8	10,2	8,4	17,8	4,1	5,5	7,4	5,2	3,1
QS university ranking, averagescore	95,7	57,4	69,6	70,1	83	28,5	5	12,7	7,7	21,2
PISA reading, math	503,5	501,1	493,7	500,4	498,2	512,8	426,7	487,4	427,8	462,7
Digital skills among population, 1-7 (best)	4,94	5,42	4,49	5,07	5	4,27	4,65	4,79	4,49	4,45
ICT indicators										
ICT access, score	91,5	79,5	85,7	88,5	85,2	73,8	71,3	71,5	72,1	65,9
ICT use, score	86,5	90,3	82,8	80,3	88,8	68,1	69,9	76,3	67,4	43,7
Gov online service, score	97,9	100	97,9	93,1	84,7	93,1	76,4	66,7	66	56,9
E-participation	98,3	100	96,6	92,1	84,3	89,3	87,1	68,5	70,8	68,5

a) ICT indicators (score)   *b) Educational indicators (%)*
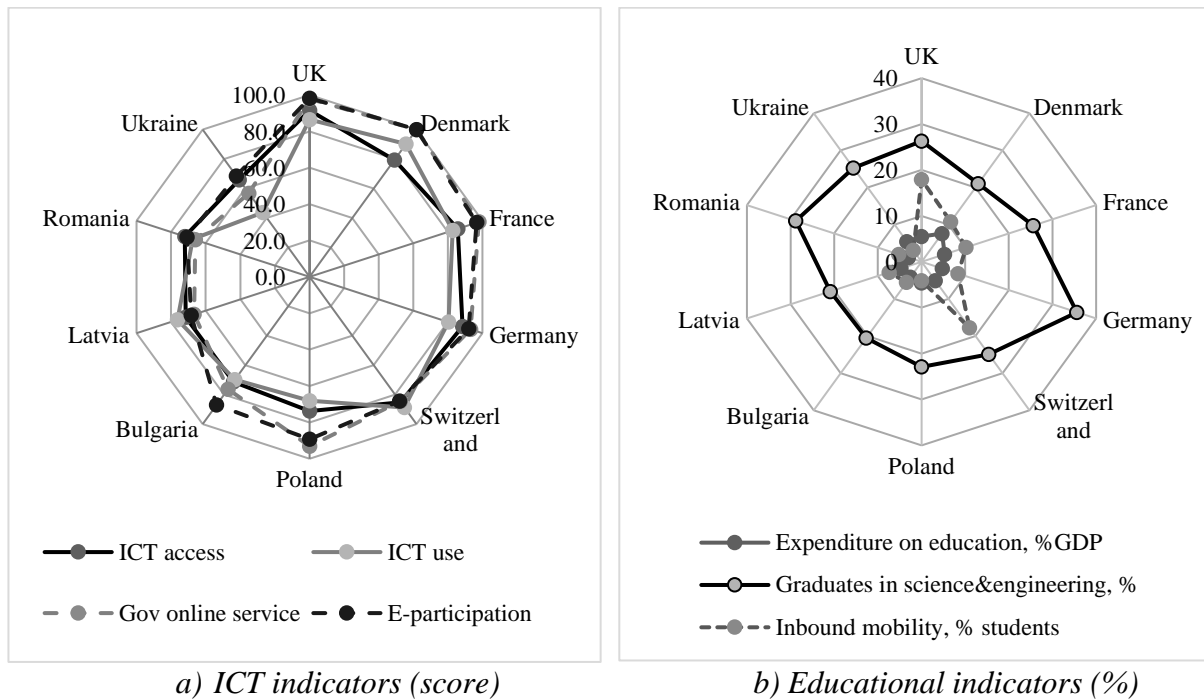
*Figure 3 **European ICT Infrastructure via Education Performance***
(authors' calculations based on European Commission, 2020)

The research led to the conclusion, that countries with the highest expenditure on education are the most developed in ICT services. One can observe an increasing tendency for the significant growth of graduates in science and engineering in the countries with the best ICT scores. Moreover, this could be interpreted as a condition for the competitiveness of modern tertiary education.

International ICT's Roadmap for Tertiary Education in Terms of Smart Economics

The concept of interaction between ICT sector and higher education should be considered as cyclical. Initially, ICT provides numerous tools for the educational process. Tertiary education, in turn, contributes to the creation of a new knowledge and innovation. Eventually, such innovation becomes a driver of the Industry 4.0, that gradually accelerates scientific researches, technological development and ICT design. In addition, it is impossible to consider this complex process without the economy and dynamic market relations.

It is noteworthy, that global digitalization describes modern world from the perspective of "smart", namely smart industry, smart home, smart city etc. SMART economy is measured as Specific, Measurable, Achievable, Realistic and Timed (Elgazzar, 2017). Smart economy involves high-tech innovation,

digitalization, intellectual potential, effective production, free market, social and ecological responsibility (Izmaylov et al., 2018).

Thinking this way, the development of information and communication technologies reflects the new paradigm of smart education. Tertiary Smart education is based on ICT and provides open access to educational process, automatization and support, distance learning, individual approach to student's study, transparent form of a control, personal accounts for students and lecturers (Berdnikova et al., 2019).

The world ICT market is represented by 2 profound sectors: ICT manufacturing (hardware production) and ICT services. This fact should be taken into account in elaborating the national strategy of education development based on ICT introduction.

The hierarchical structure of these ICT sectors is the following (Figure 4).
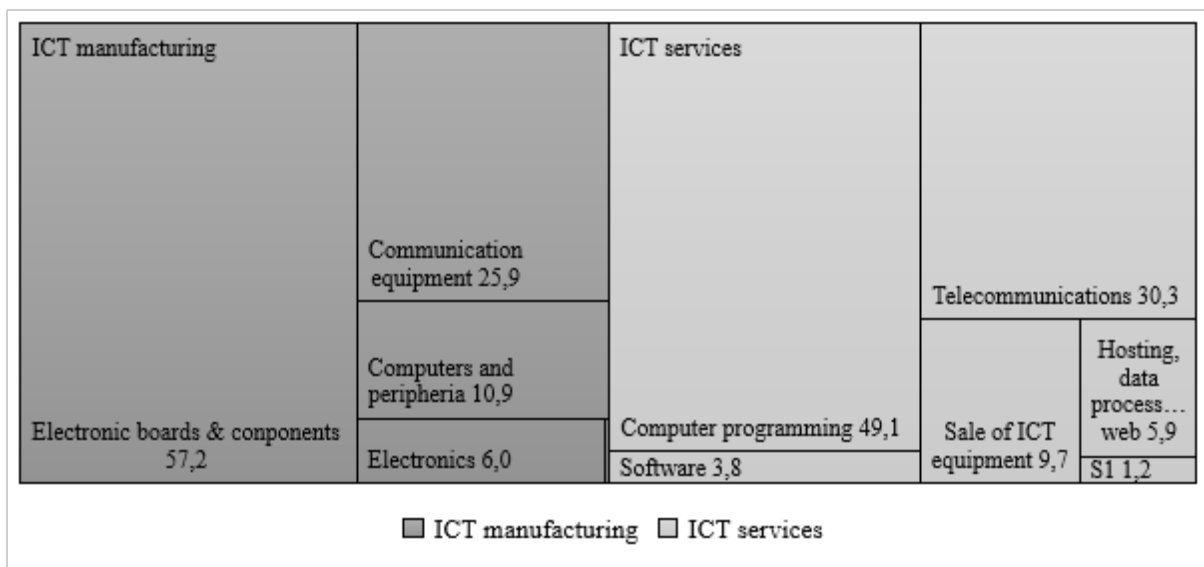
Where S1 – computer maintenance and repairing

Figure 4 **Structure of ICT Manufacturing and Services in Terms of its Value Added, %**
(authors' calculations based on Eurostat, 2019)

The model reveals that manufacture of electronic components and boards is dominated field of ICT production. It provides 57.2 % of the total ICT value added. Communication equipment relates to the next largest share (25.9%), while production of consumer electronics, magnetic and optical media provides only 6% and 0.1% consequently.

As illustrated above (Figure 1), ICT services represent the lion's share of global ICT value added and actually drive the market. Computer programming, consultancy and related activities cover about the half of all ICT services

(49.1 %). Telecommunication is also very promising kind of ICT services accounted for 30 % of the total value added.

In practice, ICT allows effective presenting of educational information with color, graphics, sound, video that reflect real situation or simulate some processes.

ICT services and manufacturing can address different needs and goals of tertiary education. Besides, the integration of ICT into educational process contributes to the establishment of the innovative forms in tertiary education, such as virtual universities, open and distance education etc. That is the most spectacular opportunity of ICT implementation.

Accordingly, the following scheme illustrates the common roadmap of ICT integration into tertiary education (Figure 5).

Virtual university

Entrepreneurial university

Model of open education

Model of distance education

Impact
- Internalisation of education
- Education for everyone (Goal for Sustainable development #4)
- Latest knowledge and open scientific schools
- Availability and transparency

Major "smart" models in tertiary education

Information and Communication Technology (ICT)

Major ICT projects in tertiary education

Computer labs, R&D centers

Smart textbooks with virtual reality

Educational TV and the Internet

Smart university network and student-oriented infrastructure

Special software for knowledge delivering and revising

*Figure 5 **Common ICT Roadmap Focused on Tertiary Education** (authors' scheme)*

The implementation of this roadmap involves the following steps and reformations.

1. The reform of the educational infrastructure that should be designed on the digital basis. It is necessary to develop and to implement fundamentally new pedagogical ICT that will ensure a high level of basic digital literacy among the population. Such infrastructure ensures

    equal access to tertiary education and includes a wider range of digital services, such as lifelong learning, distance learning and dual education.

2. Funding the universities in the fields of applied research and digital entrepreneurship. Tertiary education requires effective scientific R&D centers and digital business models.

3. Training centers and additional education in the field of digital economics. According to McKinsey Global Institute, up to 50% of all work activities will be automated by 2036, which will lead to a significant layoff of labor, reducing the number of jobs that require secondary skills (Illanes et al., 2018). Thus, the university mission is overcome the lack of needable skills.

4. Improvement of the knowledge monitoring system. ICT allows changing the approach to the control of educational activities. This provides flexibility and transparency in the management of the educational process.

5. Partnership between universities, government and business. This interaction involves the development of analytical platforms and IT applications for data exchange.

As a result, ICT introduction requires the increase of students and lecturers awareness about the importance of innovation, digital approaches to education, common risks and prospects.

Conclusions

Global digitalization forces all areas of human being, including primary and tertiary education. In these conditions Information and Communication technology becomes an essential tool for the educational management and knowledge transfer, since. In addition, ICT serves multilateral communication between all educational stakeholders and participants.

ICT provides very significant opportunities for the development of tertiary education, namely automatization of the learning process, application of digital technologies and virtual reality, access to the big data and the latest scientific information, global internet, distance learning, smart equipment (tablets, interactive boards) etc. On the other hand, the implementation of ICT benefits depends on country's readiness to the digital transformation.

The analysis confirms that the development of ICT impacts both the national economy and national tertiary education. A high level of GDP per capita is followed by a sufficiently high access to ICT infrastructure. This proves the hypothesis that modern domestic production is grounded on the digital basis and mostly depends on Industry 4.0. Research results confirmed, that ICT access

accelerates universities development. Thus, countries with highly developed tertiary education also have a good access to ICT services and hardware.

The analysis illustrates comparatively strong position in all ICT indicators for high income economies (United Kingdom, Germany, France, Denmark and Switzerland). Romania, Latvia, Bulgaria and Poland show a little delay. The biggest negative gaps were established for the level of ICT use and government online services in Ukraine.

Countries with the highest expenditure on education are the most developed in ICT services. There is a significant growth of graduates in science and engineering in the countries with the best ICT scores.

The roadmap of ICT integration implies the launching of ICT projects into tertiary education, such as computer labs and R&D, smart university infrastructure, educational Internet, smart books etc. This allows forcing the new educational ICT-based models, namely virtual and entrepreneurial university, open, distance and blended learning. The implementation of this roadmap involves some complex steps and reformations, given in the paper.

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LEGAL TECH IN LEGAL EDUCATION: GLOBAL PERSPECTIVES AND CHALLENGES FROM THE LATVIAN - UKRAINIAN EXPERIENCE

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Abstract. *The paper examines legal rules covering the legal industry and the field of legal education against the background of fast-growing innovation technology and it's influence. The field of legal education faces with several transformation processes. Thus, educators should be ready to prepare law students for innovations in the legal field as well. The era of legal technology (or "Legal Tech") is becoming a crucial element of modern lawyers. According to several reports, Legal Tech brings new trends for a lawyer. Such profession faces new challenges, therefore from the educational point of view it is important to prepare students for those changes. The work on national and global level in the field of policy planning documents is needed. Authors found out that nowadays legal education has a weakness that relates to insufficient cooperation with such vital elements as technology and innovation. Law science and technology cannot be considered separately taking into account changes in the global disciplines. Legal Tech in the legal education system can be implemented on several educational levels. Legal Tech education should take part on university level to instill in young lawyers a taste for progressive technologies from the student's bench.*
Keywords: *education, future, Legal Tech.*

Introduction

Technology and innovations are changing the concept of legal services and the deliverability of particular services. The world in common as well as the world of legal services are becoming virtual. Technologies provide more unique opportunities for lawyers, but the question is are lawyers, society, and educational systems ready to accept them. Digitization already has an impact on legal issues. McGinnis and Pearce reckon that the disruption of the legal profession has begun and that technological acceleration will have significant implications for both legal practice and legal education (McFaul, FitzGerald, Byrne et al., 2020).

Nowadays, the law profession is more advanced than the law school model. Law schools still provide 20th century skills knowledge to the students. Nevertheless, the legal profession with the technological progress is more

compliant to 21st-century system. There is a lot of practical legal work that can be done by special technologies, systems, and machines. The same situation is with the document analyzing process and legal research. There is no need anymore to review a large number of legal documents, case law, etc. New technologies provide this option (Corrales, Forgo, & Kono, 2020).

From the authors point of view, it is significant to identify and clarify the importance of modern and developed legal educational systems. Considering the new technological trends, Legal Tech, fast-growing artificial intelligence and the opportunities they provide, there is a need for lawyers who work with the systems. Modern or future lawyers are persons who can solve the problem of the client with regard to the data provided by the mechanisms. Legal Tech is the way to achieve the goal and provide competitive services to advanced clients. Some scientific resources provide the definition "legal knowledge engineer". Authors agree with the idea of a new concepts of legal knowledge, because modern as well as future lawyers will be the people who will work with the development of new ways of solving legal problems. And with the "new ways" authors understand technological support in the legal profession.

The development and usage of new educational technology (hereinafter - EdTech) and Legal Tech can drastically transform the legal education system. The implementation of the Legal Tech tool in the system of higher legal education requires joint efforts of the representatives of different law schools, legal practitioners, and IT specialists. We consider the issues of improving legal education in Ukraine and Latvia, the legal background, and the first steps taken towards the implementation of Legal Tech to be relevant and that they require to be discussed in detail by the representatives of the academic community (Ryan, 2020).

Does it mean that the implementation of EdTech and Legal Tech can fully replace "traditional training" of law students? It is obvious that the development of educational technology requires adjustment to new conditions of training, and that legal education must adopt to it and implement certain Legal Tech tools.

We firmly believe that the only way to get new forms of training legal students is to combine EdTech and Legal Tech. The **aim of the research is** to investigate factors associated with the Legal Tech in Latvian and Ukrainian legal education systems.

For the purposes to achieve the aim of the research, the authors will use general scientific methods. The authors will make the legal analysis of national, international documents. To complete the research, authors will use general scientific methods such as synthesis, comparative method, and deductive methods.

The theoretical base of the study is constituted by contemporary scientific works and articles of national and international authors. As well as scientists'

views who have provided a global contribution to the development of Legal Tech in the educational systems will be considered and analyzed.

Research

Future developments of legal digital transformation give a lot of advantages, as well as provide new challenges for legal education. Examples mentioned before illustrate the application of Legal Tech in practice and show how to automatized workflows, artificial intelligence, automatized generation of documents are in use today and will be used in the future (Hartung, Bues, & Halbleib, 2018).

The legal market is changed. As well the work of nowadays layers becomes more technological. Legal Tech is an important instrument to increase the potential of lawyers. New technologies make changes in lawyers' professional lives. Legal Tech is as assisting programme for lawyers. And provide them legal services much faster. The advantage is the cost efficiency as well. Legal Tech in practice can make the matter more efficient and profitable. Many national, as well as international legal firms use the technological progress for reasons mentioned before. Legal market has new challenges - new branches of laws, new types of legal transactions, technological progress, fast -changing legislation, the law can't keep up with new technologies anymore etc. The advantage of Legal Tech is the fast research of the legal problem, the possibility to adapt to the changes in the legislation field, the automatization of the management, and customer or client-based approach (the communication with the clients).

Law students starting studies at a university deal with particularly new challenges. Fast growing changes into the law industry influence the content of the study. At the same time, new skills are needed to be prepared for the lawyer profession transformation (Hartung, Bues, & Halbleib, 2018). Nowadays, the issue of artificial intelligence and artificial intelligence technology in the context of lawyer's duties is not futuristic anymore. Artificial intelligence programs help law firms with contract management and contract drafting. Softwares can provide standardized contract templates that, for instance, can be based on previous years' experience, past legal disputes, etc. (Betts & Jaep, 2017). The same situation is with legal chatbots that help with lawyers in the consulting sphere. Therefore, there are new accents in the law education system shall be made. The skills that the lawyers of 21th should gain are collecting contract performance data, ethical issues on artificial intelligence usage in legal practice etc. (Andrade, 2020).

Digital transformation (digitalization) is a driving force for legal occupation and it requires a different set of skills and capabilities than those traditionally taught in law school or used in legal practice.

EdTech	✚	Legal Tech	＝	New forms of training legal students

Figure 1 **Legal Tech Scheme**

Tanner Mirrlees and Shahid Alvi (2020) also discuss the issue of transforming higher education under the conditions of the «digital age»: «But has digital technology produced a "digital age" that compels society and all of its universities to undergo or adapt to a profound change?» (Mirrlees & Alvi, 2020). While current digital developments are accompanied by projections of and often pleas for revolutionary change in higher education, we do not believe that a technology-determined "digital age" is the fundamental cause of the contemporary transformation of higher education in the early 21st century. Higher education and digital technology are part and product of society, and in any age they will express society's broader economic, political, and ideological conditions (Mirrlees & Alvi, 2020).

Within this context, it is necessary to consider certain approaches to understanding the concept EdTech. Clear definitions of the term are in short supply, and this is largely because the meaning of the technology itself "is messy and complex" (Hughes, 2004); it has been often described as "the knowledge and instruments that humans use to accomplish the purposes of life" (Friedel, 2007). The meaning of "digital technology" is no less clean and simple, as this phrase is frequently an umbrella for the totality of devices (hardware), applications (software), and platforms enabling the creation, circulation, storage, retrieval, manipulation or reception of digital content. Current ideas of EdTech are also multifaceted (Mirrlees & Alvi, 2020).

They tend to encompass three currents: an academic discipline usually housed in faculties, departments, and programs associated with "education". An educational "design science" or mode of educational governmentality for developing, carrying out, and evaluating the whole process of teaching and learning, with the goal of improving educational performance or a subject's conduct of educational conduct. It shall be noted, that the digital technologies used by teachers and learners for the means and ends deemed "educational." (Moller, Huett, & Harvey, 2009). In much popular discourse, and throughout much of this book, EdTech tends to denote an industry and commercially available digital technologies used by teachers and learners for the means and ends of something called "education" (Mirrlees & Alvi, 2020).

In order for new education technologies to be actually embodied and used in the learning process, Michael Spector suggested that "educational technologists"

follow the so-called "Educational Oath" in their work, kind of like the Hippocratic Oath:

1. Do nothing to impair learning performance and instruction.
2. Do what you can to improve learning performance and instruction.
3. Base your actions on the evidence that you and others have gathered and analyzed.
4. Share the principles of learning, performance, and instruction that you have learned with others.
5. Respect the individual rights of all those with whom you interact.

Summarized, it summons us to improve education (and not hinder it), to use evidence from research and practice, to share, and to respect others (Spector, Ohrazda, Van Schaack, Wiley, 2005).

It is obvious that legal education cannot stand aside from educational technologies and new technological tools that are actively used in legal practice. A modern law student must acquire a set of Legal Tech skills during the study.

M. Fenwick, W.A. Kaal, E.P.M. Vermeulen think that the introduction of a Coding for Lawyers course into our legal education programs is highly appropriate. They are convinced that coding can help in solving many contemporary economic, environmental, and social issues. Such skills can help «the lawyers of the future» to understand and communicate with programmers. This is why law students will benefit on understanding the basic concepts and power of coding (Fenwick & Kaal, 2020).

To make the analyses of the current situation in the field of Legal Tech authors decide to compare Latvia and Ukraine experience. Latvia is the EU country with the fast growing technological - digital potential. Ministry of Environmental Protection and Regional Development of Latvia work on "Digital Transformation Guidelines for 2021-2027". The document sets long-term priorities and strategic guidelines for the country's digital development and changes to be implemented in all areas of the economy and life in order to ensure the digital environment (Ministry of Environmental Protection and Regional Development of the Republic of Latvia, 2021). But Ukraine in non EU country that according to the Legal Tech project catalogue has up to 50 Legal Tech projects at the Ukrainian market. Legal Tech development in Ukraine is at the initial stage but still there are fast growing market. Theme of present article is not so much discussed in the academic literature in Latvia, but it must be noted, that the lawyer's profession involves both providing legal aid to others persons in the protection of their rights and taking a nationally important positions. It is vital that the demands of a lawyer qualifications are high enough andmodern from the development perspective (Grasis, 2020). The new system of National Uniform Professional Legal Qualification Examination for lawers shows the necessity to transform the study process, to make changes in the study courses, and this is the

good opportunity for Legal Tech implementation in the study process (Vilks, 2019).

According to paragraph 4, part 1 of the Presidential Decree dated 30.09.2019 №722/2019 "On the Sustainable Development Goals of Ukraine until 2030" ensuring inclusive and quality education and encouraging lifelong learning opportunities for all are defined as guidelines for the development of draft forecast and program documents, draft regulations in order to ensure sustainable development of Ukraine for the period up to 2030 (President of Ukraine, 2019).

Cabinet of Ministers of Ukraine Resolution dated 12 June 2020 № 471 "On approval of the Programme of Activity of the Cabinet of Ministers of Ukraine" defines the need for comprehensive reform of higher legal education and preparation of educational institutions for the educational process in a pandemic (2020-2021) is determined. (Cabinet of the Ministers of Ukraine, 2020) To implement this Order, the Concept for the Development of Legal Education was developed and discussed at the working meetings of the people's Deputies of Ukraine together with experts in the field of law and higher education. It should be noted that this concept defines the state of modern legal education in Ukraine and the ways of its improvement (Komitet Verhovnoj Radi Ukraini, 2020).

Thus, the concept for the development of Legal Education demonstrates the inconsistency of the content of legal education and the quality of training in law schools with modern labor market requirements and challenges facing modern democratic society, global development trends, and the task of lawyers in various fields. The content of legal disciplines taught in the law schools of Ukraine, methods of teaching legal science, as well as the administration of these schools and universities, in general, is slowly undergoing qualitative changes, and remain to be a legacy of the Soviet legal education system, according to which a lawyer is perceived as a person summoned to serve the state, rather than a guarantee, assert and protect human rights or ensure effective public prosecution. Because of this, forming the legislative area for the activities of legal institutions following European standards, the state does not get specialists who can implement new laws for the assertion and protection of human rights (Abroski, 2020).

The concept of the development of legal education as a guiding document of state policy in the field of legal education consists of so-called strategic goals. It is planned that the gradual achievement of these goals will help improve the training of future lawyers. We would like to give a positive notice to the activities of the legal community directed at launching a strategic document, which provides for certain issues of the use of Legal Tech in legal education.

We offer to get acquainted in more detail with the main strategic goals and their compliance with modern requirements relating to the implementation of Legal Tech in the educational process.

Strategic goal № 5 "Law schools ensure that higher legal education students acquire a high level of applied practical skills and abilities". According to this goal, the active introduction of innovative forms and methods of teaching into the educational process is envisaged: cases, educational court hearings, etc.

Strategic goal №10 "Law schools are powerful centers of scientific, educational, and innovative development." It should be emphasized that within the framework of this goal, it is planned to provide legal education seekers with access to educational resources including recognized professional databases, international informational, scientific and practical, library, and other resources.

We have reason to note that the draft Concept for the Development of Legal Education indirectly mentions the need to implement certain tools of Legal Tech during the training of law students (use of educational resources, practical cases, training court hearings) (Komitet Verhovnoj Radi Ukraini, 2020). However, there is no legal act that regulates the issue of consistent implementation of Legal Tech in training programs for lawyers.

Latvian Education Law (Education Law, 1999) demonstrates the positive tendency in developing education from the technological perspective. The Law provides information on technical teaching aids (technical equipment and devices to be used in the learning process, including technical equipment and devices provided for educates with special needs), the use of individual learning accessories, as well as technologies. The new lawyer's professional standard in Latvia should be mentioned as well. According to the standard, a lawyer should have general knowledge on Information technology law. The students during the education process should be educated more on technology. Nevertheless, it is universities that play the substantial role in training future lawyers and legal tech implementation during the educational process. The content of the legal programs depends on both international and national politics and guidelines, legal regulations, but the higher education institutions can play a bigger role.

During the establishment of a program, for instance, Master of Law program, higher university is able to create the study programme that includes study courses based on Legal Tech and innovation in particular area. The current topics on Legal Tech can be included in to the study course as well (Ryan, 2020). For example, a study course Environmental law can be based on Legal Tech applications, systems, etc. During the educational process, students can work with Legal Tech systems and solve legal problems based on the innovative approach. The European Commission supports in Estonia an established Legal Tech. - A.I. powered legal service platform of Lawyers was created HUGO.legal (European Comission, 2020). Legal program Legium – the legal platform to sign online legal contracts on blockchain. There are several professional legal document drafting programmes. Professional lawyers work a lot with legal documents. During the educational process, especially on professional level programs, during the

practical classes, lecturers pay big attention to the improvement of students' legal skills in a particular area. However, it must be noted that over time, technologies demonstrate that there are more efficient ways to draft some legal documents. Some legal offices, even in Latvia are already working with tools like text templates or "speech-to-text". It can be mentioned that Legal Tech's new document management tools can automatically input contextual data, generate texts, etc. (Mirrlees, Alvi, 2020).

It should be noted that to eliminate these and other problems of modern legal education in terms of application of Legal Tech tools in the educational process, in Ukraine, the first steps have been taken (Lindgren, 2018).

The term "legal tech" (short for "legal technology") is an area where legal practice and high technology meet, mainly through the creation and development of computer programs (offline and online applications, bots (including chatbots), scripts, search engines, and more) to increase the efficiency, speed, quality, convenience and economy of solving certain legal problems (Spector, Ohrazda, Van Schaack, Wiley, 2005). This combination of law and technology is largely achieved through the intelligent automation of the actions that need to be performed by a living person (who usually has legal education and/or relevant work experience). These actions include searching, editing/replacing, text, matching, finding similarities, translating into another language, analysis, interpretation, selection, decision making, and more (Online encyclopedia ukrainskogo legal tech, 2020).

For the first time in Ukraine: (On July 22–26), the first Legal Innovations Summer School (LISS) was held in a small town (Yaremche) next to the Ukrainian part of the Carpathian mountains. The School brought together university teachers from all over Ukraine, representatives of Ukrainian student chapters of the Legal Hackers movement, the best speakers and mentors from disrupting legal projects. LISS was organized by KYIV Legal Hackers, Ministry of Justice of Ukraine, USAID New Justice Program, and OSCE Project Coordinator in Ukraine (Ivanov, 2020).

Based on the LISS's work results, a unique comprehensive course was prepared in Ukraine which provides systematic knowledge, practical skills in innovative legal technologies and is recommended for implementation in the curricula of higher education institutions of Ukraine.

Thus, the course "Legal Innovation & Technologies" is aimed at: 1) raising the level of technological awareness; 2) applying legal innovation and technology; 3) creating own Legal Tech projects; 4) ensuring the compliance of knowledge and skills of graduates with the realities of the market (Legal innovation, 2020).

The main objectives of the course include: 1) the information about existing legal innovations and technologies, trends in the market of legal innovations obtained by students; 2) practical skills of using existing innovative technological

products in the field of law acquired by students; 3) searching skills in open sources and the analysis of the received information acquired by students; 4) skills of drawing up legal documents using technologies, understanding the peculiarities of resolving disputes online acquired by students; 5) the information on the basics of cybersecurity in Ukraine and the EU obtained by students; 6) peculiarities of commercialization of startups, raising funds, etc comprehended by students (Ivanov, 2020).

It is proposed that the basics of "Legal Innovation & Technology" are taught using traditional forms of learning such as lectures, workshops, workshops, group classes, and independent work (Jackson, 2016). The course program offers students to study relevant and nonclassical jurisprudence disciplines, such as: 1) introduction to legal innovation and technologies (evolution of digitalization of law; digitalization as a non-stop process; basic concept and categories/typology of digitalization of law; trends of legal innovation in Ukraine and the world; landscape Legal Tech projects in Ukraine (e-court); 2) design thinking (design thinking as a tool for solving cases in legal practice; design thinking as a tool for legal innovation); 3) algorithmization and automation in law (algorithmization and automation of processes in law; neural networks as a means of algorithmization and automation in law; chat (web) bots), etc. (Ivanov, 2020).

It is planned that based on the results of the training, the student will be able to create a chatbot, a crypto wallet, a road map of a project, to visualize the procedure of online dispute resolution, to offer an own startup in this area. In other words, to master the skills of a legal engineer.

In the market of educational services of Ukraine, students or lawyers who already have work experience and want to gain or deepen their knowledge in Legal Tech, the certificate programs are also offered. Such courses include: "Information Technology Law" program of the National University of "Kyiv-Mohyla Academy" and the Association "IT Ukraine" (Information Technology Law, 2020); Ukrainian-American program on legal aspects of business in IT "Institute of Law Technology and Innovation" (ILTI), launched in 2015 (Institute of Law Technology and Innovation, 2020) and others.

In the market of educational services of Latvia, there are just two law schools which provide to law students minimums of Legal Tech based study. There are not any certificate programs offered based on Legal Tech implementation during the educational process. There are some law schools which provide program Technology Law (Riga Graduate School of Law, 2020), there are two law schools, universities which provide study courses based on information technology law (Riga Stradiņš university, 2020). However, in common, there are lack of Legal Tech implementation in legal education system. The digitalization process places a greater burden on educational institutions and provides new challenges from the technological progress. Historically, digital transformation has been under

discussion in other spheres, but now this is topical issues for the legal industry as well around the world (Palkova, 2020).

The research confirms that currently most law schools, universities in Latvia and in Ukraine do not offer any technologically advanced Legal Tech options to explore legal technologies. The practice of law is developing very fast, nevertheless the legal education system stays at 20th century level. There is a vital need from the legal profession future perspective to provide students with the opportunity to implement and learn Legal Tech during the education process.

Conclusions

Legal Tech in Education in Ukraine and in Latvia is still at the stage of its formation. The first steps in launching it in legal education have been taken, but the implementation of this tool in the curricula of higher legal education institutions, the opening of faculties that train "legal engineers" and the approval of a new direction of the legal profession "legal engineer" at the legislative level remain unresolved.

The legal profession and legal practice are developing faster than legal education system. As a result, new lawyers are not prepared for the technological progress provided by Legal Tech.

The potential transformation of the existing legal profession is closely linked to legal education. Nowadays, law schools' graduates trying to enter the profession from the future challenges' perspective. Legal education system now is fundamentally different from that of the future and previous generations.

The legislation of both Latvia and Ukraine just indirectly regulates the application of Legal Tech in higher education institutions of the legal field. We are convinced that the Concept for the Development of Legal Education should become a document that will regulate the use of the Legal Tech tool during the training of law students, as well as the launch of special training courses on technological literacy of lawyers (certified educational program, faculty training legal engineers, etc.).

There are two groups of law schools: law schools that started to provide to law and technology related courses which promoted student engagement with legal tech. And law schools that do not provide any Legal Tech related courses. As the Legal Tech is not mandatory and not enshrined in law, there is a risk of stagnation of the legal profession. Cooperation with higher education institutions, the Ministry of Justice, Ministry of Education and Science, National Collegium of Sworn Advocates, lawyers, etc. is vital to implement the Legal Innovations & Technologies or Legal Tech related courses in the legal education system. The single an officially approved program recommended for implementation in higher education institutions can give real outcomes.

Modern lawyers should consider new technologies as a source of great opportunities for development. However, to reap the benefits of such opportunities, a future lawyer needs to master a new level of literacy in this digitalized world. The main task of higher education institutions is to quickly adapt to these conditions and offer an educational product that can meet the needs of the European labor market.

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CYBER VULNERABILITY IN LIGHT OF ONLINE LEARNING REALITY

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Abstract. *Presently, as Covid 19 has caused most of educational processes to move online, cybersecurity and data protection is rapidly gaining importance in all educational institutions, and most of the academia became more vulnerable to cyberattacks. This article sheds some light on how communities of higher education institutions perceive increased online threats, what measures they take to protect themselves against cybercrime, whether they practice good security hygiene. This paper presents and analyses results of a survey conducted at higher education institutions (universities, colleges) into perception of cybersecurity, online culture and hygiene during the present times of remote education.*
Keywords: *Cyber threats, Privacy, Security, Social engineering, Social Networking Websites.*

Introduction

Social media and social networks are a beneficial realm for contemporary society. Interacting with millions of other Internet users in real time, shopping without leaving home, searching for information, blogging, studying and training remotely during a pandemic is just a small part of the benefits that Internet users enjoy in their world. However, Internet, despite the many benefits humanity enjoy, has increasingly been proven to be a double-edged sword. In the age of digitalization, much of both personal and organizational data has been transferred to the internet space, and alongside the facilitation of everyday life, information technology created threats. News about identity theft, information leakage, and violation of personal privacy has become part of frequent, if not every day, news.

The dominance of digital technology, the convergence of computer and communication devices have altered the way we communicate, conduct other important work, and so on. Technological advances in the past meant greater connectivity for computers; however, over the past decade it has shifted to digital socialization of people. The main factor behind this change is the growing

popularity of the Internet, and thus of social networking sites (Bialaszewski, 2015). It has especially been apparent since the beginning of 2020, when in majority areas, business, education, etc., the use of the Internet from being optional became compulsory. According to the official statistics portal (Statistics Lithuania, 2020), in 2020, 82% of households in Lithuania had Internet access, 82% of the population aged 16-74 used the Internet at least once a week, 79% used the Internet for communication. 74% of the population of the same age read the news, 71% used it in their free time (watching movies or TV shows, listening to music, playing or downloading recordings, games), and 68% used online banking services. Unfortunately, such a huge digital population also means access to a countless number of potential victims of interactive scams. Digital photography allows global distribution of child sexual abuse material on a large scale. Digital information may be copied and shared, allowing copyright and related rights to be infringed. Social networks can be used for intimidation and bullying. Mankind's growing dependence on computers and digital networks is turning technology itself into a target for crime (Clough, 2011). Presently, not a day goes by without a record of some type of cybercrime: hijacking and defacement of websites, identity theft, a devastating virus attack, diversion of money from bank accounts, ransomware and theft of sensitive data. Security professionals face a never-ending battle with criminals, programmers, terrorists, and foreign intelligence agencies who feel the satisfaction of running viruses, trojans, worms, and other malicious software (Peltsverger & Zheng, 2016). Clearly, both a cybersecurity culture and an understanding of what constitutes a cybersecurity threat at all are particularly important today.

The Law on Cybersecurity of the Republic of Lithuania and the National Cybersecurity Strategy (National Cybersecurity Strategy, 2017) define the threat of cybersecurity as a threat arising ("may arise") "... to the availability, authenticity, integrity and confidentiality of electronic information transmitted or processed by communication and information systems and /or possibility to interfere with the operation, management and provision of services by communication and information systems". In this context, in accordance with the logic of the Law on Cybersecurity of the Republic of Lithuania, "cyber" should be understood as related to the environment consisting of computers and other communication and information technology equipment and the creation and / or transmission of electronic information. Thus, a cybersecurity threat is a threat to the environment between computers and information technology equipment and the information it contains and transmits.

The aim of this study was to find out the level of cyber literacy and culture among students and lecturers (academic community), their opinion about the usefulness of applying virtual environment elements at present, and to compare

the results of the survey in different age groups. For this purpose, the methods of the questionnaire survey and comparative analysis of the obtained data were used.

Identification of the Problem

Cybersecurity threats and the consequences of cyber incidents have been in the focus of the scholarly world for quite a while. The issues have been analyzed by Bellovin et al. (2017), Cullen & Armitage (2016), Heitzenrater & Simpson (2016) and Renaud & Zimmermann (2020). The authors highlight a variety of cybersecurity threats, e.g., malicious code, ransomware, spam, phishing scams, etc. Cyber-attacks in Lithuania usually happen using various social engineering methods, such as phishing, smishing, vishing (Kapsevičius, 2019). The concept of social engineering in information and computer systems is generally defined as a way to obtain information by technical and / or non-technical means (Manske, 2000).

Social engineering encompasses a broad spectrum of malicious activity. As the purpose of this article is cybersecurity perception and online culture, the focus here will only be on social engineering in the IT context. In terms of information security, social engineering is often used solely for the attacker's benefit. In these cases, social engineering involves manipulation to obtain sensitive information, such as personal or financial information. Computer users are tricked into voluntarily taking action to help break into and take over computer networks. It is observed that more and more social engineering methods are used to persuade the user to reveal confidential information (passwords, credit card numbers, etc.), to infect the computer with malicious code. This method manipulates users' emotions and psychology, lack of attention, ignorance of technology. For example, phishing is a form of attack primarily aimed at the human factor rather than the system. The consumer usually receives an email that mimics a request sent from a government agency or, say, a bank. The letter identifies the problem and asks for personal details. Because such a letter is very similar to that sent by a real institution, the consumer enters the required information, and this way, scammers achieve their purpose. Such emails can also contain viruses. Whaling works in a similar way, except that it is usually aimed at high-ranking employees and officials.

There are numerous forms of cyber-attacks, and while they are being prevented by various institutions at the national level, as well as by countless IT professionals, the real fight against them begins with the awareness of every Internet user. Cyber literacy and culture should be part of school curriculum, and knowledge about cyberspace and its protection should be constantly refreshed. In 2020, a survey was conducted in Vilnius higher education institutions to

determine the level of knowledge academic community has about cybersecurity, cyber threats, social networks security.

Research Methodology and Purpose

The aim of this study was to find out the level of cyber literacy and culture among students and lecturers (academic community), their opinion about the usefulness of applying virtual environment elements at present, and to compare the results of the survey in different age groups. For this purpose, the methods of the questionnaire survey and comparative analysis of the obtained data were used.

A quantitative survey was conducted in 2020, and 308 questionnaires were completed. The study involved staff and students from higher education institutions. Respondents were provided with questionnaires consisting of 20 questions. The questions were both closed and open, and this allowed for more detailed answers and more reliable information.

The questionnaire included general questions regarding information about the respondent, and more specific ones that were focused on the issues related to perception of security in cyberspace and preparation for it.

The survey involved 195 women and 113 men. For the most part, the respondents were students, so the 18-30 age group was the largest (83 %). The distribution of other respondents, who were academic staff, was as follows: 30-40 age group - 4 %. 40-50 age group - 8 %. and 50 years and more - 5 %. Students and lecturers of social and technological sciences were interviewed.

Research Results

The first set of questions was aimed at finding out the level of self-confidence and psychological characteristics of the respondents, and the very first question was *Do you trust other people*? Slightly more than half of all respondents (54.5%), said they tended to consider themselves distrustful, but almost the same number of the surveyed (30 %) thought themselves to be trusting, and 16.5% assigned themselves to neither of the categories. Comparing the results obtained in different age groups, it turned out that the older respondents were, the less trusting they thought themselves to be. Another question of that group - *Did you have to deal with scammers or manipulators* – received diverse answers. Almost a fifth (17,4%) respondents answered that they had not experienced such encounter. The majority of respondents (39.1%) had encountered telephone scammers, 26.1%. – had been faced with physical fraudsters and 17.4% with online scammers. The distribution of responses across age groups appeared to be very similar.

The next question *What information did the scammers want to obtain* received various replies. Some respondents reported that phone scammers tried to manipulate *a disastrous accident of a loved one*, to find out *bank account numbers*, to offer a *panacea for all diseases*, to ask for *financial support for an ill person*; internet fraudsters *hacked email and stole game data*, *stole money from the account*, infected the computer with a virus.

When asked how survey participants evaluated their learning/working environment in terms of security and confidentiality, two-thirds (68.8%) stated they felt safe, almost a fifth (18.8%) said that they did not feel safe, and the rest (12.5 %) did not have an opinion.

The next set of questions addressed the perception of cybersecurity among academia. To achieve this end, questions of practical nature were asked. For example, a question regarding knowledge of the concepts of social engineering, phishing, firewall revealed that more than a fifth (21%) respondents have not heard any of these concepts, one third (33%) of respondents have heard the concept of a firewall, more than one fifth were familiar with the concepts of social engineering and phishing (21% and 25% respectively). The finding emphasizes the general lack of cyberliteracy among some academic community. The analysis of the results across different age groups revealed that the majority participants of the youngest group were well aware of the meaning of the concepts, while a significant number of older respondents admitted not knowing the terms.

One more question of the same set addressed the ability to recognize cyber-attacks. The survey participants were presented with a few examples of cyberactivity and were asked to decide whether these were criminal or not. The majority of the respondents (86%) knew that a cyber-attack could be an email that contains a malicious link which is disguised to look like a familiar link or a link to an announcement about a bogus award, a fake website that looks almost identical to real, where internet users are tricked into revealing their personal/login information.

The answers to the question *Do you know how to distinguish dangerous from non-dangerous sites?* are visualized in fig. 1. The chart shows that respondents aged 18-30 believe they distinguish dangerous from non-dangerous sites, while the older age groups provided completely opposite answers.

When asked a more detailed question *What do http: // and https: // mean in a website address?* respondents of the youngest age group again demonstrated much better knowledge than older ones, as three-quarters of 18-30 age group knew that HTTPS encryption protects the channel between the browser and the website being visited, while in the older groups only up to one third knew the meaning.
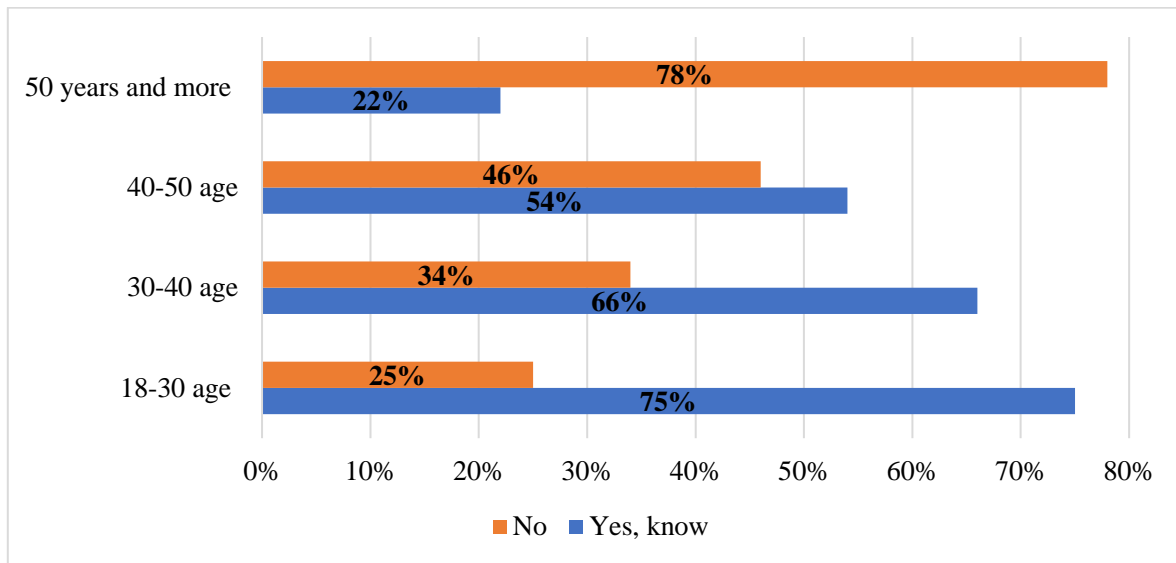
Figure 1 **Respondents' Ability to Recognize Dangerous Websites**

Responses to a question about searching ("browsing") the Internet *Does your computer / phone have a filter (ban on unwanted and dangerous websites)?* again pinpointed to a lack of cyber-education among academia. Only one quarter of all respondents indicated that their devices were equipped with a filter that prevented visiting unwanted and dangerous websites; as many as three-quarters answered "I don't know." Responses did not differ between age groups.

When asked whether respondents *agree with all the statements/cookies/pop ups* when they open the file or download the program, more than half of the respondents in all age groups admitted that they do not if they do not understand all information provided, one tenth stated that they always agreed even without reading, and a quarter of survey participants read the information carefully before agreeing.

Respondents were asked to specify arguments for their answers. The most common motives were as follows: too many rules to read, time-consuming activity, unknown terminology, some participants indicated language barrier.

To find out how aware respondents were of the safety of the public internet use, a practical question *If you want to access a public Wi-Fi network and need a password, is it safe to use that network for sensitive activities such as online banking?* was asked. Although the majority (56.3%) believe that such a network is not safe to use for the transmission of "sensitive" information, many respondents (37.5%) still admitted not knowing whether the public Internet network is secure, and 6.3% believe that it is secure.

A vast majority of the survey participants (87.5%) appeared to realise the importance of a strong password and claimed to know how to create one. However, if the webpage does not provide a set of requirements for password

development, many admit still choosing their own or their children's names and birth dates, or using the same password for many web addresses. It is well known that such passwords are easy to crack and they do not protect against data breaches.

To find out opinion of the survey participants about the risks online, the following question was asked: *What internet threats do you find most dangerous?* The replies according to the age groups are presented in Table 1.

*Table 1 **Threats Named by Respondents***

	18-30 age group	30-40 age group	40-50 age group	50 year old and above group
Bullying on the internet	9.7%	18.1%	21.4%	33.1%
Internet fraud	19.2%	21.2%	19.9%	19.2%
Pirating	5.3%	5.3%	5.3%	3.2%
Viruses	21.3%	16.3%	12.3%	9.3%
Spam	4.6%	3.2%	3.2%	2.7%
False information	15.4%	11.5%	4.8%	11.4%
Data theft	24.5%	24.4%	33.1%	21.1%

A question *Which source of information do you trust the most?* addressed the level of trust people have in various sources of information. The majority of respondents aged 18-30 admitted that they equally trusted the information received on internet news portals (Delfi, 15min.lt, lrytas.lt, etc.) and the information received from friends. The groups of older respondents, however, expressed more faith in the information obtained from the news portals. In light of the previous question *Do you trust other people?* to which more than a half of responses were negative, it can be concluded that members of the educational community look for "reliable", "verified" information, sometimes using "information provided by friends" as a reliable source. Some respondents mentioned that "obtaining news is only getting information and does not create trust", a few admitted "checking several sources of information" and "using the knowledge of specialists".

The next set of questions was designed to find out how much knowledge the academic community had about cybersecurity.

The survey revealed that in all age groups only less than a fifth (18.6%) of respondents were educated about internet / cybersecurity in educational institutions, two thirds (62.1%) of respondents were interested in this issue and sought information themselves, but did not take part in any formal training or

lectures on the topic. A fifth of respondents (19.3%) stated that they had no interest in online safety at all.

The question *What would you do in the event of a cyber-attack?* (Figure 2), received diverse answers. This diversity proves that no uniform norms of behavior have been formed in the event of a cyber-attack. In such an event, everyone would behave spontaneously.
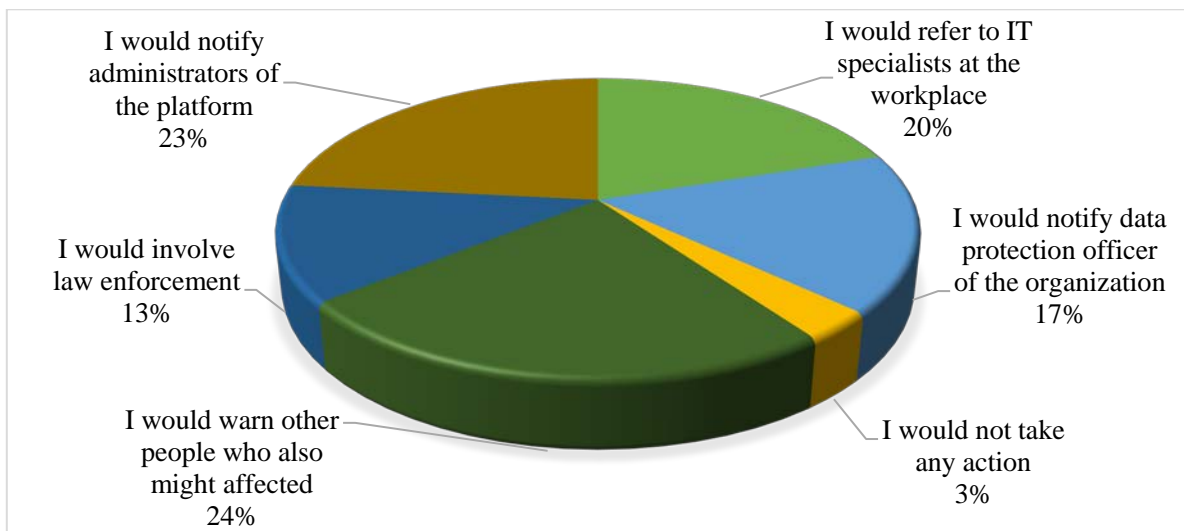
*Figure 2 **Actions of Respondents in the Event of a Cyber-attack***

The majority (90%) of respondents answered the question *Have you had to contact the relevant authority about a cyber-attack organized against you?* negatively. Survey participants claimed they had not experienced or been unaware of cyber-attacks because these did not cause any appreciable damage, and only 2% said they had to apply.

Respondents were also asked to identify knowledge they lack to protect themselves from social engineering attacks. The survey participants said they would benefit from acquiring technical knowledge about equipment security, safe internet browsing, they also expressed a desire to get some psychological knowledge enabling them to recognize aspects of manipulating.

Conclusions and Recommendations

Cybersecurity is the practice of defending computers, servers, mobile devices, electronic systems, networks, and data from malicious attacks. It is also known as information technology security or electronic information security. The purpose of cyber-attacks is usually to gain access to, modify or destroy confidential information, cheat out users of their money, or disrupt normal business processes.

Implementing effective cybersecurity measures today is particularly challenging, as devices outnumber people and hackers are using increasingly sophisticated attack techniques.

Manipulators frequently know the weaknesses of the IT users better than the users themselves, and people become easy prey for cybercrime.

The analysis of the survey revealed that the academic community is acquainted with cyber threats; however, in most cases, majority do not know what actions should be taken when faced with cyber-criminal activities. However, some responses clearly identified a lack of consensus on certain issues.

Although the scope of the research was not really large, the results of the survey still permit to conclude that younger members of the academic community have more experience using information technology, more flexibly seek information, trust information based on friends' experiences, have heard more about social engineering and manipulation terms, but do not dramatize cyber-attack threats. The older users of information technologies, on the contrary, collect information, verify it, trust major "verified" news portals.

Insufficient knowledge of academia about cybersecurity and accidental attacks by online manipulators can result in higher education institutions becoming a target for large-scale cyber-attacks that would disrupt the institution's work and leak "sensitive information".

The purpose of the survey was to shed some light on cyber-security awareness among members of higher education community. As a result, this study uncovered clear gaps in cyber literacy and a lack of in-house cyber-training. The situation could be changed if regular seminars on cybersecurity for the first-year students of a college or a university, as well as for academic and administrative staff were organized. The content of these trainings should cover information about secure passwords, secure use of personal data, social engineering threats, managing and banning access to different accounts (e.g., social networks), e-banking and other systems, law enforcement authorities that manage cyber-issues, and so on.

Cybersecurity is first and foremost a set of protective layers for computers, networks, applications, and data. It is important that all organizations, including educational, understand the importance of taking care of their cybersecurity and the cyber-literacy of their community. Effective protection against cyber-attacks is only possible with the right coordination of people, processes and technologies.

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SIMULATION PROGRAMS IN DISTANCE LEARNING

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Abstract. *In the era of the development of computer technology, methods were created that enable teaching, not only through direct contact with the student, but also through the computer network and the Internet. In order for this to be possible, programs allowing this type of activity had to be created. They are to model the operating conditions of electronic and measurement systems in virtual space as much as possible. Such programs must reflect the operation of such systems under operating conditions, taking into account disturbing signals. They should also be adapted to remote work via the Internet. In the era of epidemics, when the possibilities of teaching in the classical form are very limited or impossible, simulation programs working in a network environment may make sense. The results of modeling the operation of systems in virtual reality and the created measurement systems can be sent electronically. This allows their verification with the laboratory teacher and joint work on the project by a group of students during the laboratory classes.*
Keywords: electronic and measuring systems, remote work, simulation programs.

Introduction

Along with the development of computer technology and PC software, applications have been created that allow modeling the operating conditions of electronic and measuring systems in the virtual space (Noga, Olszewska, Ptak, Prauzner, & Migo, 2018). Programs of this type must reflect the operation of this type of systems under operating conditions, taking into account disturbing signals (Prauzner et al., 2020). This task is very well fulfilled by integrated software environments such as LTSpice or Multisim by National Instruments (Olszewska, Prauzner, Krupa, & Ptak, 2018).

Integrated software environments are specialized software packages that have a variety of built-in functions to achieve a specific goal (Prauzner & Ptak, 2018). For programming environments it will be a utility application, and for measurement environments it will be, for example, an application controlling the operation of a measurement system (Ptak & Prauzner, 2017). Designing a measurement system consists in creating connections and dependencies between objects presented in graphic form. These objects are placed on virtual desktops using the drag-and-drop technique (Swisulski, 2004). Performing an operation on a specific object (e.g. clicking the mouse) creates the so-called events. The

user's task is to create a set of handling events of this type (Ptak, Prauzner, Noga, Migo, & Depešova, 2020). This is done with the use of programming languages such as C or Basic, or with the help of graphic languages (Winiecki, 2001). The aim of the research was to check the capabilities of the software for remote work with electronic systems. To achieve this, the capabilities of the two described programs were compared, using them to perform the same design tasks. The main features of selected integrated development environments are described below.

Integrated Software Packages

The LTSpice software suite is a free application from Linear Technology Corporation®. It is designed to design electronic circuits and simulate their operation in a software environment. The construction of the electronic circuit in the program consists in selecting the appropriate symbols describing electronic elements from the program menu and inserting them into the virtual simulation screen. These elements on the simulation screen should be connected with each other according to the schematic diagram of the electronic system (Ptak, 2018b). The program is equipped with an extensive library of electronic elements and components. This makes it possible to build not only simple but also quite complex electronic circuits. The database of elements used for simulation can be extended by installing libraries from the software manufacturer's website.

Thanks to the extensive functions of the LTSpice software package, the operation of the designed electronic circuits can be analyzed using built-in measuring and recording devices. The current and voltage values can be checked at selected points of the tested electronic circuit. An example of a system built in LTSpice is shown in Figure 1.
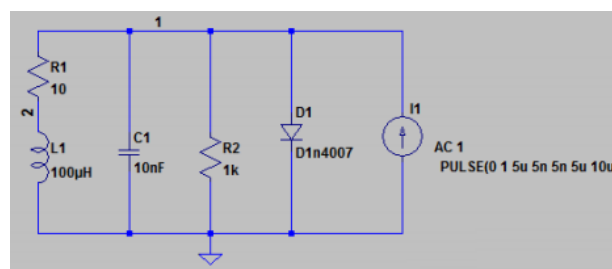

Figure 1 ***Sample Electronic Circuit Built in LTSpice*** *(Pilarek, 2020)*

The software package of National Instruments Corporation® - Multisim Education enables the construction and simulation of electric and electronic circuits, and is also used for computer analysis of analog and digital circuits (Prauzner, 2016). In this program, we can perform graphical editing of

electronic diagrams. It has a built-in library of models of electronic components, both digital and analog. This enables the construction of a large number of not only simple but also more advanced measurement and research systems. The elements that are used to build these systems have been divided into groups in terms of their functions (Ptak, 2018a). Among them, we can distinguish the following functional groups: operational amplifiers, power sources, transistors, diodes, TTL elements, passive elements, CMOS elements, analog integrated circuits, digital integrated circuits, mechanical elements, displays and indicators, and elements of radio technology.

The electronic components built into the software package are available in two versions: real and virtual. The parameters of virtual elements can be changed before the simulation as well as during its duration. Properties of real elements are typical of electronic elements available on the market, and their parameters cannot be changed. Different types of elements have different colors as well as the associated data flow paths. In simulated electronic circuits, real and ideal elements can be used simultaneously (Ptak & Prauzner, 2019). The measuring instruments built into the system are also available in two types: simulated and real. The latter is a representation of real measuring instruments with a realistic appearance of the faceplate, regulation and control elements. These elements look the same as in a real measuring instrument.
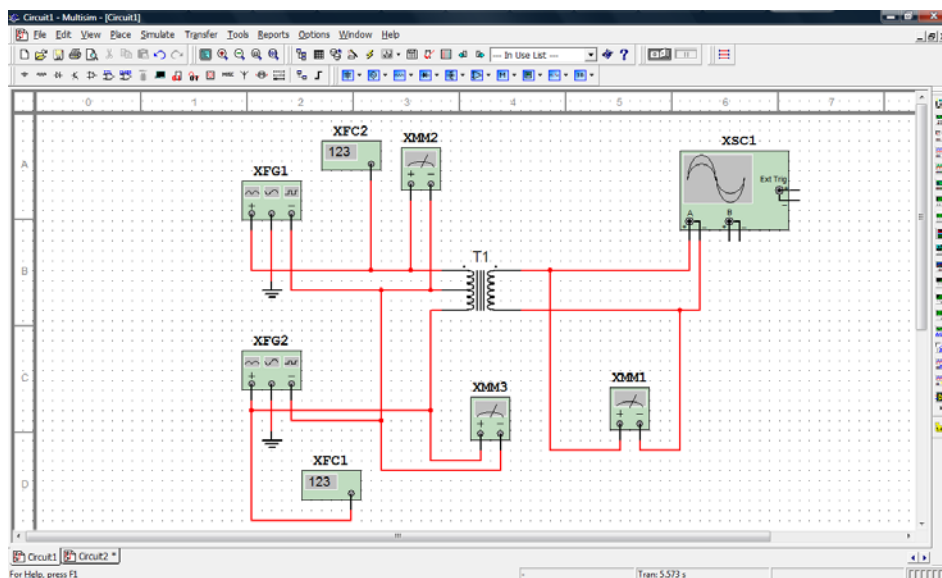
*Figure 2 **An Example of an Electronic Circuit Built in the Multisim Education Program**
(Ptak, 2011)*

The Multisim Education software package allows you to perform interactive simulations of constructed electronic systems. The designed electronic circuits can be analyzed in terms of their operation. For this purpose,

the output signals are tested and the operation of the simulated system is checked. By analyzing the operation of electronic systems, it is possible to adjust the parameters of the generated measurement and supply signals and check how these changes affect the operation of the simulated systems. Analysis of the operation of electronic circuits is also possible thanks to measuring and recording devices. The measured signals can be observed on the screen of the oscilloscope built into the system and saved as graphic files. During the analysis of the work of the designed electronic systems, its operating parameters can be changed and the results of these changes can be observed. It is similar to working in a real electronics laboratory where we use real measuring equipment. The Multisim Education software package is more extensive and has more possibilities than the LTSpice software package for similar tasks. Figure 2 shows exemplary results of the simulation of the operation of the electronic system built in the Multisim Education software package.

Sample Simulations

To check the capabilities of the integrated LTSpice and Multisim Education software packages, simulations of two measuring systems were performed. The first circuit is a derivative circuit built using an operational amplifier. Figure 3 shows a diagram of the tested differentiating system designed in the Multisim Education program.
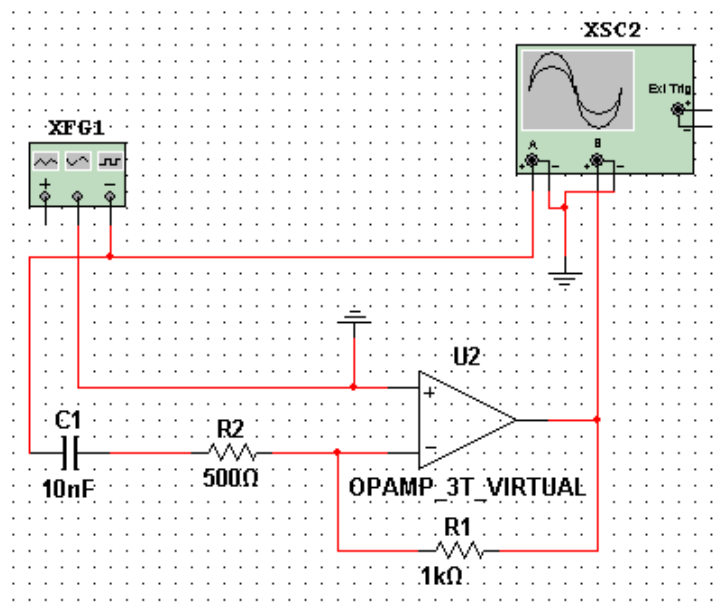
Figure 3 **Diagram of the Differential Circuit Built in the Multisim Education Program**
(Pilarek, 2020)

Figure 4 shows a schematic of a differentiator built in the LTSpice software package.
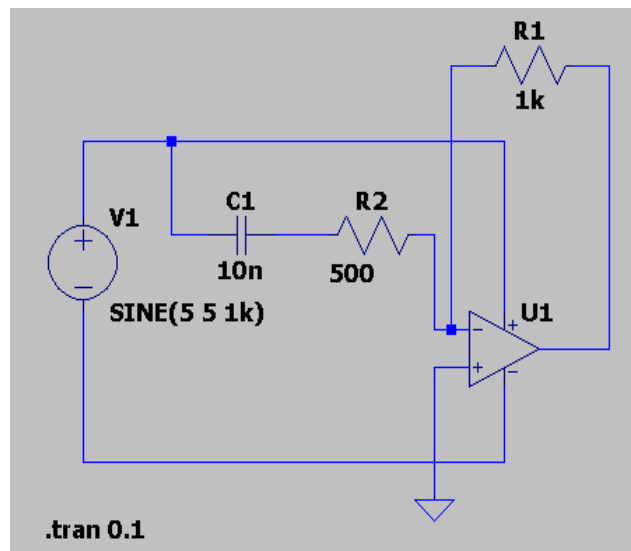
Figure 4 **Scheme of the Differential Circuit Built in LTSpice** *(Pilarek, 2020)*

The test was carried out for a square wave input with a signal amplitude of 5V and a frequency of 1 kHz. After conducting the simulation, it was necessary to check whether the shape of the obtained waveform was consistent with the theoretical assumptions. The control of the output voltage also made it possible to check the correct operation of the differentiator.

Figure 5 shows the results of the simulation of the tested system in the Multisim Education program. The characteristic shows the voltage at the output of the tested system.
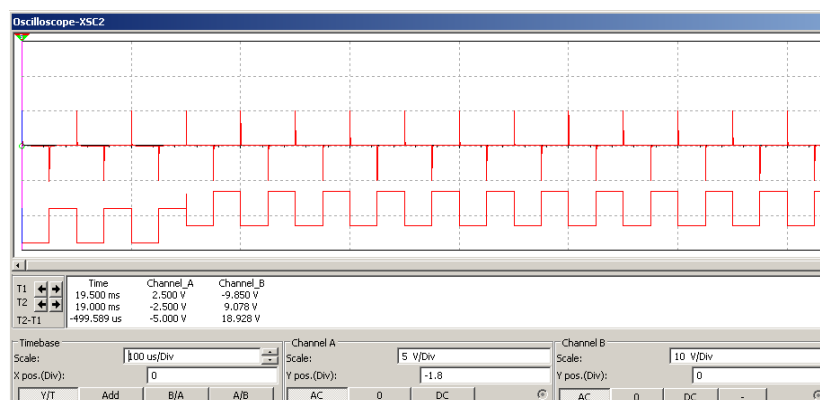
Figure 5 **Voltage Value at the Output of the Tested System in the Multisim Education Program** *(Pilarek, 2020)*

Figure 6 shows the results of the simulation performed in the LTSpice software package.
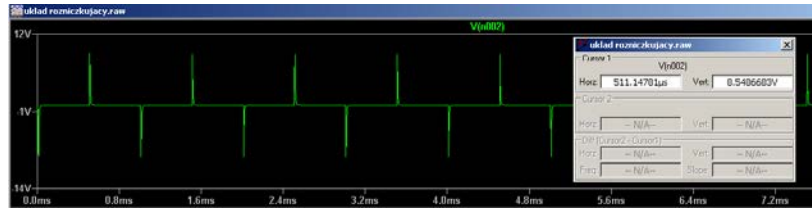
Figure 6 ***Characteristics of the Output Voltage of the Simulated Circuit in the LTSpice Program*** *(Pilarek, 2020)*

Based on the simulation results in LTSpice and Multisim Education, it can be concluded that the results obtained in the simulations are comparable. The shapes and values of the signals are similar to the values obtained from theoretical calculations.

The second simulation that was performed was the construction of an inverting operational amplifier based on the LM741 electronic circuit. The aim of the test was to measure the maximum value of the voltage at the output of the system. The test was performed for several gain values: k = 1; 10; 50; and 100. Figure 7 shows a schematic diagram of an operational amplifier built in the Multisim Education program.
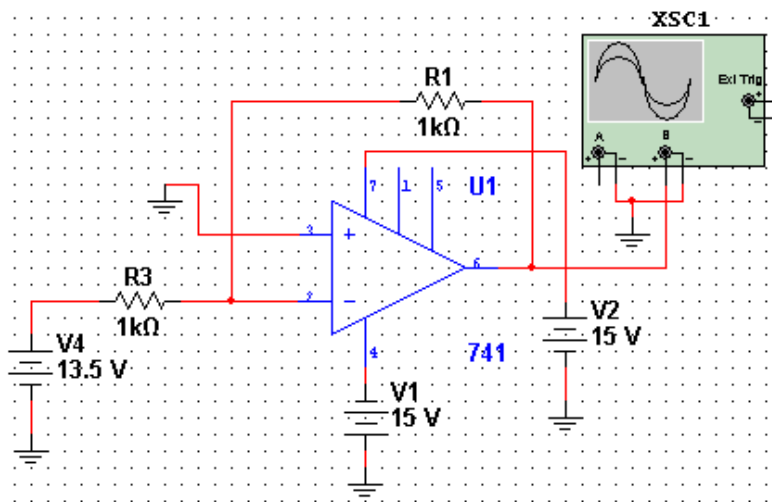
Figure 7 ***Diagram of an Operational Amplifier Built in the Multisim Education Program*** *(Pilarek, 2020)*

The same electronic circuit is designed in the LTSpice software package. The system was made to compare the simulation properties in both programs. Figure 8 shows a schematic diagram of an inverting op amp built in LTSpice.
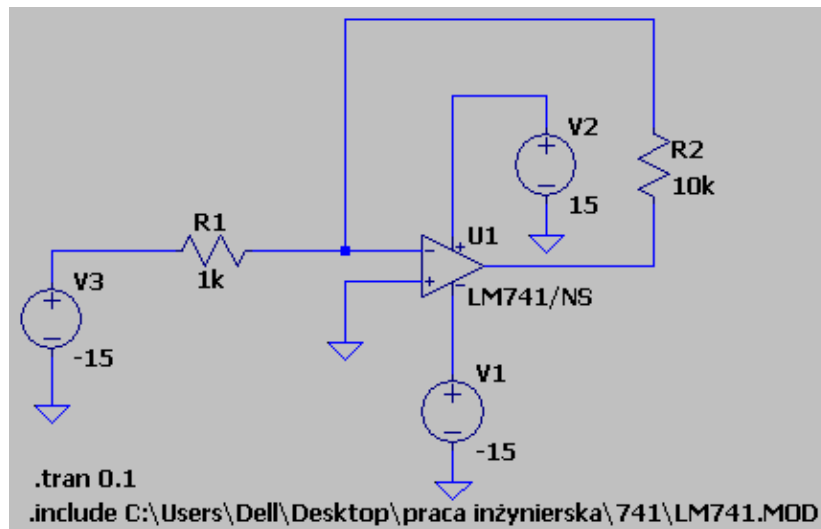
Figure 8 **Diagram of an Operational Amplifier Built in LTSpice** *(Pilarek, 2020)*

After the simulation, the characteristics of the dependence of the output voltage on the input voltage were made. The measurements were made for the amplification of the amplifier with the value k = 1. For comparison, the characteristics of the amplifier determined on the basis of actual measurements are additionally presented. The performed characteristics were used to present in one graph together with the characteristics obtained on the basis of simulations in LTSpice and Multisim Education programs. The obtained results of the programs' work are shown in Figure 9 in the form of the dependence of the output voltage on the input voltage.
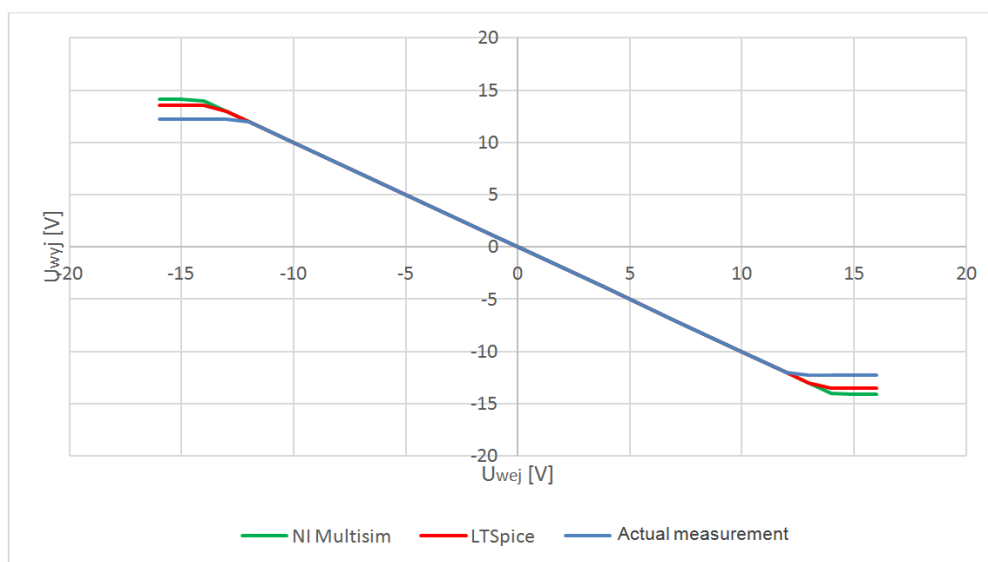
Figure 9 **The Operational Amplifier Output Voltage Distribution Characteristics Obtained on the basis of Simulations** *(Pilarek, 2020)*

The data obtained as a result of simulations in the LTSpice and Multisim Education software packages are very similar. As shown in the figure, the values of the output voltage of the operational amplifier in the simulations have a similar value and almost the same characteristics as the values obtained as a result of empirical measurements. LTSpice turned out to be minimally more accurate, but it is not a significant difference. Both programs can be used without problems as virtual laboratories for researching and designing analog and digital electronic circuits.

Program Packages in Distance Learning

From the beginning of the development of computer technology and the Internet, a new possibility of distance learning has appeared. First, it was an innovative method that appeared as a curiosity. It was usually used in desolate places in the wilderness where, due to the small population, there are not many schools for children and teenagers. Successfully used in countries such as Australia or the United States in Alaska. Later, with the advancement of computer technology, distance learning became a complement to the traditional teaching method in a traditional school. Along with gaining experience, a lot of specialized software was developed, e.g. moodle type for such applications. Unfortunately, distance learning has not yet become dominant in the education process. It was slowly gaining the trust of teachers all over the world who had more and more experience with this software.

It is only recently that the worldwide epidemic of the covid-19 coronavirus has caused many schools in the world to quickly switch to long-distance work. The experience gained in previous years has now been of great use. Remote teaching procedures needed to be developed quickly. In Poland, the Moodle and Microsoft Teams platforms are the most popular. These platforms cover the entire course of the education process, regardless of the field they concern. It became necessary to supplement these platforms with specialized software packages.

In the field of electronics and electrical engineering, these packages are intended to support the education process. This especially applies to classes conducted in laboratories where we have access to electronic and measuring equipment (Prauzner, 2015a). Due to the epidemic, schools and universities have often switched to remote work. This resulted in the lack of access of pupils and students to electronic equipment and measuring systems in laboratories. Integrated software packages such as LTSpice or Multisim Education turned out to be a solution to this problem. As has been checked in the chapter "Sample simulations", we can use them as a replacement for work in a stationary laboratory at school or university. The results obtained during the simulation are

very similar to the results obtained in the simulation programs (Prauzner, 2020). The choice of a specific program is due to several factors. It can be a financial matter because LTSpice is free and the price of Multisim Education is high. Our choice may also result from the possibilities that individual programs have. It can also be the result of a user's habituation to certain software (Prauzner 2017). If other people with whom we perform laboratory exercises have a specific program, this may be a decisive criterion for the selection. With the same software, you can work together on common tasks in electronics or electrical engineering.

The programs do not allow you to work on a project simultaneously on the Internet. However, part of the work on the electronics can be done and the project sent to the next person for completion (Prauzner, 2015b). You can also make your own corrections and send it to someone else to test the layout and accept the changes (Prauzner, T., Prauzner, M., Prauzner, K., & Ptak, 2019). Thanks to this, remote work becomes easier, although it is not possible to work on a project simultaneously by different people using their own copy of the same software on a PC.

As for the possibilities of the programs, they are quite large. You can design, build and test the operation of electronic circuits similar to working in a stationary laboratory (Prauzner, 2018). The advantage of this type of software package is that the individual stages of project work can be carried out safely at home. You don't have to expose yourself to contact with other people and you can still work together on a virtual task. In the program, we perform activities related to the construction and operation of the electronic system. On the other hand, on the Moodle and Microsoft Teams e-learning platforms, you can meet in a virtual room and discuss the problem. Thus, the program packages perfectly complement e-learning platforms, creating a common virtual base for distance learning.

Summary

Based on the simulations, we can describe the following observations:
1.   LTSpice or Multisim Education software packages are a very good tool for working with the design, manufacture and operation of electronic circuits. The results of these simulations are comparable with the results carried out in a classic stationary laboratory.
2.   When working on electronic systems, we do not incur unnecessary costs resulting from any mistakes that we may make in a stationary laboratory. They can be the result of damage to electronics or measuring instruments. By using software packages, all errors can be corrected at the circuit design stage, and others can be eliminated when testing the work of the finished project. It does not generate any costs. We can make any corrections without any problems at any stage of the project. When working with electronic components in a stationary laboratory,

      some corrections will no longer be possible without changing the entire design and may generate additional costs.

3.   The use of LTSpice or Multisim Education program packages enables the project to be carried out by pupils or students and sent for review. The person conducting the classes can check the correctness of the project without direct contact, which is of particular importance in the period of the covid-19 epidemic. If the project has any disadvantages, the lecturer may contact the authors of the work via videoconference. This can be done using the Moodle and Microsoft Teams e-learning platforms. The submitted comments will be used for corrections to be made in the designed and constructed electronic system.

4.   With the use of the Moodle and Microsoft Teams e-learning platforms, the entire process of designing, implementing and testing the designed electronic systems can also be carried out during the videoconference. During the online lecture, the lecturer can answer questions and make any changes to the project. There is also a possibility that during the videoconference, the pupils or students will together with the teacher build the same layout on their computer in the program package.

5.   The use of such a common base for distance learning will increase the level of education and the results obtained will be comparable to the results achieved in day-to-day teaching. Mutual involvement while working online increases the interest in the conveyed content and encourages independent work and competition with others.

6.   At the present stage of the epidemic, it would be difficult to assess the quality of such education. In the future, after the Covid-19 threat has ceased, full learning outcomes studies should be performed. It is also necessary to check how the students rate this type of education and whether it suits them better than traditional classroom teaching.

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RESEARCH OF ROBOTIC SYSTEMS CONTROL METHODS USING MOTION RECOGNITION TOOLS, MACHINE LEARNING AND SKELETALIZATION ALGORITHMS

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Abstract. *The aim of the research is to develop possible control methods of robotic systems based on the usability of motion detection equipment, skeletalization algorithms and robotic systems, integrating them into the existing test bench by performing compatibility tests. The article reviews the possible motion detection systems, establishing the criteria of applicability in the control of robotic systems, describes the experimental research plan, research stand, discusses the research results and presents summarized conclusions and suggestions for the integration of research results into the educational process.*
Keywords: *machine learning, motion recognition, robotic system, skeletalization algorithms.*

Introduction

Robots and robotic systems have not yet replaced people in disadvantaged areas. Humans are still working in potentially physically hazardous work environments, and there are many areas of activity where a sequence of human-robot interactions could be implemented - joint work that requires training the robot or robotic system to observe, capture, and accurately reproduce human body movements.

The aim of this study is to implement a robotic system control method based on skeletal methods and machine learning algorithms using digital optical human body motion recognition tools to determine the speed of motion recognition. The article reviews the most commonly used skeletal methods, the principles of operation of digital optical motion recognition devices of the human body, the methodology of their interconnection, and presents the results, conclusions and suggestions of the first simulation tests.

Literature Review

Structured recognition of human movement is necessary for robotics movement control training. It is appropriate to use the skeletal method to identify the main human kinematic motion points. In order to select the most appropriate skeletal method, it is necessary to define the concept of skeleton and the issues related to the creation of a skeletal model. Skeletal extraction is important in a variety of areas: image processing, process visualization, navigation, medical research, and computer graphics (Davies, 2017). Some authors often refer to the skeleton as the central axis. The central axis is the set of maximum circles drawn at least between two surface points. A maximal circle is one that is not completely scratched into any other circle within the o surface of the object in question (Rokicki, 2010). In three-dimensional space, instead of circles, draw maximum balls (Formula 1):

$$S_r = \{y \in R_3, d(x,y) < r\}, \tag{1}$$

where r is the radius of the sphere (or circle in the case of two dimensions); x $O \in$ is the central point when $3\ O\ R \subset$; d (x, y) - distance between x and y points in three-dimensional space. Without any additional operations, the central axis becomes the central surface in three-dimensional space (Carmelo, Acutis, Carrabba, Criscenti, & Vozzi, 2016). It can be argued that the skeleton is a subset of the central surface (Rokicki, 2010; Paulinas & Rokicki, 2008). By reviewing the relevant sources of information, two main types of skeletons can be distinguished:

- Geometric skeleton - depicts the center of an object. It does not always have to be one point wide (Fig. 1a). Often the geometric skeleton is called the central axis, so the geometric skeleton does not necessarily have to be one pixel wide, but it always corresponds to the center of the object (Rokicki, 2010).
- Skeleton of curves - a set of connected central lines is called a skeleton of curves (Fig. 1b). The number of skeletal branches does not necessarily coincide with the branches of the skeletal object (Jin, Chen, Hoffman, & Saha, 2017), so not every curved skeleton is at the same time a topological skeleton. The skeleton of the curves is one-dimensional everywhere except for the branching points, because the one-dimensional centerlines intersect at those points.
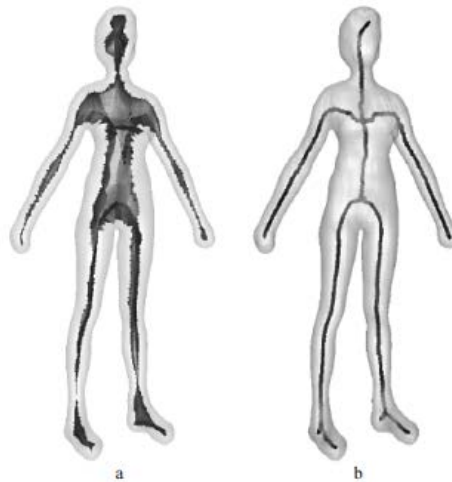
*Figure 1 **The Main Types of Skeletons** (Rokicki, 2010)*

Many skeletal extraction (skeletal) algorithms have been developed. Algorithms that implement skeletonization can be divided into the following groups (Saha, Borgefors, & Baja, 2017):

- Iterative thinning. The main principle of this group of algorithms is the identification and destruction of simple points. Deleting a simple point does not affect the topology of the object. All iterative thinning algorithms operate in discrete space. Thinning iterations are performed until no simple points remain in the object. The main problem with this group of algorithms is limb clipping or uneven reconstruction, so additional conditions are introduced to preserve them. Also, the resulting skeleton is not always geometric, it is centered (Palionyte, 2011). The distance field is formed when each point P of the object O is assigned a distance value to the nearest point Q of the surface B (O) (Formula 2):

$$d(P) \underset{P \in O}{=} \underset{Q \in B(O)}{min}(d(P,Q)), \qquad (2)$$

where d (P, Q) is the selected metric. After calculating the distance field, an attempt is made to pave the way through the points where the distance to the boundaries of the object is the maximum. It is these points that correspond to the skeleton of the object (Rokicki, 2010). The aggregation of points is performed using a gradient search or graph theory (searching for the shortest path between the selected maximum). The main advantage of these algorithms is that the distance field is quickly calculated.

- Geometric methods are most commonly used in cases where the surface of an object is represented using a set of scattered points (Chaminade &

Cheng, 2019) or a grid of surfaces. These points are used to construct the Voronoi diagram, that is, to create the Voronoi cells. Each wall of a Voronean cell is equidistant from the vertices or points of the grid that constructs it (Fig. 2). The inner edges of Voronoi can be used to approximate the geometric skeleton. The main advantage of these algorithms is speed, because to determine a simple point it is enough to examine the position of its 3×3 adjacent points (Paulinas & Rokicki, 2008). Additional transformation steps are required to isolate the one-dimensional skeleton.
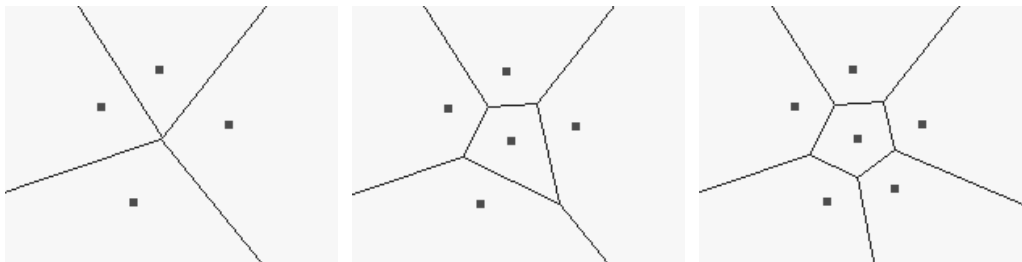
*Figure 2 **Examples of Voronoy Cells** (Palagyi, n.d.)*

When creating a skeleton based on points in three-dimensional space, the change of human movement describing the coordinates using digitization means must take into account the calculation speed of the chosen skeletal method (Vassilevski, Olshanskii, Simakov, Kolobov, & Dailov, 2020). The fastest in terms of calculations is the latter described geometric method.

Methodology

The description of the research methodology is divided into three parts: description of the research object and its simulation parallelism (part a), explanation of the moving object (human) digital skeleton formation principle (part b) and robotic system motion repetition training algorithm analysis (part c):

a. The object of the study is a robotic system (Fig. 3 a) identified with the human body, having two robotic arms with nine kinematic degrees of freedom - manipulators, and a head representing a robot with two degrees of freedom, equipped with environmental video surveillance equipment. For the simulation tests of this study, a virtual kinematic model (Fig. 3 b) was developed, identical to the number of degrees of freedom and motion displacements in space of the constructed robotic system. The initial tests presented in the article will be performed with the right-hand movements of the virtual model.

a   b
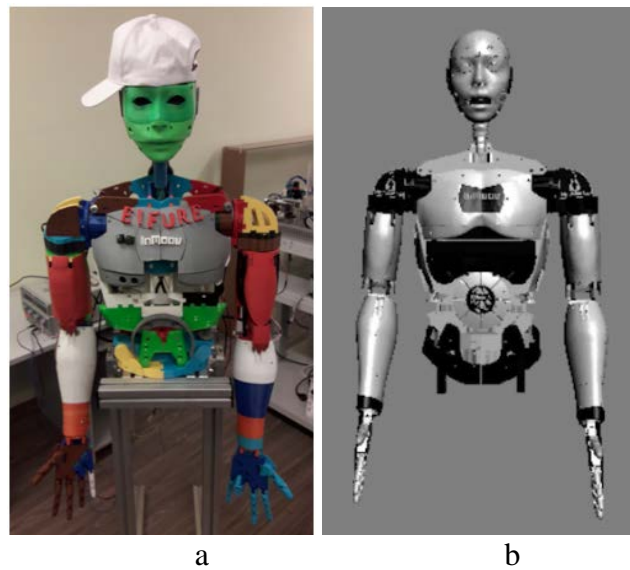
Figure 3 **Robotic System**

b. The principle of digital skeleton formation of a moving object (human): The Kinect multi-infrared projection camera (Fig. 4) is used for the study. (1) and controller (5) (Stitilis, 2014).
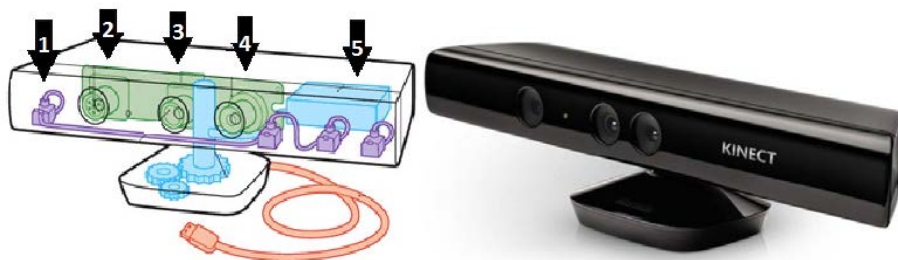
Figure 4 **Kinect Multi-Infrared Projection Camera** *(Stitilis, 2014)*

Thanks to the specified cameras and infrared projector, the device forms a three-dimensional image field in which it distinguishes moving points (Fig. 5):

1. The depth camera sensor illuminates the real space and determines the distances specified for each pixel of the image based on the reflections of the infrared point projections.
2. The software that combines the depth camera results and the RGB camera image creates a map of the depth pixel projections of each object in front of the camera, and creates RGB textures based on the location corresponding to the RGB pixels. All information is generated in real time at a rate of 30 times per second.
3. The processed data is sent to the middleware on the receiving computer.
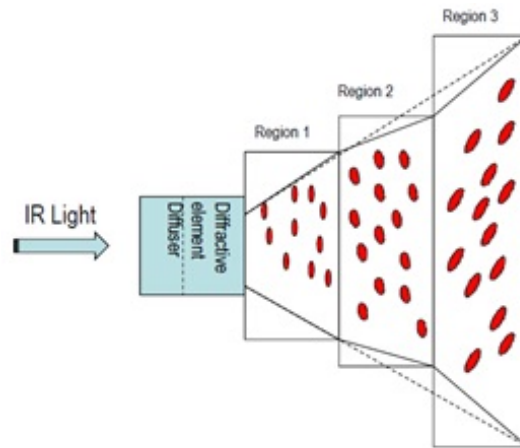
*Figure 5 **Formation of Three-dimensional Image Field Points by Infrared** (Stitilis, 2014)*

The first version of the Kinect used for the study returns the joint positions with a three-dimensional vector. The OpenNI library (for access to the cameras) used on the receiving computer provides a function that returns the position of the joint in the orientation matrix (Fig. 6):

```
public float getJointOrientationSkeleton(int userId, int joint, PMatrix3D jointOrientation) {
    float[] mat = new float[9];

    float ret = getJointOrientationSkeleton(userId, joint, mat);

    jointOrientation.set(mat[0], mat[1], mat[2], 0,
                         mat[3], mat[4], mat[5], 0,
                         mat[6], mat[7], mat[8], 0,
                         0,      0,      0,      1);

    return ret;
}
```

*Figure 6 **An OpenNI Library Function that Outputs a Position Orientation Matrix***

After the calculations, the value of the returned matrix changes only in the first 3 rows. Therefore, we can reduce the size of this matrix to 3x3. Using Euler's characteristics for a given 3x3 matrix (Fig. 7):

$$R = \begin{bmatrix} r_{11} & r_{12} & r_{13} \\ r_{21} & r_{22} & r_{23} \\ r_{31} & r_{32} & r_{33} \end{bmatrix}$$

*Figure 7 **Transformed Orientation Coordinate Matrix***

The steering angles at the three coordinate points are calculated using formulas 1-3:

$$\theta_x = \text{atan2}(r_{32}, r_{33}), \tag{3}$$

$$\theta_y = \text{atan2}(-r_{31}, \sqrt{r_{32}^2 + r_{33}^2}), \tag{4}$$

$$\theta_z = \text{atan2}(r_{21}, r_{11}), \tag{5}$$

The coordinates of the obtained moving points are linked to each other to form a skeleton.

c. Robot system motion repetition training algorithm: positions of the obtained skeleton coordinate points - gestures are stored every 30 milliseconds in the control program, giving access rights to call them. Robot system training algorithm (Fig. 8):
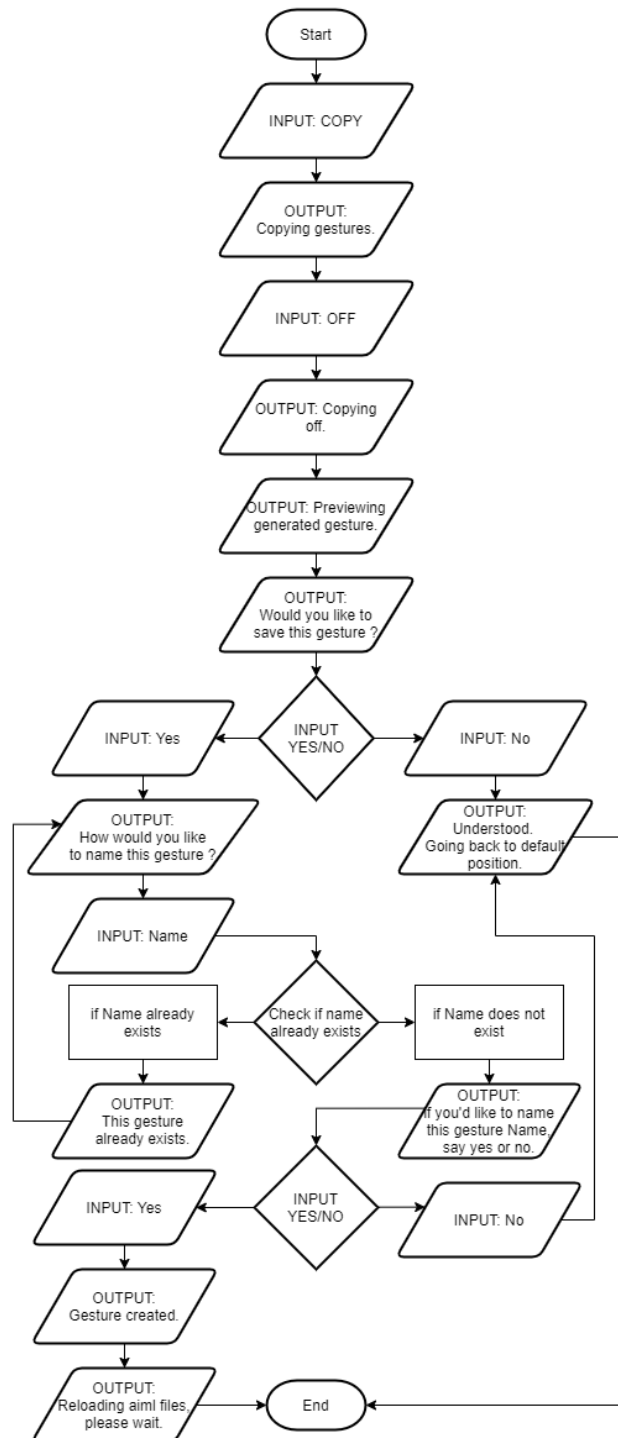
*Figure 8 **Robot System Training Algorithm***

The sequence of the motion capture function of the Kinect camera is shown in the activity diagram. When using this feature, the client makes a "Copy" request in the command input field or with voice commands. This request starts the repetition of the robot's movements with the Kinect camera. As already mentioned, the positions of the robot servo motors are saved in a new file called "positions" during the entire repetition of the movements. The customer can stop repeating the robot's movements at any time by sending the command "Off". When this is done, the robot repeats the movements again this time taking the positions of the servo drives from the generated file. The user is then asked if they want to save this gesture. For the gesture to be saved successfully, it needs to be given a name. The name must be unique because it is used in two places. The first place is to generate a Python script. This name is used to identify the script file. Also, in order to call the generated method, one of the AIML type files needs to be edited. The AIML interpreter is used to call this function during program operation. AIML is a recursive language based on XML (Nava et al., 2014; Kar, 2011), which allows to parse natural language text input so that it corresponds to the response that a robotic system can send (Fig. 9).

```xml
<?xml version="1.0" encoding="UTF-8"?>
<aiml>
    <category>
        <pattern>HELLO WORLD</pattern>
        <template>Hello to you too!</template>
    </category>
</aiml>
```

*Figure 9 **Example of AIML Code Structure***

The first "<aiml>" tag indicates the beginning and end of the AIML document. The <category> tag defines the unit of knowledge in the robot database. The number of these tags in AIML-type files is often large, so they simply separate each unique query content, of which we have only one in example 9. Thus the robotic system is trained to identify, record and reproduce the movement of the human body.

Research Results

Motion recognition and repetition tests were performed with a virtual kinematic model of a robotic system enabled for right-hand control for the first studies. The image of the skeletal projection of the human body and the corresponding movement of the virtual model are mirror images (Fig. 10). Table

1 shows the average speeds of the steps of skeletal projection construction, which were approximately the same regardless of the position of human movement.

*Table 1 **Speed Results of Skeletal Projection Creation Stages***

Recognition phase	Time / frame (ms)
Face and body recognition	70
Distance transformation	8
Point segmentation	5
Combining points into a skeleton	10
TOTAL	**93**
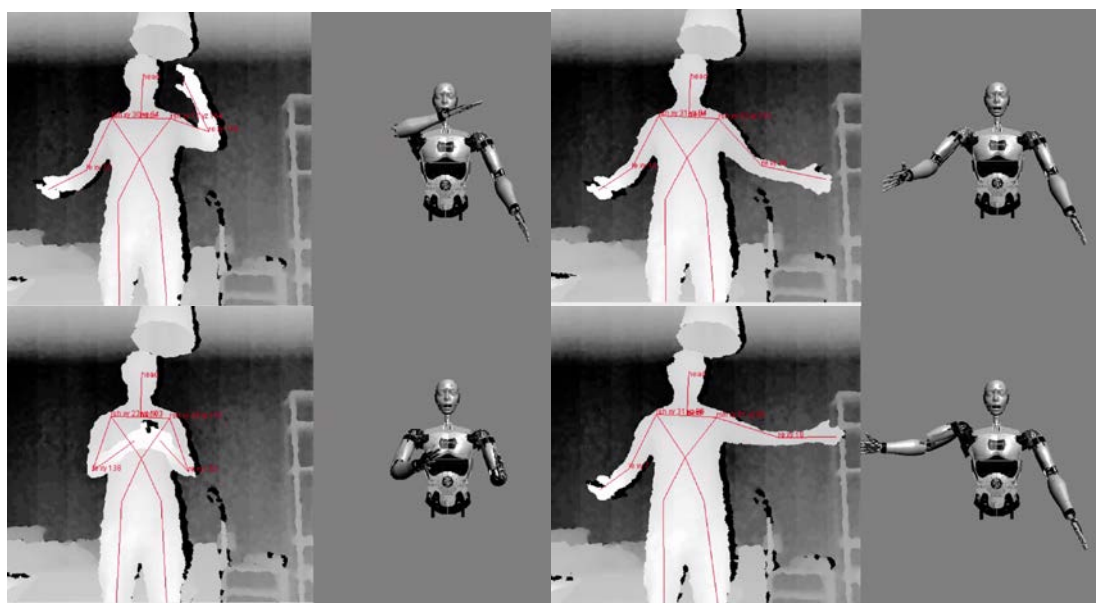
*Figure 10 **An Image of a Skeletal Projection of the Human Body and a Demonstration of the Repetitive Motion of a Virtual Model (mirrored view)***

Conclusions

The study developed a primary methodology that combines skeletal methods, machine learning algorithms and digital optical equipment to identify human body motion, create a skeletal virtual model describing it in spatial point coordinates, create a coordinate system and save it in a robotic system database with the ability to call when performing motion simulation in a virtual model:

- After reviewing the most suitable skeletalization methods available, the fastest geometric skeletalization method in terms of calculation was selected;
- Kinect digital optical infrared projector used to isolate the human body from the environment;

- The OpenNI library was used for three-dimensional vector processing, and an algorithm for calculating, configuring, recording, and calling motion angles was developed using the AIML software interpreter;
- In the virtual model, the movements of the skeletal projection of the human body are repeated, the average total speed of the formation of the skeletal projection was determined by experiments: 93 ms per frame;

The description of the performed research methodology and the obtained research results can be used in areas where synergistic interaction of human and robotic system synchronous movements is possible: performing dynamic, time-varying functions that do not operate according to a predetermined sequence of actions. The results of the study also have a wide range of applications in the training process: in the study of the properties of machine training, in the development of robotics, control systems for robotic systems and algorithms. Continuing this study, it would be appropriate to combine coordinate motion angle assemblies with a real robotic system and perform motion repeatability and positioning accuracy tests.

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SOFTWARE COMPLEX FOR PARTS RECOGNITION AS THE BASIS OF EDUCATIONAL LABORATORY WORK

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Abstract. *The article discusses the scientific and methodological foundations of laboratory work in vision systems using the author's algorithms for pattern recognition. The results were used to prepare masters of technical specialties at the Pskov State University. Another approach to using digital technologies for processing images of the working area is proposed. Some aspects of solving problems of identification of parts, determination of their location, control in automated assembly is described. The hardware-software complex in the article performs data processing and measurements in parallel with the flow of the technological process. The hardware and software complex expands the capabilities of flexible assembly platforms when assembling parts with different mass-inertial characteristics due to the geometric shape and dissimilar materials.*
Keywords: assembly platform, Bayesian criterion, digital image, digital image processing, machine learning, pattern recognition, technological area.

Introduction

Modern education in higher education is largely based on a project-based approach, which implies the implementation of such solutions as term papers and theses that would demonstrate not only the level of education of the graduate, but also his ability to solve real production problems. This is especially important in the context of the "digital" economy and production, equipped with equipment with numerical control. Digitalization covers most stages of engineering production. It is of particular importance in the technological processes of assembly and machining. It uses both numerical control equipment and software that uses pattern recognition and machine learning technologies.

The aim of the research is to train students in modern computer vision technologies by solving the real production problem of automating the assembly

processes and introducing the results into the learning process. This objective is achieved by applying by student's algorithms for processing and improving digital images, and the algorithms developed by the authors of the article for recognizing and positioning individual details on the assembly platform, as described below.

Control programs were formed based on information about the part reflected in flat drawings or volumetric models and were corrected at the place of processing under the real position of the workpiece, the position and geometry of the cutting tool, and so on. Such correction is a feedback that can be discrete or continuous and can be implemented in various ways. Feedback in CNC equipment involves the use of a variable or variables provided in the control program, the values of which are redefined during the processing of the control program (for example, by correcting the angle of rotation of the workpiece). The purpose of obtaining data and forming a digital image of a product is to change the technological process, due to the specifics of the changing technological environment. Thus, a machine with a contact sensor can determine the coordinates of a specific workpiece, and an operation controlled by a numerical control system can use the results of digital processing of the signal generated by the interaction of the stylus with the surface of the part to correct the zero point of the program, the location of the coordinate axes, etc.

Before each workpiece is machined, the contact sensor is called from the tool magazine by the command of the control program. The sensor automatically "bypasses" the workpiece, contacting the specified surfaces. Then the CNC system automatically enters the updated data, recalculates the NC program and gives the command to machine the part. The position of the zero point of the CNC of the workpiece coordinate system, corrected in this way, is called floating zero and is used in batch production to increase the processing accuracy and reduce the requirements for the accuracy of machine tools. Thus, a digital image of the product is formed on a CNC machine in a set of data available for analysis not only in the CNC system of the machine (its capabilities are inevitably limited to purely production tasks and the supplier's implementation), but also by external software, which allows using the digital image, formed during processing on a CNC machine, not only for discrete or dynamic correction of the NC, but also for solving other tasks related to preparing production.

Methods and Materials
The Tasks of Analysing Visual Information and the Possibility of Their Integration into the Technological Process

Of particular interest is the search for tasks that can be automatically solved using digital images of the working (technological) zone. A technological zone is

understood as a limited space in which technological processes of production and movement of products are carried out. The digital image of the zone is obtained using a photo or video camera (discrete or dynamic image, respectively). The digital image captures the objects (parts) involved in the technological process (assemblies, measurements) and is used to obtain data that make up the digital image of the product. Photos (video frames) taken at certain time intervals give a dynamic digital image of the product (Fig. 1).
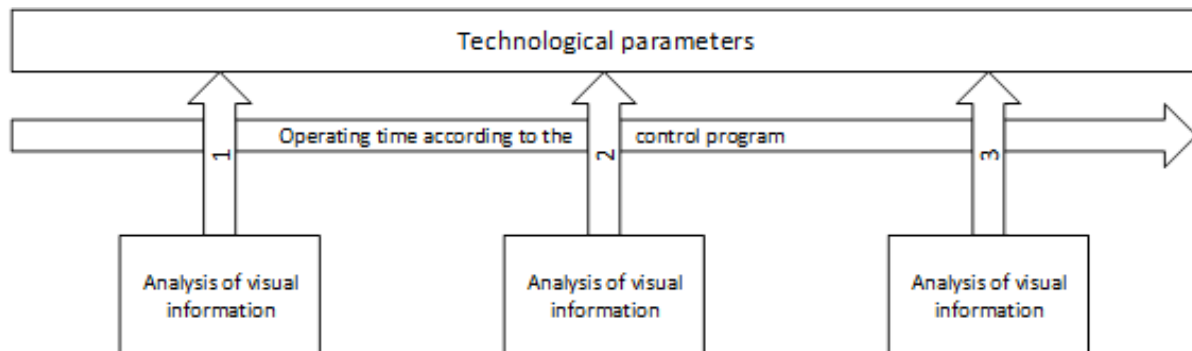
Figure 1 **Formation of a Dynamic Digital Image of the Product. Here, 1, 2, 3, are data streams obtained because of digital image processing processes that record certain stages of product assembly**

The time intervals between the launches of these processes can be different, but must be synchronized with the technological process of the program. An example of equipment that uses a digital image of a product, formed not only by sensors, but also based on photo and video filming, are modern flexible assembly platforms Uflex (Direct Industry by VirtualExpo Group, 2021).

These flexible assembly platforms have video cameras for visual inspection (using a vision system) by an operator who monitors the assembly process or performs quality control. The location of the photo or video camera on the assembly platform ensures that the objects (parts) involved in the technological process (assembly, measurement) and on the flat surface of the pallet fall into the frame (Kayasa & Herrmann, 2012; Lanza, Haefner, & Kraemer, 2015). When using automatic equipment, a certain arrangement of all assembled elements in the space of the working (technological) zone must be maintained after each assembly transition (action). On the machine or on the assembly platform it is ensured, first, the correct orientation of the product, and, second, its fixation. With automatic assembly, there is a possibility that the assembled products will receive an arrangement not provided for by the technological process, which can lead to accidents and breakdowns of the product, tool, device. This limits the possibilities of automatic assembly of products, while the automatic orientation of several products is impossible, while others - it involves serious and, often, economically

unprofitable changes in the design of products. Several tasks can be distinguished during automatic assembly, namely: identification – determination of the part from the set submitted for assembly; determination of the location of the identified part – finding its coordinates and position; checking the suitability of the part. The tasks of identifying, determining the location and control of the assembled parts must be solved jointly and comprehensively. From this viewpoint, a digital image of the working area can provide data for solving the problem of identification, locating control points. Here, the sensors of the control system provide data for solving the measurement problem by refined control points, see Fig. 2.
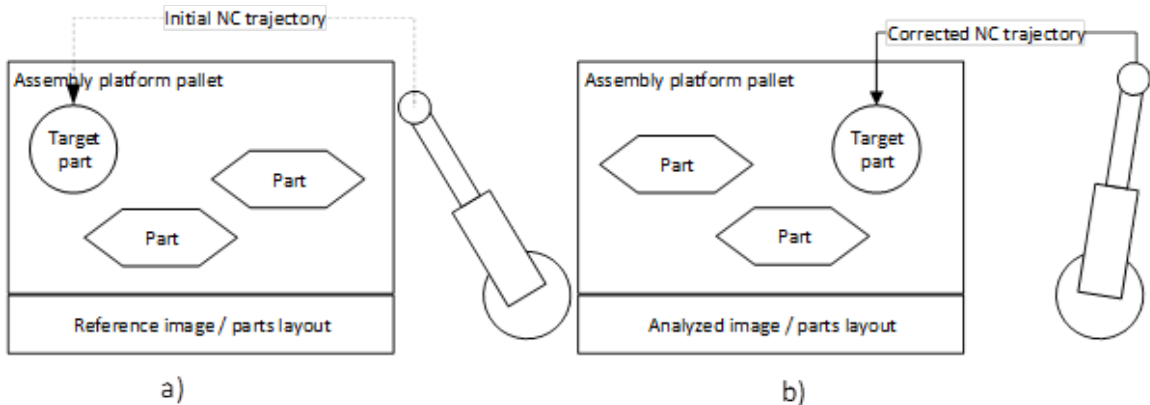
Figure 2 Changing the Trajectory of Approach of the Manipulator from the Programmed (a) to the Corrected, Considering the Actual Location of the Target Part (b).

Part a) of the figure shows the reference image of the pallet of the assembly platform, which corresponds to the values of the parameters of the developed control program b) - the actual image of the location of the parts. The trajectory of movement of the manipulator is changed under the observed arrangement of parts. Thus, the location of the part in the working (technological) zone is specified, the correction of the approach path to the controlled point is carried out by providing feedback (Fig. 3). Refinement is made based on identification, determination of the position of parts in the working area and control.
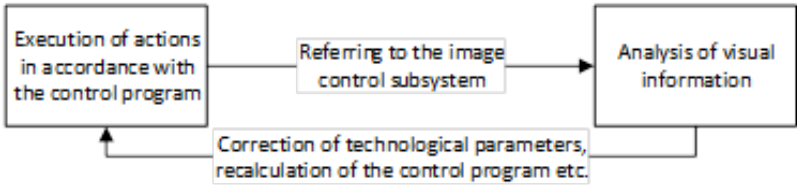
Figure 3 Scheme of Embedding the Analysis of Visual Information into the Technological Process

For numerically controlled equipment and various kinds of machines, it is necessary to analyse visual information automatically. The authors were tasked

with creating a tool for the automatic identification of parts, determining their location and monitoring their suitability for performing a technological operation, mainly in automatic assembly.

Hardware and Software Complex for Processing Digital Images of the Working Area

For automatic identification of parts and their location during assembly, the authors propose to use digital images of the technological area. The identification of parts and their location is carried out using a software and hardware complex for processing digital images of the working area, using algorithms for statistical image processing.

The hardware and software complex for processing digital images of the working area in several cases makes it possible to supplement, transform the data obtained using traditional sensors, and provides automatic feedback wherever the location of the collected objects within the working area is uncertain. This allows you to correct the instructions of the control program and automatically correct the coordinates of the motion paths calculated in the control program. Note that the acquisition and processing of images is deployed outside the working area, contactless.

Object of Analysis

The most common connection is the connection using fasteners, and these parts are distinguished by both high standardization and a significant variety of configurations and sizes. The software and hardware complex for processing digital images of the working area processes photo files similar to that shown in Fig. 4.

*Figure 4 **Test Image of the Working Area***

Description of the Hardware and Software Complex

The hardware and software complex were created using the programming language built into the Matlab software package. Here, the author's algorithms for processing digital images were used, using the Matlab library of functions.

Hardware and software complex are a software environment in which (Patrick & Fattu, op. 1986):

- preparation of digital data,
- training,
- identification.

Digital image processing includes:

- image visualization,
- converting the image to black and white for subsequent segmentation,
- automatic recognition of all its closed areas (segmentation),
- definition of sets of graphical characteristics (coordinates of the bounding rectangle, area of the object, coordinates of the centroid, etc., required for the calculation).

Converting a color image, carried out by standard Matlab functions, is sequential automatic:

- converting a color image into a gray-scaled by forming a weighted sum of the R, G, and B component,
- filling small areas inside the plate border - "voids",
- converting a "gray" image into an image containing only black and white color - binarization by thresholding (Fig. 5).

*Figure 5 **Result of Binarization***

Binarization replaces conventionally light gray pixels with white ones (code-1) (we mean the value of the code corresponding to the color shade in the image matrix), dark pixels into black ones (code-0). The standard Matlab function of

automatic object recognition in a digital image allows you to distinguish two types of objects: the background is black and spots are white (or vice versa). An array of objects is formed. Each object is associated with its own binary matrix (Fig. 6).
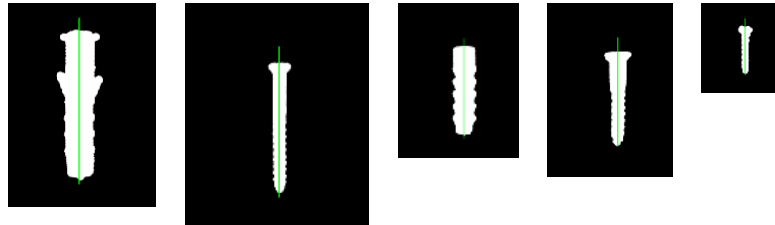
*Figure 6 **Recognized Objects***

Here, the vertical line is the main axis of the ellipse enclosing the recognized object. Objects are rotated so the main axis is vertical. The author's technique described in (Samarkina, Samarkin, Sokolova, & Zharov, 2019) allows to obtain the relative coordinates of the points of the outer contour of parts, the centroid coordinate acts as a base point.

The result of the stage "Determining the parameters of each object" is to obtain the relative coordinates of the outer contour of the parts. Figure 7 shows graphically the parameters of six parts of the same standard size as an example. This data in tabular form is used for object recognition.
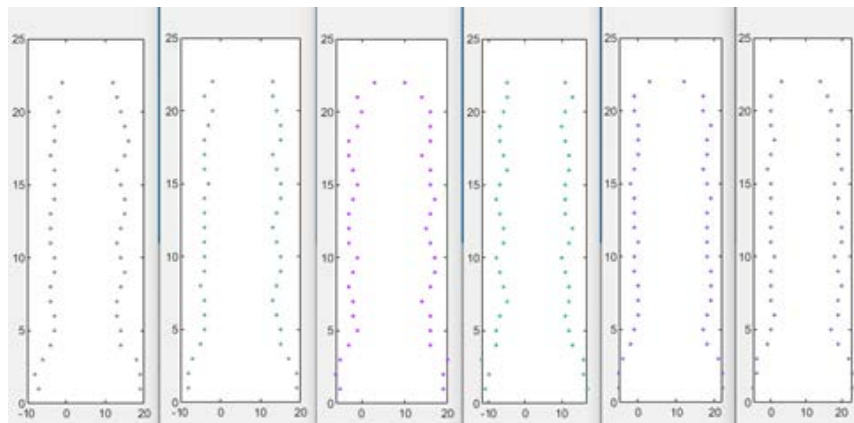
*Figure 7 **Coordinates of the Points of the Outer Contour of Parts of the Same Size***

Analysis of Digital Data of Recognized Objects

As in all tasks of pattern recognition, the stage of the workflow is training. The method under as in all tasks of pattern recognition, the stage of the workflow is training. The method under consideration uses a method of object recognition based on the Bayesian approach (Patrick, 1972; Shirman, 1998). For training, a

few examples are required in comparison with other methods; high training efficiency is also mentioned (Shirman, 2000; Wang, Pau, & Chen, 1993).

Suppose that in observation a certain set of measured features of the object that make up the observation vector is obtained. Suppose that the observation vector is a random vector with a conditional probability density, depending on its belonging to a certain class. If the conditional probability density is known for each class of products, then the problem of recognizing product classes is reduced to statistical testing of hypotheses. Let's assume that the vector X is the vector of observations of the object. Then the classification rule for the vector X has the form (1) (Shirman, 2000; Wang, Pau, & Chen, 1993):

$$h(x) = -\ln p\left(\frac{X}{\omega_1}\right) + \ln p\left(\frac{X}{\omega_2}\right) \underset{>}{\overset{<}{}} \ln\left(\frac{P(\omega_1)}{P(\omega_2)}\right) \quad (1)$$

Here: ω is the class to which the analyzed part can be assigned (distinguished by indices), $p\left(\frac{X}{\omega}\right)$ is the conditional probability density of the vector X when determining its belonging to the class ω. In turn, $p(\omega)$ is the prior probability of the corresponding class of products, $T = \ln\left(\frac{p(\omega_1)}{p(\omega_2)}\right)$ is the threshold value of the likelihood ratio.

The software package includes a toolkit that allows you to upload photos for training. During the training phase, digital photographs contain only objects of the same class. The enlarged stages of the training cycle are shown in Fig. 8.
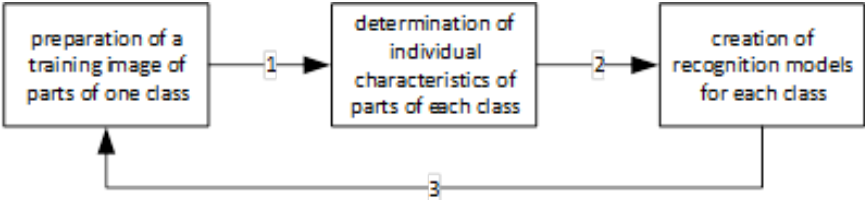
*Figure 8 **Learning Cycle***

The result of training is a data table. Each row of the table corresponds to one class of parts involved in the technological process. The class can correspond to both a new class of a product, and a separate standard size (execution, design option).

After training, the formation of a table, the complex allows you to perform the identification process, the enlarged stages of which are shown in Fig. 9.

*Figure 9 **Identification Stage***

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The automatic recognition of objects here means the correlation of the object image to the class name - identification. Individual parameters of parts of the n-th class or subclass, means the geometric shape (points of the outer contour, areas).

Recognizing standard sizes is reduced to statistical hypothesis testing. To decide on the classification of the target, the definition of a minimax criterion is used, which solves the worst case.

Bayesian criterion minimizes the error of assigning a particular part to a standard size. Regarding the technological process, at the identification stage during the assembly of the product, we automatically receive an answer to the question, what are the parts under the camera, how each is located.
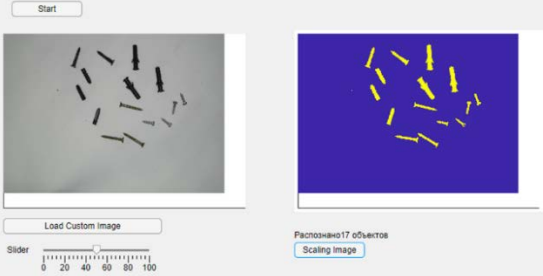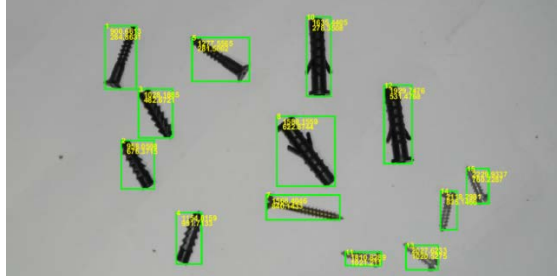
Implementation of the Complex and an Example of Its Work

The next series of figures shows the interface of the complex and some stages of its operation, inevitably limited by the volume of the article.

Then the complex creates a table with real data on the classification of objects, the coordinates of their outer contour and location coordinates, including the angles of rotation.

The presented complex is available as a Github repository (Samarkina & Samarkin, 2021) and can be used for further development.

*Table 1 **Stages of the Software Package***

1. Import and binarization of the working area image	2. Image segmentation
3. Preliminary analysis of areas occupied by products	4. Object recognition
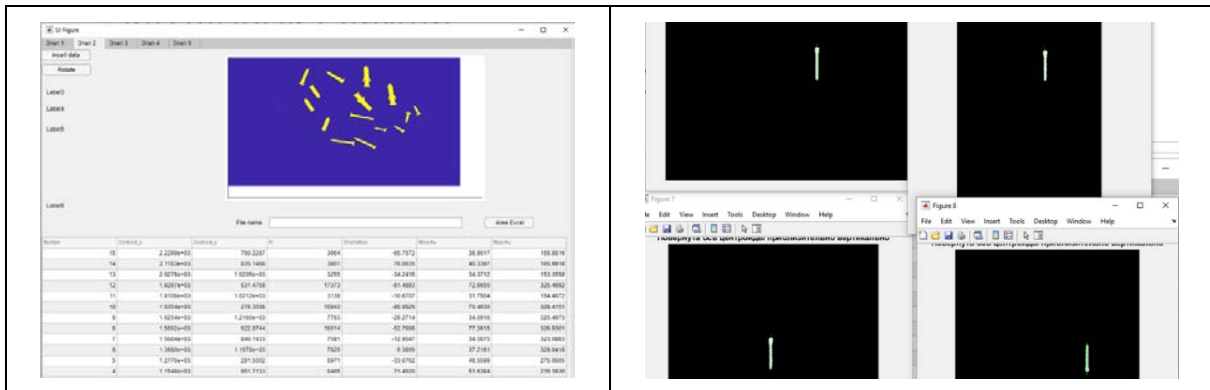
Discussion

The presented complex has several disadvantages due to both the research nature of the project and the forced limitations set by the authors for themselves. The published version is debug in nature, so it provides redundant information about the recognition process. In the presented version, the algorithm cannot identify internal cavities and pockets (for example, depressions on the contour), which is corrected in the newest version of the 2021 complex. The present version of the complex also does not include a module for interfacing with specific numerically controlled equipment. The noted shortcomings are the basis for further improvement of the program.

Conclusions

Modern mechanical engineering is increasingly being integrated with computer technologies, such as statistical data processing, computer vision systems, and artificial neural networks.

Besides traditional laboratory work, with known input conditions and predictable results, this implies the involvement of students in real or close to real production projects. Students face new working conditions for themselves, requirements for solutions and the level of responsibility. The proposed work is at the junction of laboratory work and full-fledged engineering and scientific developments. This allows both to improve the quality of training and to introduce new competencies into training.

Based on the results, presented in this article, the student defended his graduation work and preparations are underway for implementing new laboratory work on computer vision.

Acknowledgments

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USE OF LEARNING MANAGEMENT SYSTEM ILIAS IN TEACHING TECHNOLOGIES FOR INTENDING TEACHERS OF SECONDARY AND VOCATIONAL EDUCATION

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Abstract. *The purpose of the article is to substantiate the features of e-learning technologies of materials for intending teachers of secondary and vocational education through the use of available learning management system ILIAS.*
The web-based learning management system ILIAS is used to develop e-learning materials, manage and disseminate multimedia materials in an online educational environment. The ILIAS system is available, free of charge and designed to manage learning resources as part of integrated systems and e-learning. The independence of the international project ILIAS and its support by many European universities as well as IT organizations are the basis for use and development in the training of intending teachers of secondary and vocational education. While researching the given issue, we have used theoretical and empirical research methods, i.e. analysis and synthesis to clarify the basic concepts and categories of computer-based education; conceptual and comparative analysis of curricula and programs, psychological and pedagogical, scientific and methodical literature as well as the materials of scientific and practical conferences on the problem of research and advanced pedagogical experience, comparing traditional and computer-oriented approaches in teaching technology. We have also used the methods of identifying patterns and drawing conclusions on the given issue.
The use of web-based management system ILIAS in the teaching of construction materials technology contributes to the formation of professional competencies of intending teachers of secondary and vocational education, manifested in the ability to integrate knowledge of different technologies, make sound technical decisions and implement them in virtual reality; selection of technological processes, planning, forecasting and evaluation of technology efficiency; perception of computer models of technological processes.
Keywords: *construction materials technology, e-learning, pedagogical software, intending teachers of secondary and vocational education, modern technological processes, computer testing.*

Introduction

Computer technology is widely used in modern education. The intensification of the educational process is nowadays linked to the development of both individual courseware and complex learning computer systems (LCS). The Paris Communiqué Paris recommendations for 2018 state that higher education institutions (HEIs) should prepare students and guide teachers so that they act actively and creatively in digital environments with advanced data analysis, using e-learning and blended learning to build digital skills and personal competences. In this process, intelligent NQSs are a new type of learning system, capable of supporting and monitoring student learning at different levels of complexity in an individualised way and providing each student with opportunities to acquire new knowledge as quickly and efficiently as possible.

The report of the COMPETING project, funded by the European Union Erasmus+ programme, outlines the didactic and technical concepts as a basis for course design, development of learning materials and digital tools to support the educational process in new courses/curricula. The purpose of the COMPETING project is to create a blended modular learning environment for specialist training by integrating advanced technological solutions. Part of the project is the Learning Management System (LMS) (FHOO, 2020) which is a self-contained program where materials (instruction) can be placed. The system makes it possible to organise these materials (Gatreau, 2011). At the same time, such a system serves to introduce various digital tools in education, and the system is also used to manage teaching and learning activities in an online learning environment (Dias & Diniz, 2014).

The analysis of selected studies by scientists on the problems of implementation of electronic (digital) learning (Alabi, Thaddeus, & Falode, 2020; Brusilovsky & Miller, 1999) allows us to consider a promising direction of improvement and computerisation of the educational process in HEIs through the introduction of complex software solutions – Learning Management Systems (LMS) for creating an electronic information learning environment, learning management, development, organisation, placement of electronic learning materials, administration of learning resources, tracking progress of learning activities by students and evaluating their results.

The implementation of such systems in educational institutions worldwide through commercial software products (e.g. WebCT, Blackboard, HyperMethod eLearning Server) and free and open source software (e.g. Moodle, ILIAS, etc.), reflected in scientific publications (Osman, 2010), shows that e-learning has the features of an adapted technology of interaction with the student in real time,

providing individual automated support to each participant of the educational process, can be effective in achieving programme learning outcomes.

Thus, the New Media Consortium report "NMC Horizon: Higher Education 2017" focuses on the following advances in educational technology for higher education: adaptive learning technologies, mobile learning, Internet of Things, next generation learning management systems, artificial intelligence, natural user interfaces. The development of personalised learning, linked to learning analytics, in an adaptive learning environment is based on technologies to track student progress and use data to make real-time adjustments to the teaching process (Adams et al., 2017, p. 38).

The study of the literature we have used allows us to state that automated learning management systems (LMS), built using information and telecommunication technologies, are widely used in modern conditions by students and teachers alike. LMS ILIAS is successfully used in the most developed countries of the world (ILIAS Installations) because it provides many advantages: it is available anywhere and anytime; it allows the use of various modern tools and teaching methods (text, multimedia, tests, etc.); it enables students to communicate with each other and teachers online; the simultaneous use by students of many sources of educational information; the use in the learning process of new information technology advances that contribute to a person's entry into the global information and education space and the formation of information and digital competence.

Research Methodological Foundations and Methods

The idea of using didactic (teaching and learning) complexes – sets of scientific, methodological and information materials for the organization of the learning process in a particular discipline is now common in academia and in the practice of higher education institutions (HEIs). Scientific research into the creation and use in the educational process of electronic educational and methodical complexes, as well as psychological and pedagogical justification of the specifics of the use of information and communication technologies (ICT) for this purpose prove that the introduction of eLMK and ICT in the educational process opens up new opportunities for deepening and expanding the theoretical knowledge base and enhancing the learning and cognitive activities of students, creating conditions for individualized learning of intending teachers of technology in secondary and vocational education institutions.

With the increasing role of students' independent work and the introduction of new forms of educational process organization, to which we include e-learning, the function of the teacher as a source of information loses its relevance – he/she becomes, above all, an organizer, consultant, supervisor and

expert of learning, cognitive activities and independent work of students. These aspects determine the search for innovative means of monitoring the quality of education, determining the effectiveness of a particular educational process and the students' skills during the monitoring activities in the learning of certain disciplines. Optimal organization of the e-learning process is possible under conditions of flexible management with the teacher-student feedback system, when teachers are provided with information about the degree of coincidence of the actually performed action and the planned action. The effectiveness of feedback is achieved by systematic, regular, consistent monitoring and in the context of certain methods that do not require a significant amount of study time for students to complete assignments and for the teacher to check them. This is what an automated test form of monitoring in an e-learning environment is all about.

At the turn of the 20th-21st centuries, scientists, educators, and IT specialists are acutely interested in the content and methods of computer-based knowledge control: different types of control are being studied (Lerner, 1996); types of questions, their components, and metadata are being usually used in forming the content and set of control tasks (Brusilovsky & Miller, 1999); mathematical methods of knowledge evaluation (Moiseev, Usmanov, Tarantseva, & Piatyrublevii, 2001) along with modern control technologies are being worked out. However, it is worth mentioning the lack of special scientific research that would deal with the problems of organizing a system of computer monitoring of independent cognitive activity of future teachers of secondary and vocational education students in learning technologies that would enhance the effectiveness of e-learning and the formation of students' abilities to work independently.

Scholars claim that e-learning and systematic objective monitoring are effective means of differentiating, individualising and increasing students' motivation for systematic self-learning. Students take an active part in organizing and carrying out their learning and cognitive activities by self-monitoring and self-checking through testing their independent work. It is worth agreeing with V. Kuzneczov, «self-testing with diagnostic tests is of great psychological importance, it stimulates learning» (Kuzneczov, 1999).

The advantages of testing as a tool for assessing the effectiveness of e-learning compared to other forms of monitoring are, firstly, that the tests are qualitative and objective means of assessment and, secondly, that the test indicators focus on measuring and determining the levels of mastering key concepts, the content of topics and curriculum sections, the formation of general and professional subject competences of students, rather than stating whether a student has a certain set of formal mastered knowledge, which is indicated by Majorov (Majorov, 1997).

In our study we also considered the advantages of computer-based testing over traditional forms of knowledge control (Avanesov, 2002): fast results and freeing the teacher from the time-consuming work of processing the tests; objective assessment; computer-based testing is more interesting than traditional forms of questioning and creates positive motivation among students as well as increases effectiveness of the teaching staff.

In scientific literature the problems of e-learning and automated (computer-based) monitoring of students' knowledge, we examine in the aspect of technology training for future teachers of secondary and vocational education, have two interrelated aspects – methodological and technical (Table 1) (Zajceva, Prokofˆeva, 2002).

Table 1 **Methodological and Technical Aspects of E-learning and Computer-based Student Monitoring**

Methodological aspect	Technical aspect
1. Designing the content and teaching techniques. 2. Planning and organization of monitoring activities. 3. Identifying the types of questions and selecting the tasks for testing the students' knowledge. 4. Generating a set of questions and assignments for the survey. 5. Defining the criteria for assessing the performance of a particular task and of the checklist as a whole, and so and so forth.	1. Automatically generated set of checklists based on the selected approach. 2. Selection and use of different settings in the monitoring system. 3. 3. Defining algorithms for assessing knowledge and determining the levels of formation of subject competences and the like.

Modern computer-based test control tools enable the use of different forms of test tasks, adaptation to the user's capabilities, generation of a given sequence of tasks from a common database, web-based interface of software shells intuitive and easy to use on different devices (Chua, Yan Piaw, 2012).

While working on the learning technology content for future teachers of secondary and vocational education institutions and creating tests, we were inspired by the scientists' recommendations, (Avanesov (2002), Kuzneczov (1999), Majorov (1997) and others), who proved that the main conditions necessary for organizing an effective automated test monitoring are: a) consideration of classical and modern test theory, which ensures reliability, validity and effectiveness of control; b) test control is not limited by testing students' knowledge; c) in the testing process, a comprehensive check of student's learning activity, in particular: dynamics of general development, formation of general and professional competencies, activity, cognitive interests,

creative abilities of future teachers, is especially important; d) a creative teacher has creative attitude to organize and manage the educational process.

We took into consideration Avanesov's opinion that "tests can be effective only in an educational process in which the teacher ... becomes a developer of a new software and methodological tools, an organizer of the process of students' independent learning. «Training should begin with an entry test, be followed by self-monitoring and end with a final test» (Avanesov, 2002). For this reason, our practice involves the active participation of students in the organization and implementation of cognitive activities through self-monitoring by means of testing of their learning results.

Results and Discussion

In order to improve the efficiency of the students' self-study activities we have used ILIAS, a free and open-source web-based system for teaching construction materials technology. On the basis of ILIAS the electronic course «Material science and production technology of structural materials» was created and implemented into the educational process (Fig. 1) as well as the system of computer-based knowledge monitoring and measuring the levels of students' learning achievements has been developed.
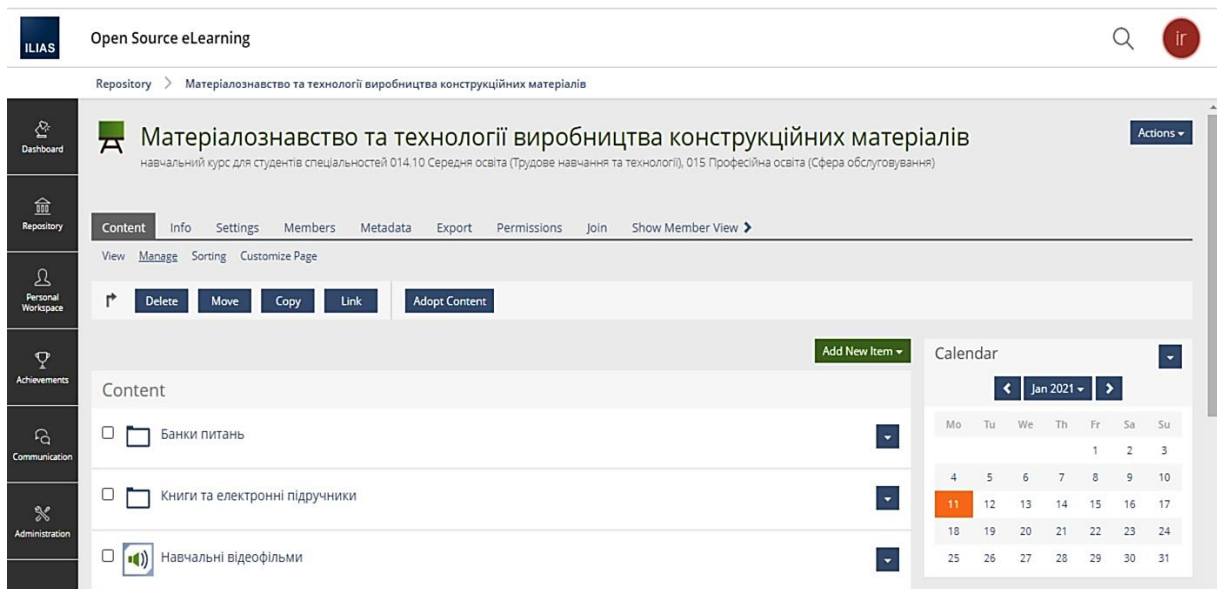
Figure 1 **Interface of the E-learning Course «Material Science and Manufacturing Technology for Structural Materials»**

We agree with scholars that using the ILIAS learning platform can turn any boring or complex learning content into interesting and easy to understand (Alabi et al., 2020).

ILIAS provides the opportunity not only to implement the learning content of construction materials technology, but also to connect virtual classrooms and evaluate students' progress. At the same time, students can study course content at any accessible location, check assessments, create and develop learning materials (Fig. 2).
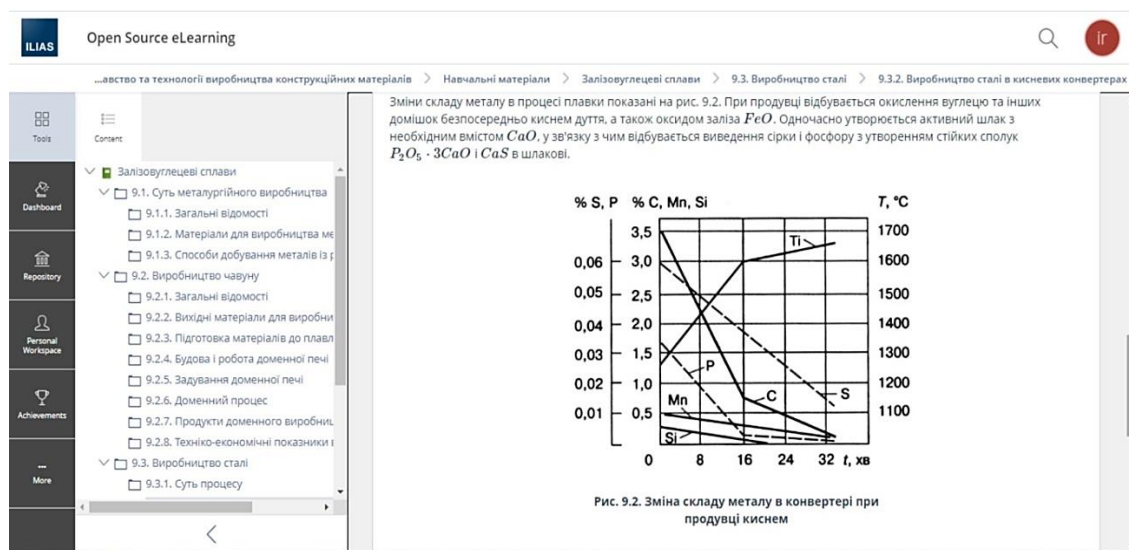
Figure 2 **Fragment of the Contents of the E-course «Material Science and Manufacturing Technology of Structural Materials»**

We have used ILIAS to develop, manage and distribute multimedia learning materials. The training materials were created for online learning environments with the following considerations in mind (Shymkova, 2012):

1. A single hardware and software platform consisting of individual, functionally complete subsystems with a high degree of integration makes it possible to provide a holistic, integrated solution. In particular, it is possible to monitor and support the development and implementation of the training and information provision process centrally.

2. The implementation of the system reflects the experience of its many years of use in education. In addition, the stable development cycle, prompt implementation of the latest information technology (IT) trends and professional support of the software product are important advantages. The implementation of the developed professional-level platform in compliance with international standards seems to us more convenient and logical than the common practice of combining software and multimedia products created by teachers (or students)

themselves using different tools and data formats.

3. Simple yet effective unified tools for creating and publishing web-based multimedia learning resources, supporting a wide variety of multimedia formats (TeX, audio, video, media streaming formats), allow users with varying levels of IT competency, from basic to professional, to work effectively with the system.

4. Integrated monitoring tools allow you to keep track of every user and item of learning material, see detailed access statistics and monitor the progress of pre-defined tasks set by the teacher.

5. A powerful test control system supports various types of questions – from classical correct answer selection tasks to open-ended questions with uncertain answer analysis (Levenshtein algorithm) and multimedia data in the tasks, has a flexible evaluation and results processing system.

6. Integrated information security features – centralised authentication, authorisation and logging of incoming requests, remote access, separation of access rights and the ability to personalise the working environment.

7. Low cost of use and implementation. The software package is free, independent of the operating system, and any modern web browser is sufficient to use it as a user.

8. A priori, the system is oriented towards network use. Implemented on its basis, electronic-methodical training complex (EMTC) can be used in the local network for information and methodological support of students' independent activities, creation of automated test control centres, organization of educational environment for electronic and distance learning of higher education institutions.

ILIAS built-in test controls allow for online testing and automatic processing of results, i.e. ILIAS test tasks have advanced interactive controls with error diagnostics and feedback. ILIAS uses the following test tasks: Multiple Choice Question (Single Response) with multiple correct answers (Multiple Choice Question - Multiple Response). Multiple Response) Matching Question (Matching Question) Sequencing Question (Ordening Question) Cloze Question (Text Subset Question) Short Text Answer (Essay Question) Interactive Image with Active Slices (Image Map Question) Numerical Value or Spacing Check (Numeric Question).

In order to receive access to ILIAS, a user account should be registered, a unique identifier (login) and password are provided which will be used every time the student logs in to the system. For example, either an account is created independently by using the link on the home page, or a teacher registers student, signs them up for a particular course and then issues logins and passwords (which the student can later change), controls the content and amount of information available to the student group.

Test assignments are stored in test databanks and can be used in various tests, training courses, and combinations. Separately, test assignments integrated

directly into a block of training material – ILIAS training module – are offered to check comprehension and self-monitoring of learnt material. The ILIAS test can be implemented as a separate learning object in the repository by clicking on a specific header to access the test (Fig. 3).
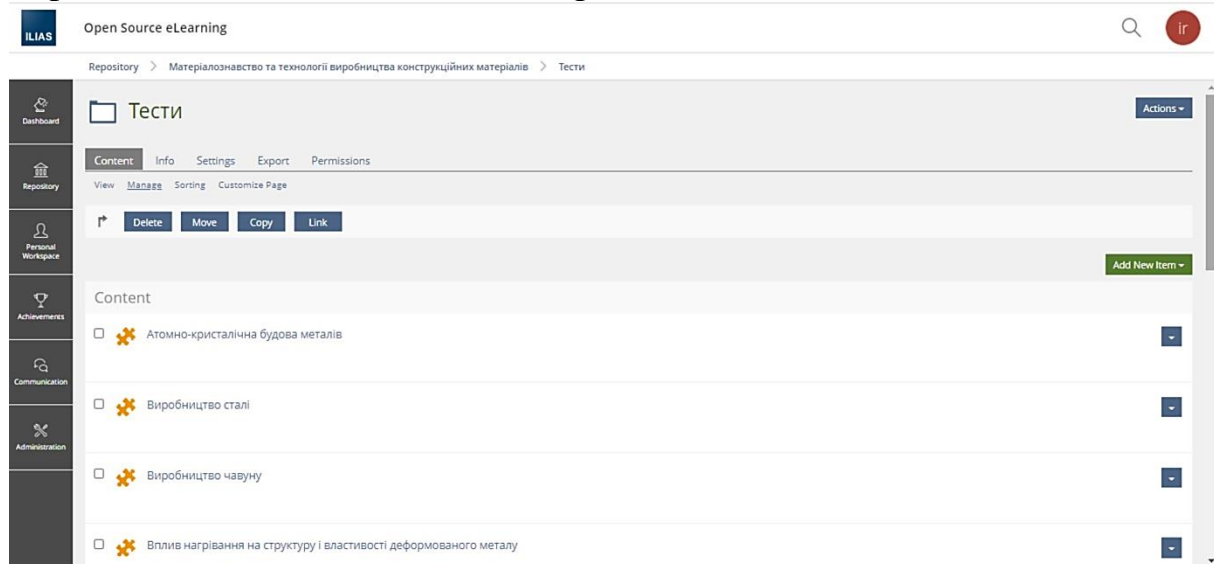
Figure 3 **Tests Content**

On the test start page, the system will generate a sequence of different types of questions after pressing the «Start Test» button. The test in ILIAS is an ordered sequence of questions. Depending on the type of question, one or more of the suggested options are chosen or an answer is entered from the keyboard.

The testing process consists of selecting the correct answer and confirming it by pressing «Next» (Fig. 4). When moving on to the last question, the «End Test» button appears.
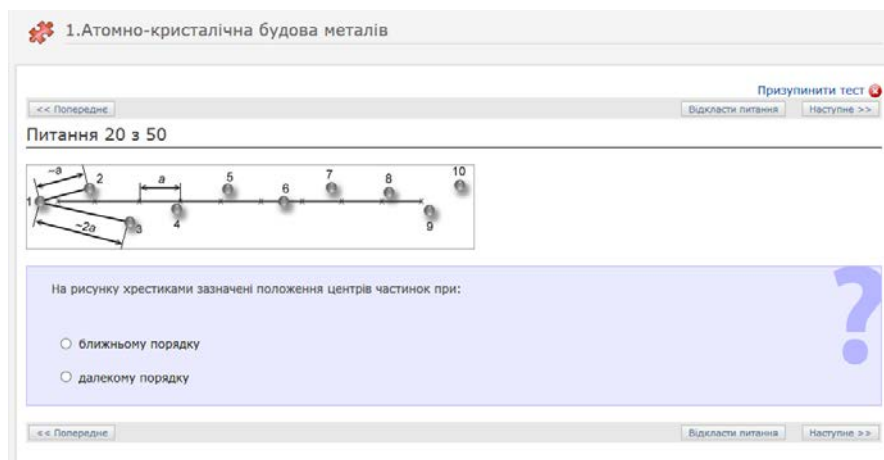
Figure 4 **An Example of the Atomic Crystal Structure of Metals Test Page**

If time limits for the current attempt (the teacher sets a time limit depending on the difficulty of the questions) are enabled when taking a test, a timer appears with a countdown to the end of the test.

The «Postpone Question» function allows you to postpone the current question to the end of the test and you can return to the previous question by pressing the «Previous» button. Normally a random sequence of questions and answer choices is generated for each attempt. You can pause the test without completing the current attempt by pressing the «pause test» button. The teacher can also activate additional functions for students, primarily focused on independent learning, in particular:

- the «Show results» button displays the results of the assessment of the question that has been answered;
- the «Hint» button gives short additional information;
- the «Feedback» button displays a detailed assessment with appropriate methodological guidance depending on the answer option chosen (correct, incorrect, partial, etc.).
- The «Solution Suggested» button will direct you to a training module, section, page or other training item which can be used to find the correct answer.

When the teacher has set a specific grading scale, a grade on a point scale is displayed (Fig. 5). In addition, information is obtained on the total number of correct answers, the ratio of the maximum possible score to the achieved score.

Ім'я	Логін	Досягнуті бали ↓	Оцінка	Відповіді	Час роботи	Detailed Evaluation
Жулінський, Володимир	[zhulinskyi.volodymyr]	123 of 150	пройдено	50 of 50 (100.00 %)	00:09:39	Детальніше
Додишев, Денис	[dodyshev.denys]	120 of 150	пройдено	50 of 50 (100.00 %)	00:18:09	Детальніше
Заболотна, Тетяна	[zabolotna.tetiana]	117 of 150	пройдено	50 of 50 (100.00 %)	00:07:04	Детальніше
Собко, Олександр	[sobko.oleksandr]	96 of 150	пройдено	50 of 50 (100.00 %)	00:11:34	Детальніше
Насіковський, Віталій	[nasikovskyi.vitalii]	82 of 150	пройдено	50 of 50 (100.00 %)	00:04:14	Детальніше
Тищенко, Іван	[tyshchenko.ivan]	76 of 150	пройдено	50 of 50 (100.00 %)	00:04:07	Детальніше
Шоробура, Наталія	[shorobura.nataliia]	72 of 150	провалений	50 of 50 (100.00 %)	00:53:17	Детальніше
Топчій, Павло	[topchii.pavlo]	64 of 150	провалений	50 of 50 (100.00 %)	00:03:33	Детальніше
Гуменюк, Інна	[humeniuk.inna]	62 of 150	провалений	48 of 50 (96.00 %)	00:03:27	Детальніше
Гонтар, Вікторія	[hontar.viktoriia]	58 of 150	провалений	50 of 50 (100.00 %)	00:03:53	Детальніше
Купріянов, Сергій	[kupriianov.serhii]	40 of 150	провалений	50 of 50 (100.00 %)	00:02:15	Детальніше

Figure 5 **Fragment of the Teacher's Page with Test Results**

In addition to general information on test results, detailed results for each student and specific questions can be shown (Fig. 6).

Figure 6 **The Result of the Test as Seen by the Student**

According to our observations, independent work is no longer a formal element in the holistic pedagogical process only when students perceive it as an essential element of their own development. For this purpose, we built a system of tasks so that to encourage a future specialist to self-promote information and professional activity in the system "information-knowledge-information".

Conclusions

The organization of the learning process of special subjects using ICT tools has a direct impact on the content of education. At the same time, the new forms of the learning process can provide the acquisition of qualitatively new professional skills.

The implementation of an automated integrated learning management system has ensured greater productivity, improved the quality of education and efficiency in the development of teaching and learning support compared to traditional methods of work. The integrated system based on ILIAS proved to be flexible and easy to organize and develop comprehensive information and methodological support.

The implementation of computer-based test control in the assessment and self-assessment of general and professional competences of students provides high technological efficiency of control and objectivity of the results, allows using flexible scale of knowledge assessment. Computer-based testing is an effective means of motivating students for systematic active self-study of the course, strengthening individualisation of learning, adapting the educational process to the requirements defined by the European Credit Transfer System (ECTS), the features of credit-module system of the educational process organization.

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KNOWLEDGE MANAGEMENT AS AN ASSISTANT IN DATA PROCESSING AND DATABASE FOR PSYCHOPHYSIOLOGICAL TESTS

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Abstract. *In nowadays modern society is a knowledge society and we are living in the information communication technologies century, so smart use of different computing tools, instruments and techniques are more and more used and applied for the problems of getting relevant information from the ever-increasing data flow and surrounding information problems resolving. Evaluation of children visual perception is not an exemption. In previous articles, authors described how mechanical skills of children's visual perception can be thoroughly evaluated by computerized system assistance that rates mechanical skills of perception or the computer screening. This computerized approach is a unique and promising opportunity, even a new method, of children's development level of visual perception evaluation at a very early age. In addition – with such evaluation by the computerized system there is not only possible to exclude the risk of the human factor (subjective assess or overlook), but the possibility to get extreme time-saving and extra accuracy of computer-aided tests. Extra fast test results proceeding is the main advantage of the computerized psychophysiological tests, especially when computing of tests means technical resolution and value-added outcome of tests results. The main purpose of this study is to consider how the KM system can be used as an assistant in data processing and creation/storage of databases for psychophysiological tests, especially for DTVP tests in the ImageJ computer program.*
Keywords: *database, data mining, data processing, ImageJ knowledge management, Psychophysiological tests.*

Introduction

Knowledge Management (KM) captures, distributes, and effectively uses knowledge. KM systems differ from traditional information systems (IS) by the active role users of KM systems play in building such systems' content. Users of traditional IS are typically not required to contribute to building the content of such systems actively, an effort typically delegated to the managing IS department or to IS consultants. The successful implementation of KM systems requires that their users effectively "use" such systems as traditional IS and

"contribute" to such systems' knowledge base (Becerra-Fernandez & *Sabherwal*, 2010). It means that KM is a process that allows creating, integrating, transforming, applying, and distributing any type and kind of knowledge to satisfy existing or potentially emerging needs and realize new opportunities.

At the same time – different psychophysiological tests mean the concentration of large information volume. This information relates to the data collecting regarding research objects (patients), the theory regarding different test methods and results interpretation, data storage methods, etc. So, as nowadays everything is more and more digitalized, KM system could be used as a digital assistant in data processing and creation and storing of a database for psychophysiological tests, for example – a test that relates to the visual perception, which is a generic term for describing visual information processing techniques such as visual analysis, visual-spatial and visual-motor integration (VMI). Moreover, such psychophysiological tests need a significant database for successful such program working, so there is a need for a particular computer program with KM for successful test processing.

To better understand such a computer program and value-added KM in it, it should be noted that VMI characterizes the level of coordination of visual perception and body movements. I.e., a sensory perception that activates muscles to make any task smooth and productive. Best examples of such activities are catching the ball and writing down from the school board (Schwartz, 2009). Simultaneously, visual perception is a combination of visual, kinaesthetic, and kinetic analyser actions coordinated and simultaneous. It is the ability to perceive, recognize, analyse, systematize, and remember visual information.

Furthermore, if this visual perception process is disturbed, people have many difficulties regarding visual and visual-spatial analysis, for example, difficulty orienting in space or remembering visual images (Tükel, 2013). The most important issue is that children visual perception disorders are not very easily spotted. In most cases only when children experienced problems in learning, such visual perception disorders has been discovered. However, not all people's VMI is fully developed, but they cannot be considered disabled – it is one of the specifics of vision.

As in nowadays modern society is known as a knowledge society and we are living in the information communication technologies century, it is logical that smart use of different computing tools, instruments and techniques are more and more applied for the problems of getting relevant information from the ever-increasing data flow and surrounding information problems resolving. Even employers nowadays demand a workforce with a higher level of knowledge and computer literacy (UNESCO, 2005). Moreover, children's visual perception's mechanical skills can also be fully assessed by nowadays solutions – by

computerized evaluation of mechanical skills of perception or the computer screening. Using a computer program in such an assessment does not eliminate the risk of a human factor. Computer-aided test processing significantly accelerates the collection and acquisition of test results (Howe, Chen, Lee, Chen, & Wang, 2017). That is why the KM system should be used as an assistant in data processing and creation/storing databases for psychophysiological tests, especially for DTVP tests in the ImageJ computer program.

Tools and Methods

As the ImageJ computer program was developed to process and obtain the results of the standard psychophysiological test DTVP-2 (Turlisova, 2018), it allows analysing the eye-hand coordination test results of the DTVP-2 test (Exercises 1-16). Scanned filled tests pages or online (with special stylus pen) made test results are proceeding by computer, stored in unique databases that hold quite impressive database/information storage. Furthermore, if those imputed data are smartly used with added KM elements in the program, there are many possibilities to identify particular actions for each test maker to develop his eye-hand coordination and visual perception as a whole in a comparatively short-term period.

Of course, before real test proceedings and results evaluation, much preliminary work should be done – all of those preparation works the author has mentioned in previous researches, such as special macros developing, "etalons" creation and saving for test results evaluation, automatized saving conditions which allow to identify each tested human but not to put all test results in a considerable bind in an anonymous way. It should be noted that extensive and long preparation and the computerized assessment provide a significantly more accurate and faster interpretation of results. Therefore, professionals have more time for the chosen correction works to develop specialized visual perception development materials. (Turlisova & Jansone, 2019). As the technology world is rapidly developing and updating, the paper aims to consider how KM usage could improve data mining, data processing, and further work with evaluated children's. It is an excellent example for KM and data mining co-working in the real practice to simplify and fasten psychophysiological test results interpretation and decision making to develop visual perception for children whose test results are not acceptable.

Implementation

ImageJ program works on Android as well as on Windows, based on Microsoft Visual Studio 2017. The purpose is to display on the screen of an electronic tablet (tablet PC) the initial data of psychomotor tests, accept the drawing and its subsequent processing with scoring and saving the results for later comparison. The program can be beneficial for evaluating children, especially children with developmental problems, developing psychomotor skills. So, the program provides different functions, represented in (Fig .1).
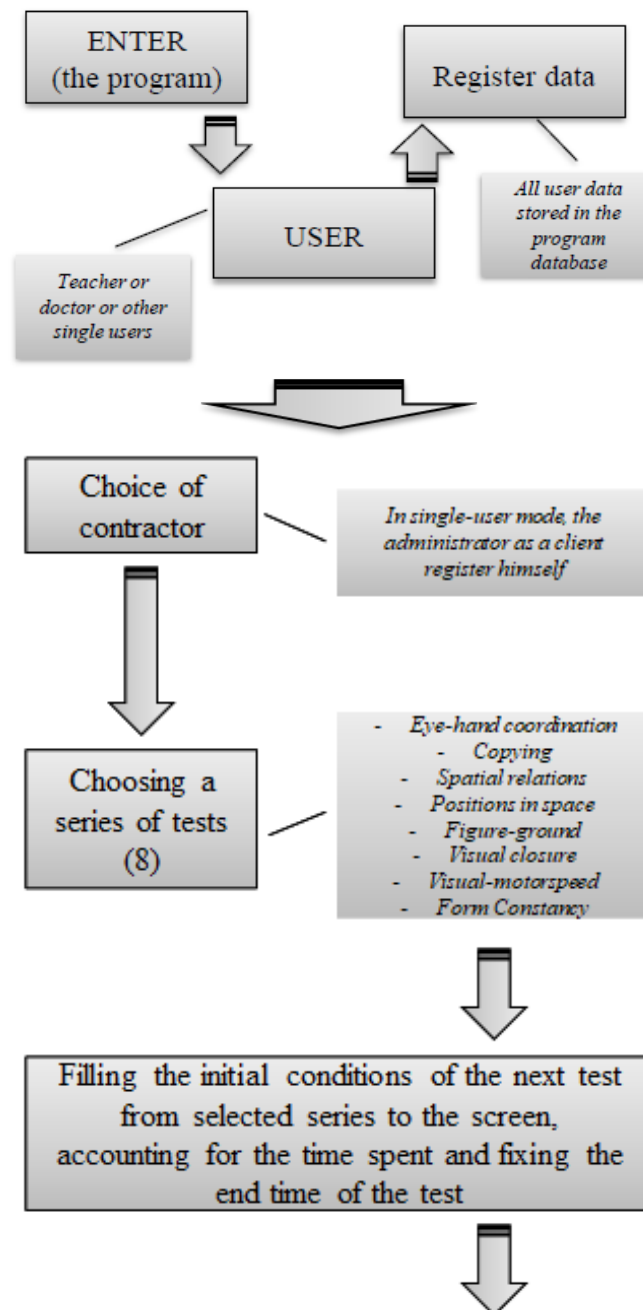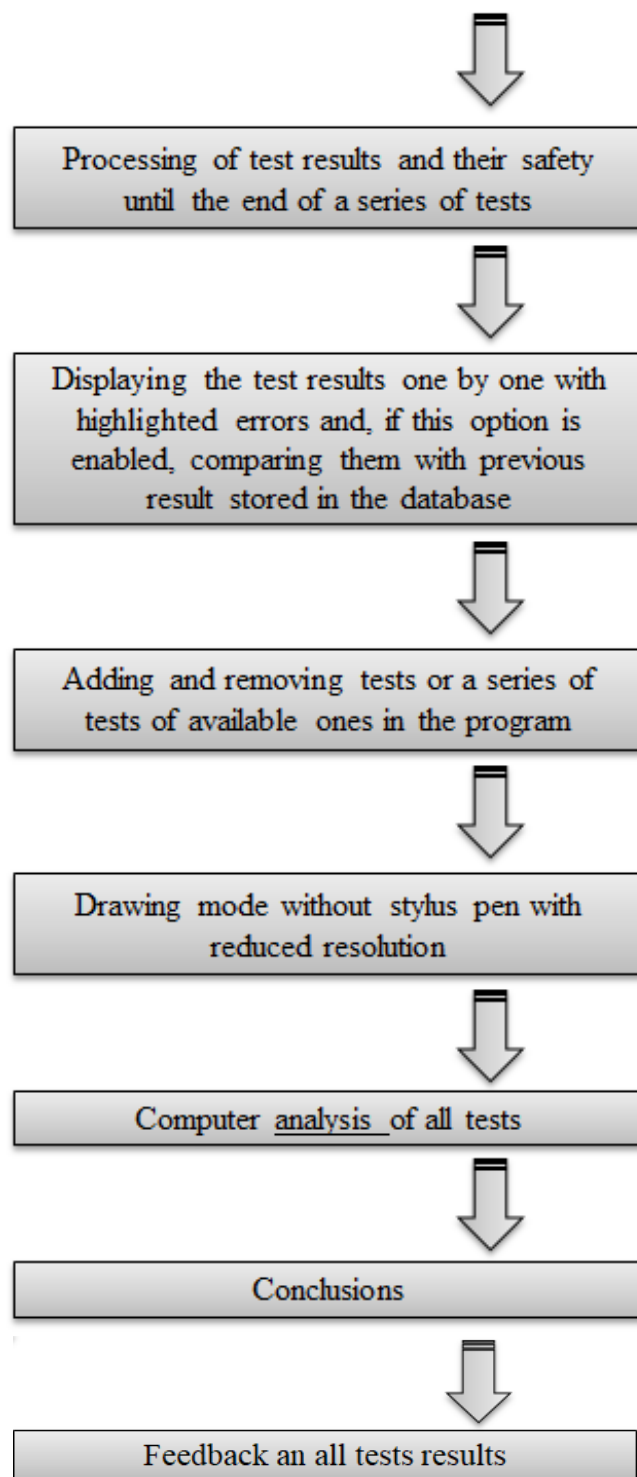
*Figure 1 **Scheme of ImageJ Program Functions** (Turlisova, Jansone, 2019)*

For KM's successful implementation in ImageJ and the previously mentioned program prototype working, some data warehouses should be developed. In other words – at the moment, there is an electronic program prototype that allows the analysis of DTVP-2 tests very precisely by unique

algorithms and computer counting methods. Simultaneously, the existing program prototype has some lack of KM in it – without KM existing program only displays results if the tests one by one with highlighted errors and, if this option is enabled, test results could be compared with previous results stored in the database. It is not very usable for fast feedback to decide for further actions from a data mining and KM perspective. Without implementing KM in this program, there are limited possibilities to use all their capacity tests. For example, a test result prescribes specialists' further actions (doctors, teachers, etc.) for possible children's visual perception development. Nevertheless, those action choice options are not collected in one data warehouse where test results can automatically give the tester the most relevant further action scenarios. The authors suggest implementing case-based reasoning (CBR) system/algorithm in the ImageJ program. Initially, some data mining and input for test results should be matched/linked with different further action scenarios related to the different test results. Since there is a great deal of similarity in test results submitted, it is necessary to create a single prototypical case representing the entire set of similar cases, called a protocol. Of course, when there will be base algorithms and scenarios in the program, it will be possible to add new versions of the tests and different action scenarios. In that case, theoretically, the whole world's best practice in the children's visual perception development could be collected in one place.

As KM approach and system as a whole prescribes management of intellectual capital in a computing system, it is important to put in ImageJ program human-based knowledge about visual perception – road-maps, algorithms etc. It will allow using KM as an organised and systemised database for test results proceeding by an integrated approach to information searching, collecting, evaluation, restoring and further distribution. And, even more – if ImageJ will be used widely by many highly qualified specialists (optometrists) the main database could be updated by knowledge of all of them, not only by one person. All of this could be made by several processes and activities – such as information collecting and codification, human resources connecting with a system (by knowledge), researching by harvesting, harnessing, hunting and hypothesis making. Lessons learned and best practices collecting in one place – in ImageJ as some kind of database is welcomed as well as it is critically important for test-results analysis and right interpretation. It could be possible by using the previously mentioned CBR; – CBR system will compare new test results with similar past tests to determine if any action is needed. The test will be considered as similar if it is for the same child age, similar mistakes, and other -specific aspects. The set of similar test results is then analysed to determine if any further actions for possible children's visual perception development are needed. When discrepancies arise between similar TEST tests,

the system uses a confidence algorithm to determine what reason it may cause. After the new further action scenario is inputted as an answer to some new test (test result), the database automatically uses it on further tests. A similar approach of CBR system usage is fixed on some insurance companies web pages with the system of- automatic claims to a proceeding, where the system defines what attachments should be added for a different type of claims (Becerra-Fernandez & Sabherwal, 2010). Of course, after some time of the ImageJ program using in full capacity, such a data warehouse will be huge. It will only mean that DTVP-2 tests made and analysed by computer and artificial intelligence will have a personalized approach for test results, interpreting and finding the best solutions for each child's concrete test results. Although data mining does not require data collection in a data warehouse (Becerra-Fernandez & Sabherwal, 2010), the authors think that exactly data mining, that is already inputted in the program, creates data warehouse which could be re-designed to the "Roadmap." As some authors mentioned, 'Roadmap' can mean different things to different people. However, what all those different roadmaps have in common is their goal to help their owners clarify the following three problems: 1) Where are we now? 2) Where do we want to go? 3) How can we get there? (Ma, Liu & Nakamori, 2006). Moreover, this exactly fits the ImageJ development in line with KM – inputted data. Further data processing with KM assistance can give specialists a clear "Roadmap" with further steps to develop concrete children's visual perception development. For this, according to the author's thoughts, fits two Road mapping Techniques – Expert-based approach and Computer-based approach since those two approaches combines previously defined DTVP-2 test results interpretation methods and KM where high-speed computers, intelligent algorithms, and other modelling tools can assist in estimating and quantifying all test results ever made and further selected options to children's visual perception development.

In summary, the authors can conclude that fully used ImageJ program added with CBR, KM system and the huge (even unique) data warehouse; could open new researches opportunities. DTVP-2 test results interpretation could be correlated to additional information showing new aspects of possibilities/reasons for low developed visual perception.

Conclusions

There still exists the benefit of having a person in the loop to review and approve DTVP-2 tests, but nowadays, when there are many different computing opportunities – it is very important to use them for very precisely review and approve by unique algorithms and by computing counting methods. After the data mining is complete and the protocols are set up, add KM to the computer

program - and ImageJ will be able to provide static test results and advise further actions. To obtain the highest benefit from data mining in the ImageJ by using KM, there must be a clear statement of the objectives – and it is not only maximally precise test results interpretation, but maximally personalized and admissible suggestions for further actions that are focused on children's visual perception development that could help to develop their skills in different aspects of life, studies, for example, because it is necessary to provide a learning material (chosen by KM from the developed ImageJ system) that is easier to understand or the students/children who have some visual perception problems.

Acknowledgments

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THE ONLINE TEACHING VIS-À-VIS
THE CLASSROOM TEACHING
(ON THE BACKGROUND OF COVID-19)

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Abstract. *The history of mankind will depict 2020 as the beginning of the new era – the era of the pandemic, which has invaded the world countries. The life on the earth has changed drastically. A partial or complete lockdown, numerous infected citizens, an increasing economic crisis, devaluation of a national currency, paralyzed cultural and social lives – this is a partial list of the challenges faced by the majority of the world countries that have made efforts to survive. The paper depicts the challenges of Georgia's educational space in the environment of the pandemic. The major emphasis is put on the transition from a classroom teaching to an online lecturing as well as on the (dis)advantages of a face-to-face interaction and a virtual communication. Moreover, the paper presents some strategies of the "peaceful" transition (creation of a student-oriented virtual-classroom atmosphere, timely informativeness, usage of appropriate technological means, replacement of written-type exams with hybrid-type examinations, flexible site-oriented means of an extracurricular communication, updated criteria of assessment, etc.) elaborated at the Faculty of Humanities of Ivane Javakhishvili Tbilisi State University. The methodology of research includes observation, analysis and evaluation of the recent processes.*
Keywords: classroom, face-to-face interaction, online teaching, pandemic, virtual communication.

Introduction

The coronavirus named as COVID-19 has been gradually invading the world countries. The life has been changing drastically via shifting the population from socialization to desocialization, from activeness to passiveness and from a face-to-face interaction to an online communication. The latter has been treated as the safest way of the prevention of the spread of COVID-19 that has influenced and reconstructed our lives. The greatest challenges have been faced by the educational systems of the world. It has been estimated "that 107 countries implemented educational institutes' closures. It is roughly said to be affecting 862

million people around the globe. This is approximately calculated as half of the world student population" (Mahmood, 2020, p. 1).

During the outbreak of the pandemic, when the earth faced numerous challenges, technology started playing a crucial role. Educators and students found themselves in the situation where they felt compelled to embrace the digital academic experience as the summum bonum of the online teaching-learning process (Mishra, Gupta, & Shree, 2020). „In the education system E-learning has been found to be a significant tool for effectively continuing the teaching-learning process during the lockdown" (Soni, 2020, p. 1).

Generally, the e-learning should be treated as the teaching conducted via the electronic media. „It was first used in 1999 at a CBT systems seminar... It offers a way to share reading materials using internet through emails, documents, presentations or webinars" (Soni, 2020, p. 2). Educators justly indicate that the e-learning is a recent variation of the distance education, which is a long-existing phenomenon. It gradated from the correspondence and the usage of the parcel post, to the radio, then to the television and finally, to the online education. The distance teaching can be traced back to as early as the 18th century. It began in the late 1800s, but its rapid growth started in the late 1990s with the advance of the online technical revolution (Kentnor, 2015, p. 22). This revolution enabled some universities of the world to implement the online education as a tool for increasing the number of students via meeting requirements of learners' diverse groups. The 7th Annual Sloan Survey on Online Learning indicated that 4.6 million college students were enrolled in one or more online courses in fall 2008 (Baran, Correia, & Thompson, 2013, p. 2)."By fall 2010, the number of higher education students had risen to 21 million, and 6.1 million of those (29.0%) were enrolled in an online course… Still, as of fall 2012, of 20.6 million higher education students, 6.7 million (32.5%) enrolled in online courses" (Kentnor, 2015, p. 22). Despite an increasing popularity of the e-learning, until 2020 a great number of the world universities adhered to the traditional face-to-face model of teaching. „In 2018, Times Higher Education conducted a comprehensive survey with 200 participants from 45 different countries. The study revealed that virtual higher education would never replace the real traditional F2F model" (Abdeldayem, Aldulaimi, Lateef, & Aldulaimi, 2020, p. 12635). However, during recent months the latter has been forcedly replaced under the influence of the pandemic.

The paper depicts the challenges of Georgia's educational space in the environment of the coronavirus. The major emphasis is put on the transition from a classroom teaching to an online lecturing as well as on the (dis)advantages of a face-to-face interaction and a virtual communication. The paper presents some strategies of the "peaceful" transition elaborated at the Faculty of Humanities of Ivane Javakhishvili Tbilisi State University (TSU).

The Transition from the Classroom Teaching to the Online Teaching

The Georgians have always paid the greatest attention to the development of the educational space. It was assumed that education was a key factor of the nation-building. Accordingly, after the dissolution of the USSR, under the influence of the reformation plan, Georgia's universities transplanted the western model (the so-called Bologna model) and replaced the traditional *five-year teaching* with *4+2/BA+MA model*. Each teaching year comprised autumn and spring semesters. The latter started in the beginning of March. However, the spring semester of 2020 became exceptional. Due to the rapid spread of the pandemic, "the learning process was suspended from March 2 to March 16 under the recommendation of the Ministry of Education, Science, Culture and Sport of Georgia. On March 21 the country announced the state of emergency and one month' restrictions. Georgia became one of 188 countries of the world that closed all schools or localized them to avoid the spread of the virus affecting 1.576 million children and 91.3% of the world's student population" (Basilaia & Kvavadze, 2020, p. 2). A rapid transition from a classroom teaching to an online teaching was necessitated at schools and at higher educational institutions. This unexpected turnover caused confusion of teachers and professors. They had to follow all administrative and ministerial directives and simultaneously, ensure a successful lecturing as well as a peaceful completion of midterm exams, final exams, defenses of BA, MA or PhD theses, etc. The above-mentioned necessitated the modification of the already-existing teaching modes and techniques by:

- accommodating to the most appropriate online platforms (Zoom, Facebook, Skype, Moodle, etc.);
- providing the creative and skilful updating of syllabi and lecture plans;
- creating a friendly online atmosphere for the engagement of all students in classroom activities;
- providing students with teaching materials and informing them about schedules, assessment criteria, etc.;
- insurance of an appropriate arrangement of midterm and final exams, defenses of BA, MA or PhD theses, etc.

It was quite difficult to ensure an excellent modification, because there were some significant drawbacks:

- the lack of online teaching skills in educators;
- a time-consuming character of an online preparation (recording; distributing) of lectures;
- the lack of online skills in students;

- the overload of online platforms and the resulting seizures or frequent failures of communication;
- inadequate learning environments at some students' homes;
- the lack of access to internet in some regions of Georgia.

All the representatives of the educational space realized that 2019 was the starting point of the new digital era. "While the complete online and blended learning sounded like the "holy grail" in this new era in education, it required massive changes" (Cahapay, 2020, p. 3). TSU, as a driving force of Georgia's educational space, made some crucial steps for meeting new challenges. All teachers/professors were invited to join the so-called *Learning Management System* (*LMS*), which presented each educator's timetable, students' lists, all students' contact information and digital registers for indicating scores and criteria of assessment. *LMS* enabled each teacher/professor to communicate with every student individually or via group letters. Moreover, all syllabi, textbooks, readers, supplementary books and other teaching materials could be uploaded. The only drawback of *Learning Management System* was the ability of sending a limited number of materials. The authorities of the Faculty of Humanities solved this problem quite easily. The educators were invited to use the *Moodle Platform/e-learning*, which had been elaborated at the faculty several years earlier. Initially, this platform served as a supplementary e-space assisting educators to distribute readers, presentations, extra materials, videos, extra exercises, etc. After the transition to the online learning, the Moodle became one of the compulsory components of teaching. Moreover, the educators were asked to use Zoom (a cloud-based, direct communication software platform created for teleconferencing, telecommuting, distance learning and social networking (Kristóf, 2020, p. 89)) for delivering online lectures/seminars. However, the usage of Skype or Facebook was also acceptable in cases of small groups. It is noteworthy that in certain cases, communication via two social networking services became compulsory, because the majority of students were scattered in different regions of Georgia. They could not enter Zoom, but could use Facebook or Skype. As a result, at the end of the semester the results of those groups of learners, which were communicated via two social networking services, were better than the results of other students.

It is noteworthy that on the initial stage of the transition to the online teaching, the authorities of the Faculty of Humanities realized that all teachers/professors did not have appropriate skills for using the above-mentioned e-systems. Accordingly, a duly technical support was necessitated. The authorities created and distributed the special guidelines for an effective downloading or usage of the *Learning Management System, Zoom* and *Moodle Platform.* Moreover, they formed the special support teams of the administrative staff that

assisted all lecturers in need. As a result, the technical problems were gradually solved.

Moreover, the authorities took the following significant measures for guaranteeing the continuous and effective student-oriented teaching process:

- the special monitoring team of the administrative staff was formed and was asked to enter Zoom for checking every lecture/seminar delivered by the professors as well as the invited lecturers of the Faculty of Humanities;
- the teaching process was carried out even during holidays;
- the assessment criteria were duly updated - the component "presence" was dropped out and the system of scores "*60 (pre-exam) + 40 (exam)*" was replaced by "*40 (pre-exam) + 60 (exam)*";
- the teachers/professors were given an opportunity to carry out exams in the mode of their choice - oral or written. The hybrid mode was also acceptable;
- the teachers/professors were obligated to carry out main exams three times plus an additional exam per course;
- the students were duly informed about schedules of exams as well as changes made in the assessment criteria;
- the students were duly provided with e-materials (scanned or created in PDF format) necessary for their studies and preparation for exams;
- all teachers/professors and students were provided with an institutional gmail - a free web based e-mail service that provides users for storing messages and provides the ability to search for specific messages (Mahalakshmi & Radha, 2020, p. 2405).

The Experiment

During the autumn semester of 2020-2021 we decided to make the experiment for finding out the usefulness of the online teaching. The target groups of the experiment were the students of the direction of English Philology (courses: "Theoretic Grammar" (2 groups), "Introduction to British Studies", "Abstracting and Reviewing of the English Text"). In total, 65 students were interviewed. The experiment was conducted in two stages. At the initial stage, the students were asked to single out advantages and disadvantages of the online teaching. Their answers enabled us to create the following table:

Table 1 **The Advantages and Disadvantages of the Online Education**

The advantages of the online teaching	The disadvantages of the online teaching
An easy access to all resources and teaching materials	Lack of socialization
Saving time	Lack of an academic atmosphere
Saving money	A monotonous lifestyle
No traffic jams	Inactiveness
An easy access to lectures for those students, who work or have children	Psychological problems
An easy time management	A deteriorated eyesight
No sleepless students i.e. better concentration of minds	Lack of students' self-discipline
	An inadequate learning environment at students' homes
	Lack of the access to internet
	A constant fear of the appearance of technical problems

At the second stage, every statement of Table 1 was brought to a vote. The following tables depict the results of voting:

Table 2 **The Advantages of the Online Teaching - for and against**

The advantages of the online teaching	The number of the supporters	The number of the opposing students
An easy access to all resources and teaching materials	64	1
Saving time	65	0
Saving money	64	1
No traffic jams	65	0
An easy access to lectures for those students, who work or have children	62	3
An easy time management	62	3
No sleepless students i.e. better concentration of minds	48	17

Table 3 **The Disadvantages of the Online Teaching - for and against**

The disadvantages of the online teaching	The number of the supporters	The number of the opposing students
Lack of socialization	65	0
Lack of an academic atmosphere	65	0
A monotonous lifestyle	63	2
Inactiveness	65	0

Psychological problems	60	5
A deteriorated **eyesight**	65	0
Lack of students' self-discipline	57	8
An inadequate learning environment at students' homes	56	9
Lack of the access to internet	64	1
A constant fear of the appearance of technical problems	65	0

As the above tables reveal, the major disadvantages of the online teaching are related to health problems, technical issues, monotony, desocialization and less adequate learning environment at students' homes. Nothing indicates to the failure of the teaching process or problems associated with lecturing.

The Online Teaching vis-à-vis the Classroom Teaching

We quite agree with the students' opinions regarding the advantages and disadvantages of the online education. However, we should express our viewpoints about the traditional and virtual lecturing. In contrast to the classroom teaching, the online (synchronous) lecturing has the following disadvantages:

- it is impossible to promote a pair-work or a group-work;
- it is impossible to fully use VAK/VAKT (Visual, Auditory, Kinesthetic & Tactile) learning styles for equally encouraging all types of learners, especially, kinesthetic ones, "who prefer to learn via experience – doing, touching, performing" (Gvelesiani & Tvaltvadze, 2011, p. 46);
- sometimes technical problems prevent from a continuous teaching process;
- many students live in towns or remote villages. Due to a poor internet connection their voices sound impurely and discontinuously;
- it is impossible to check that all students wrote their homework in exercise-books. Turned off videos prevent this process. Turning off is often necessitated due to an unstable connection;
- non-video participants may cheat a lecturer via reading instead of retelling;
- midterm and final exams are time-consuming due to downloading and checking of 300-400 tests/essays per semester;
- an extra-curriculum communication with students via different e-platforms is time-consuming due to answering many students' letters and messages.

The following table depicts the above discussion:

*Table 4 **The Online Teaching vis-à-vis the Classroom Teaching***

The online teaching	The classroom teaching
An easy access to all resources and teaching materials, i.e. saving money	Paying money for teaching materials
No traffic jams	Constant traffic jams
An easy access to lectures for those students, who work or have children	Students, who work or have children, have problems with attendance
An easy time management	Some difficulties in time management
Less sleepless students, i.e. better concentration of minds	More sleepless students, i.e. less concentration of minds
Lack of socialization	A complete socialization
Lack of an academic atmosphere	A complete academic atmosphere
An inactive, monotonous lifestyle	An active lifestyle
Health problems	Less health problems
An inadequate learning environment at students' homes	An adequate learning environment at the university
Lack of the access to internet	A constant access to internet
A constant fear of the appearance of technical problems	No fear of the appearance of technical problems
No pair-works or group-works	Promotion of pair-works or group-works
No possibility of the usage of all learning styles	Usage of all learning styles
Possibility of cheating a lecturer	No possibility of cheating a lecturer
A time-consuming extra-curriculum communication with students	Less time-consuming extra-curriculum communication with students
Time-consuming midterm and final exams	Less time-consuming midterm and final exams

Despite the above-mentioned, the virtual teaching has some prominent advantages. It is convenient and affordable for everyone. Despite some time-consuming activities, lecturers have new opportunities brought by the coronavirus. They may attend free webinars as well as online conferences organized by various foreign centers/universities. As a result, educators save money, save time, acquire new skills and share experiences of the prominent world universities.

Conclusions

Georgia's history comprises twelve years of the electronic teaching. The latter started in 2008, when Georgia was involved in the project "E-learning in the Caucasus". One of the first universities that used e-teaching method was TSU,

which created E-Learning and E-Courses.tsu.ge in 2009 (Kikoria et al, 2019, p. 212). However, these courses were only supplementary ones. In 2020 the e-teaching became the only method used by TSU. Initially, the process of transition from a traditional to a virtual mode of lecturing seemed sudden and complicated. However, all attempts made by the authorities of the Faculty of Humanities were rational and effective. This fact is clearly demonstrated in the above tables.

Accordingly, a peaceful transition should comprise the following components:

- creation of easily accessible e-platforms;
- lecturers support with appropriate guidelines;
- lecturers support with a technical assistance;
- creation of monitoring groups;
- duly informativeness i.e. a simultaneous communication with students via two or more e-platforms;
- creation of flexible criteria of assessment and examination, etc.

Although the method of e-teaching created at the Faculty of Humanities is quite effective, it cannot fully replace the classroom lecturing. An academic atmosphere, a personal interaction, an eye-contact, an honest retelling or checking exercises (i.e. no cheating), socialization, encouragement of shy learners, usage of various methods (a pair-work, a group-work, debating) or learning styles oriented to different learners are crucial components of the process of teaching. Our observation and experiment revealed that the online education lacks these components. Moreover, delivering lectures to small groups of students (10-14 learners) is more effective than to big groups (30-40 learners). Accordingly, we recommend to divide the latter into smaller ones during the pandemic.

Summary

"Before the coronavirus pandemic, eLearning has been more or less an area of science, rather than a widespread practice" (Mladenova, Kalmukov, & Valova, 2020, p. 1163). However, nowadays it is a must-to-do activity.

The paper presents the major advantages and disadvantages of the online education, discusses the online teaching vis-à-vis the classroom teaching, describes the transition from the former to the latter and highlights the major strategies of an effective online lecturing that should be useful for different universities of the world.

Finally, it is noteworthy that despite the appearance of the greatest disaster called COVID-19, the educational institutions of the world carry out their usual activities almost uninterruptedly. This is the greatest achievement of our challenging epoch. Modern technologies, various electronic devices and e-platforms enable us to live, to work and to survive. All of us have gained new skills that will be useful in the post-pandemic period, for instance, in cases of missed lessons or emergency situations. Moreover, curricula will be updated, the created e-sources (teaching materials: e-books, videos, e-exercises, e-readers, etc.) will be available to students, many universities will implement the online learning and attract

foreign students for raising the popularity and merit. As a result, the post-pandemic period will deal with the traces of COVID-19 that will lead to more digitalization, virtual scientific cooperation and online lecturing.

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USE OF DIFFERENT TECHNIQUES OF VISUALIZATIONS IN THE TRAINING OF ENGINEERING SPECIALISTS: NEEDS VERSUS APPROACHES

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Abstract. *The quality of engineering education is closely related to the development of spatial skills of students and the ability to create and read the drawings. Visualization improves the efficiency of the information; as for visualization of geometric tasks of graphical subjects, it helps students faster comprehend complex spatial problems and solve the given exercises.*
The given article describes the study of the methodology of teaching graphical subjects from the point of view of methods of representations of education materials, the degree of inspiration and engagement of students in learning activities. The research was conducted in Latvia, Lithuania, Spain, Germany and Poland within the project "Contemporary Approach to the Development of Spatial Comprehension through Augmented Reality Content" (SPACAR).
Keywords: Augmented Reality, Engineering graphical subjects, spatial skills, Visualization Techniques.

Introduction

By 2025, two billion of the global population is going to be made up by the youngest generation: Generation Alpha. Generation Alpha are children born between 2010 and 2025. This is the first generation entirely born in the 21st century. Generation Alpha use technology, smartphones, tablets, and computers naturally. They haven't known life without the Internet or video games.

Alpha children are accustomed to gaining knowledge through action, screen touch, and experience. Schools must provide an adequate environment that enhances this type of learning. Such an environment requires changes and a new approach to education at all levels, the creation of training programs widely using various methods of visualizing educational material.

Thanks to the development of technologies, such types of visualizations as augmented, virtual and mixed reality (AR / VR / MR), it has become possible to include AR and VR content in the educational process, which can make learning

more effective, faster and more fun (da Silva, Teixeira, Cavalcante, & Teichrieb, 2019). From mathematics to chemistry to biology, AR can be incorporated into just about any subject.

In other words, this is one of the best ways an educator can use to engage and motivate students (Dobelis, Sroka-Bizon, & Branoff, 2019). Augmented Reality technology expands the physical world; it adds layers of digital information onto what we can see with the naked eye. It augments our surrounding by adding sound, video, and graphics. AR is a useful pedagogical tool in teaching because it is grounded on efficient teaching and learning models such as constructivist learning, situated learning, and inquiry-based learning (Yousef, 2021). Visualization techniques are also used to improve collaborative learning that incorporates a social component in distance education to minimize the disadvantages of studying in solitude (Anaya, Luque, & Peinado, 2016).

This article reviews the results of surveys that were conducted for graphical subjects of engineering students within the project "Contemporary Approach to the Development of Spatial Comprehension through Augmented Reality Content". The aim of this project to develop the didactic toolkit which includes set of practical exercises with 3D objects prepared for the use into AR environment.

Methodology

The study involved partners from five countries participating in the project SPACAR. The survey was conducted from 15/12/2019 to 15/02/2020 in Latvia, Lithuania, Spain, Germany, and Poland. The following partners participated in the Needs Analysis: Vilnius Builders Training Centre (Lithuania); Riga Technical University (Latvia); Warsaw Technical University (Poland); Polytechnic university of Valencia (Spain); Siauliai vocational education and training centre (Lithuania); SneakyBox Information technology company (Lithuania); Jugendförderverein Parchim/Lübz e.V. (Germany); DECROLY Vocational Education and Training college (Spain).

The survey was carried out using survey administration application Google Forms. In this study, questionnaires with closed-ended questions were used to analyse needs. The adapted questionnaire included questions with multiple options so that respondents can choose the answers true for them.

620 students at vocational schools, secondary schools, colleges, higher schools and universities participated in the survey. The study also included 195 educators of schools, colleges and higher education institutions.

The target group of Latvian students was 224 people, the Spanish group was 214 people, 113 students participated from Poland, a group of Lithuanian students was 50 people and 19 students from Germany completed the questionnaires.

75,8% of the participants of this target group were male, while 24,2% of them were female. The distribution of survey participants by country in the teacher group was as follows: 86 participants from Spain, 42 from Poland, 26 from Lithuania, 25 from Latvia, 16 from Germany. Of all the educators surveyed, 55.9% were male and 44.1% were female.

Results

620 students participated in the survey, among which 224 were from Latvia, 214 – from Spain, 113 – from Poland, 50 – from Lithuania, and 19 – from Germany. Approximately three quarters of the respondents were male, and one quarter were female.

The distribution by educational institution was not even. Most of the respondents, i.e. 61.5%, were university students (Fig. 1). For the further analysis the responses that did not contain answers to all the questions or contained (irrelevant) answers that did not correspond to the questions were excluded from consideration. The responses were grouped by educational institution where the respondents study – 'University', 'Higher School', 'Vocational School', 'College' and 'Secondary School'. Those responses which were marked as 'Other' were classified to one of aforementioned groups which, in our opinion, was the most relevant.
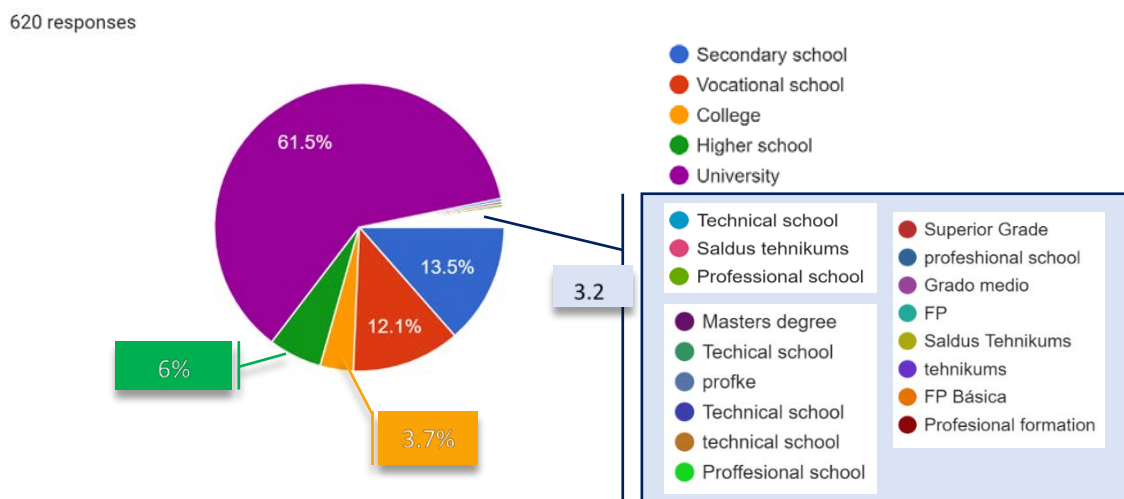
Figure 1 **The Distribution by Educational Institution of Students Participated in Study**

The chart below (Fig. 2) reflects the percentage distribution of teaching materials used in corresponding educational institutions. It can be concluded that PowerPoint presentations are the most popular teaching tool. On the other hand, AR and VR technologies are the least common.
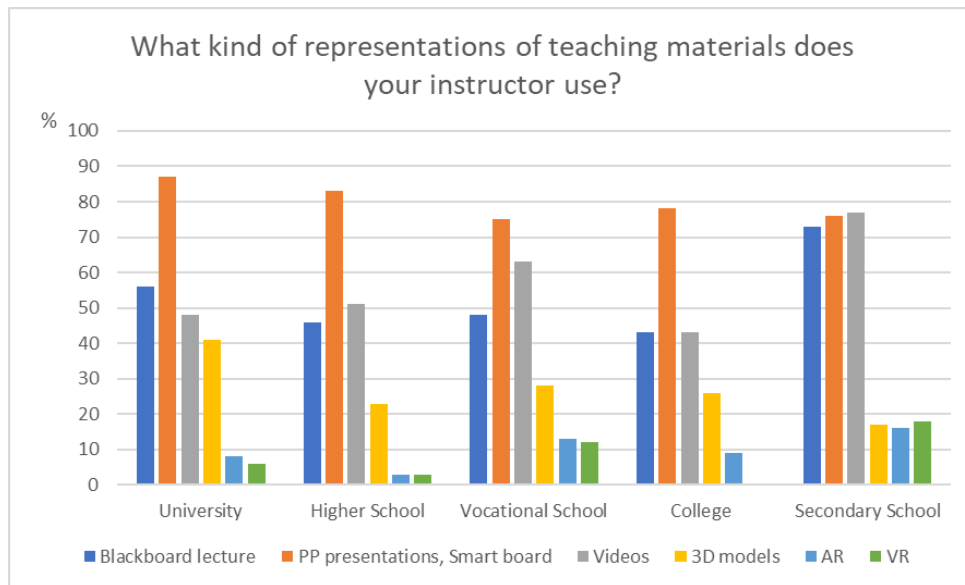
Figure 2 **Students Answers on the Question "What kind of representations of teaching materials does your instructor use?"**

The following charts (Fig. 3) reveal that students using mostly computers and smartphones.
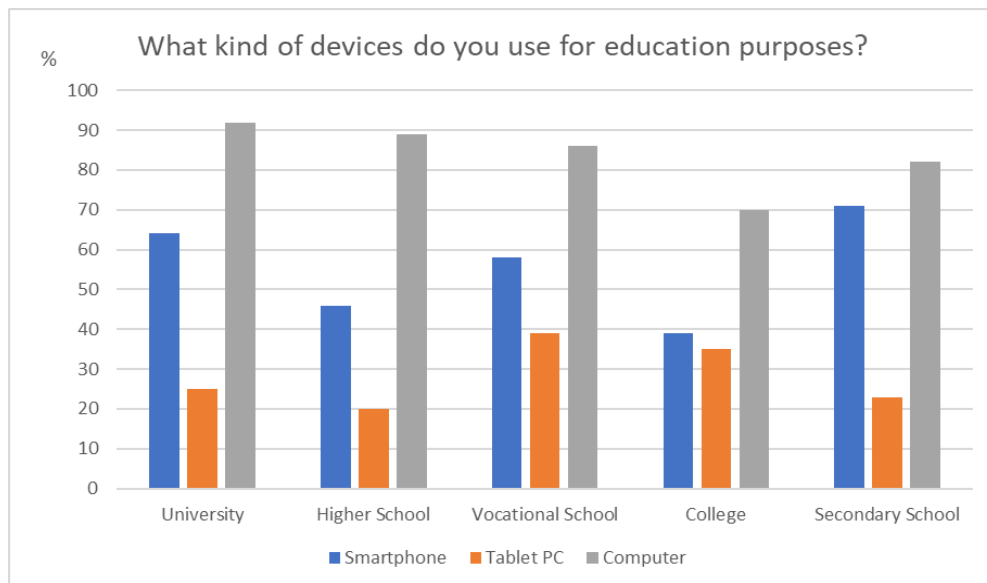
Figure 3 **Students Answers on the Question "What kind of devices do you use for education purposes?"**

To identify the degree of inspiration and engagement of students in learning activities depending on a different kind of representation of teaching materials, the questions presented on figure 3 were included in the survey. According to the results, students prefer teaching using visualization and 3D presentation techniques over traditional lectures, they are more motivated to learn new subject

content, and the content is more understandable for them when visualization techniques are used in teaching the subject.
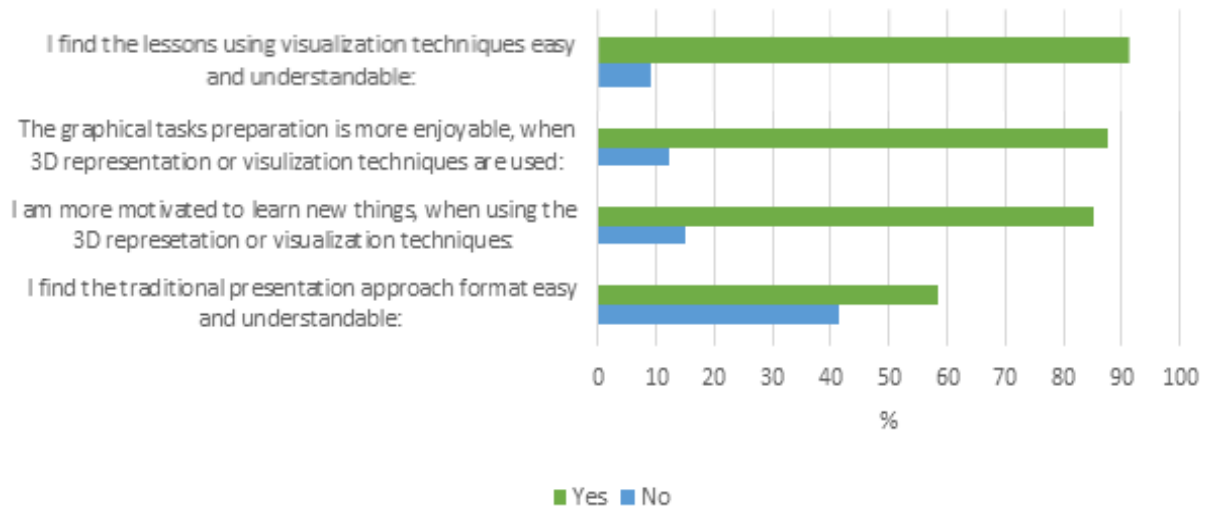
*Figure 4 **Student Opinion on the Following Statements: I find the lessons using visualization techniques easy and understandable, The graphical tasks preparation is more enjoyable, when 3D representation or visualization techniques are used, I am more motivated to learn new things when using 3D representation or visualization techniques, I find the traditional presentation approach format easy and understandable.***

Students' opinion about having difficulties during constructing orthographical views, axonometric projections and 3D objects from flat of paper is presented in figure number 5. Most of the students answered that they did not have such difficulties.
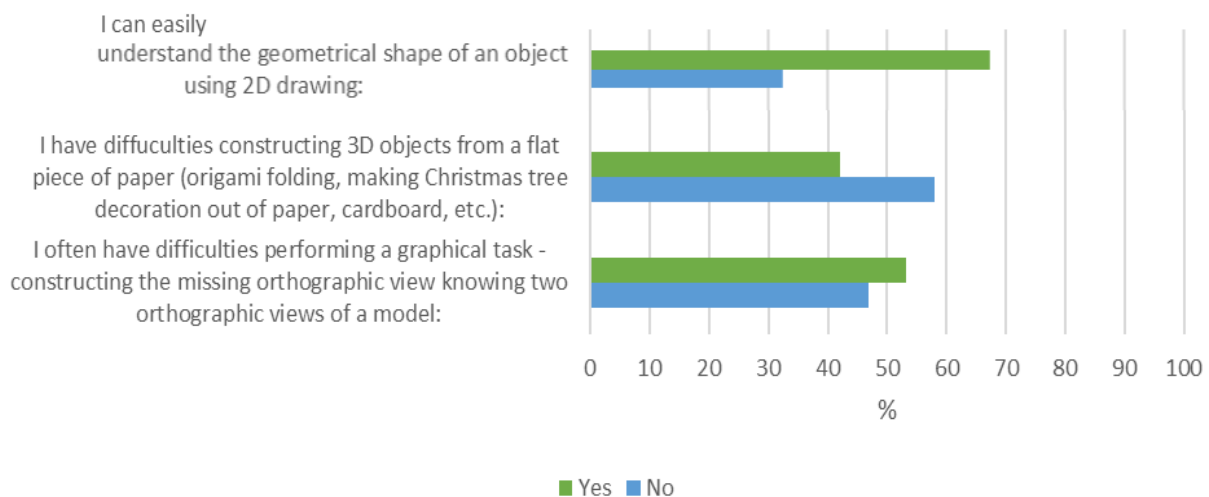
*Figure 5 **Student Opinion on the Following Statements: I can easy undertand the geometrical shape of an object using 2D drawing, I have difficulties constructing 3D object from flat piece of paper, I often have difficulties performing graphical tasks – constructing missing orthographic view knowing two orthographic views of model.***

195 instructors participated in the survey, among which 86 were from Spain, 42 – from Poland, 26 – from Lithuania, 25 – from Latvia, and 16 – from Germany. The distribution by educational institution where they work was not even. Most of the respondents, i.e. 35.9%, were university instructors (Fig. 6).
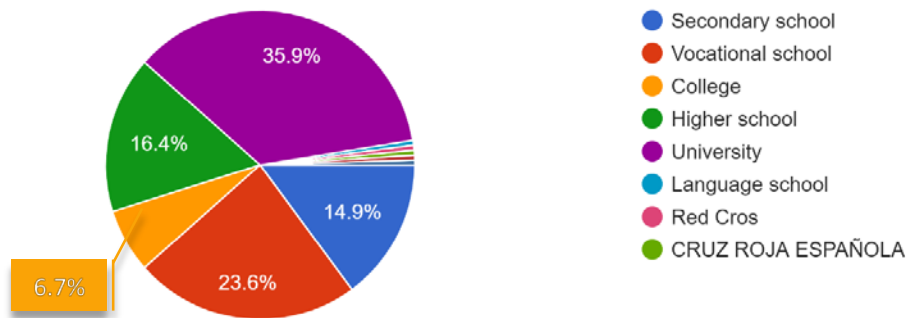
Figure 6 **The Distribution by Educational Institution Where Work Instructors Participated in the Study**

The respondents were grouped by educational institution where the respondents work – 'University', 'Higher School', 'Vocational School', 'College', 'Secondary School' and 'Other'. The charts below (Fig. 7) suggest that the most common tools used by instructors are PowerPoint presentations and Smart boards, blackboard lectures and videos respectively.
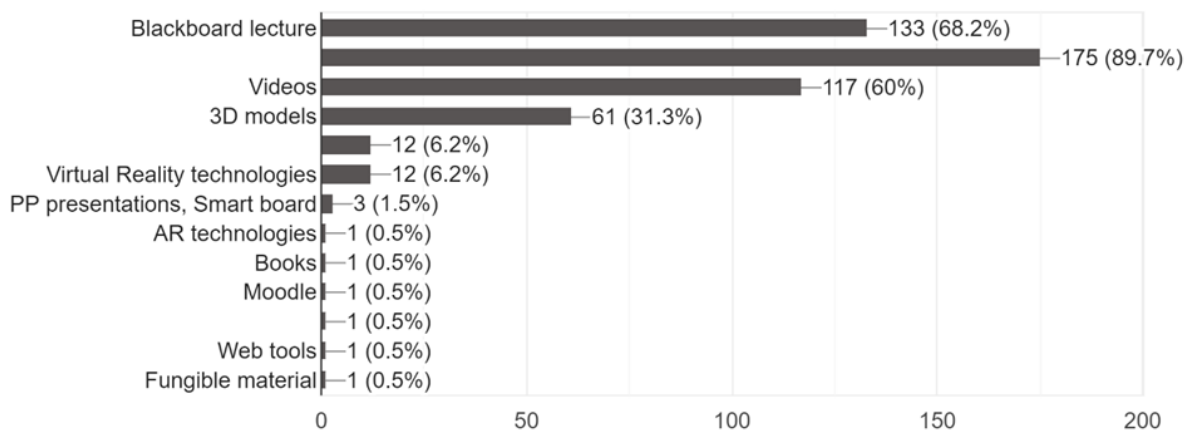
Figure 7 **Instructors Answers on the Question "What kind of representation of teaching materials do you use?"**

The instructors also claim that most students use computers for educational purposes on their lessons (Fig. 8). These answers are consistent with the answers received from students. The opinion of instructors about whether students have

difficulties in completing graphic assignments differs from the opinion of students - most educators consider that students have difficulties performing graphical tasks (Fig. 9). The instructors suppose that lessons will be easy and understandable if visualization techniques are used.
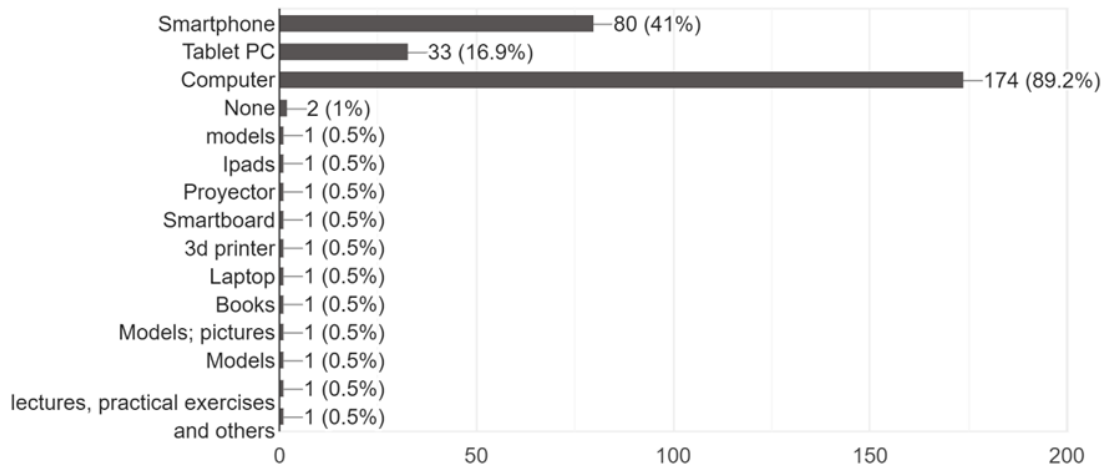
Figure 8 **Instructors answers on the question "What kind of devices do students use for education purposes on your lessons?"**
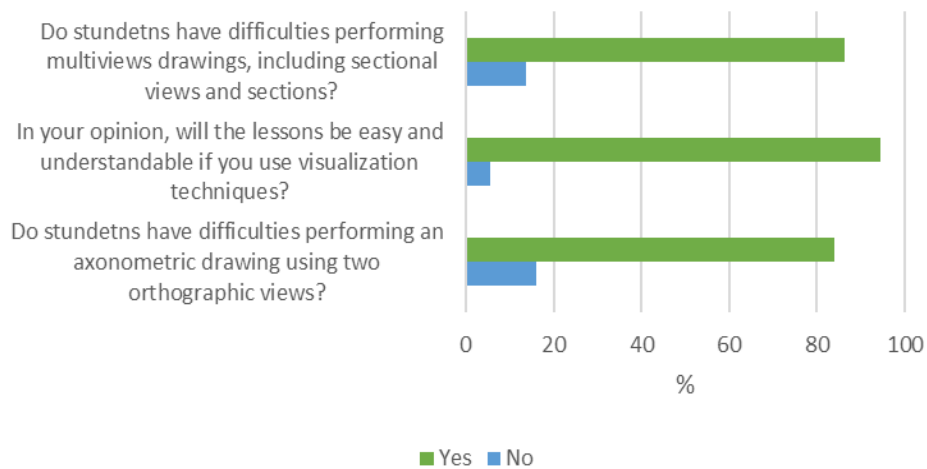
Figure 9 **Instructors answers on the questions "Do students have difficulties performing multiviews drawing, including sectional views and sections?", "In your opinion, will the lessons be easy and understandable if you use visualization techniques?", "Do students have difficulties performing axonometric drawing using two orthographic views?"**

Discussions

Based on the data obtained, the following conclusions can be drawn. In all countries of the project participants, the most common teaching method is based on the use of Blackboard lectures and PowerPoint presentations. This may indicate a lack of educational materials using augmented reality technologies.

This makes it necessary to create didactic material using AR. In addition, almost 70% of teachers find traditional teaching methods to be time-consuming. The introduction of visualization technologies into the educational process can greatly facilitate the learning process and provide an opportunity for the development of new teaching methods (Ozdemir et al., 2018). However, it should be borne in mind that the implementation of visualization methods is difficult due to the time required to find suitable examples, to learn new tools, the time required to develop visualizations and adapt them to the course content (Klerkx, Verbert, & Duval, 2014).

The majority of students (over 60%) find traditional teaching methods boring and not conducive to increasing interest in learning. An even larger number of students (about 90%) prefer teaching using visualization and three-dimensional presentation methods to traditional lectures and are of the opinion that this teaching method makes the teaching material more understandable. 94% of teachers also confirm this. According to the students, they study better, are more motivated to learn new content of the subject and are more pleased to complete graphic assignments when visualization methods are used in teaching the subject. This suggests that the introduction of teaching materials using 3D object visualization (AR /VR) in the educational process will increase student motivation (Sun, Siklander, & Ruokamo, 2019) and will contribute to academic performance (Garzón, & Acevedo, 2019).

Despite the fact that the majority of students believe that they have no difficulty in performing graphic tasks, such as building a third type of object, knowing two spelling views, the vast majority of teachers (about 85%) believe that students have difficulty in constructing a multi-view drawing. axonometric projections and sections. In addition, 42.1% of the students noted that they have difficulty constructing three-dimensional objects from a flat sheet of paper. All this may indicate a low level of spatial abilities of students. Spatial ability is especially important to student success in some engineering disciplines such as computing, mathematics, engineering drawing, and computer design, as well as solving geometric problems (Branoff & Dobelis, 2012). According to scientific research, the use of augmented reality technology in teaching graphic engineering subjects increases the level of spatial skills (Martín-Gutiérrez et al.,2015). All this confirms the need to develop modern didactic tools in order to increase the level of spatial abilities of future engineers.

Conclusions

Currently, educational institutions are not provided with an enough educational materials used visualization technologies.

The widespread use of various visualization methods is complicated by the fact that it is necessary to spend additional time on creating visualization and adapting to the content of the academic subject. A positive impact on the educational process can only be achieved if visualization techniques are fully integrated into the classes.

It is necessary to introduce into the educational process study materials using various types of visualization of the content of graphic tasks, including visualization of objects in an augmented reality environment in order to facilitate the students understanding of the teaching materials and motivate to study (Veide, & Stroževa, 2019).

The level of spatial abilities of students is not high enough. The AR application enables faster comprehension of complex spatial problems and relationships (Auliya, & Munasiah, 2020) and allows improve spatial abilities. If students try to improve their spatial skills by AR training academic performance rate will be greater.

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WAYS OF USING THE ARDUINO PLATFORM FOR EDUCATION OF FIRST-YEAR STUDENTS OF THE RIGA TECHNICAL UNIVERSITY

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Abstract*. This paper describes the actual problem of organizing the process of professional education of students in applied problems in their specialty. The problem is considered from two aspects: pedagogical (substantive) and technical, while the solution of learning problems is planned to be realized with the help of new information technologies. The article describes two study schemes based on two programming technologies: VBA and the Arduino platform, explores the advantages and disadvantages of each scheme, and provides examples of specific tasks and the results of a survey of first-year students, which study scheme is most suitable for professional education. The study involved first-year students of RTU Faculty of Electrical and Environmental Engineering, studying the educational course "Computer science".*
Keywords: *Arduino platform, student survey, study scheme, VBA language.*

Introduction

At present, the system of higher professional education is focused on improving the quality of training and the level of competitiveness of a specialist in the labor market. The necessary professional qualities and competence of university graduates are formed by using an integrated approach to the process of organizing educational activities, including the implementation of methodological and pedagogical learning tasks using effective educational and information technologies. In this regard, it is necessary and urgent to consider issues related to identifying optimal ways to improve the educational process, the choice of training models for students.

The learning process at any stage involves direct interaction between the teacher and students. The feedback received as a result of student surveys allows

the teacher to choose various teaching methods that are optimal at the moment, as well as to develop a strategy for conducting academic subjects, which allows using new forms of work with students (Prokofjeva, Uhanova, Zavjalova, & Boltunova, 2019; Prokofjeva, Uhanova, Zavjalova, & Katalnikova, 2015).

This article analyzes the possibility of using the Arduino platform (https://www.Arduino.cc/) when teaching first-year students of RTU Faculty of Electrical and Environmental Engineering. The authors of the article claim that the addition of the "Computer science" course with new content elements, in particular the use in practice of various capabilities of the Arduino platform, can significantly increase the motivation of students and their interest in raising their own professional competence.

Learning Course "Computer Science" and Two Study Schemes

Currently, due to the increasing rates of scientific and technological progress, there is a continuous increase in the volume and change in the content of knowledge and skills that modern specialists should master. The issues of computer learning are of interest to many scientists, both pedagogues and specialists in the field of information technology (Byungura, Hansson, Muparasi, & Ruhinda, 2018; Hammad, & Munir, 2018; Shadiev, Zhang, Wu, & Huang, 2020).

The solution of professional tasks that require performing, for example, a large amount of calculations, visualization of electrical, physical processes, accuracy of results, etc., is assigned to computers. There are many technologies for solving such problems. Therefore, the need to teach future engineers the basics of programming and computer technology is undeniable.

The Department of Software Engineering has been teaching the study course "Computer Science" for several years for some study programs of the Faculty of Electrical and Environmental Engineering (Fig. 1).

The main learning goal of the study course "Computer Science" is the ability to compose and solve the simplest algorithms (i.e., making a logical chain to achieve a result), as well as apply the developed algorithm to solve applied problems.

This course is the starting point for further mastering the educational material on the "Adaptorics" and "Energy and Electrical Engineering" study programs.

"Computer Science"

Basic course	Special course
Aim: give students an understanding of working with computers and application software, to teach them to create simple algorithms and to develop basic programs	Aim: give practical skills to algorithmize the task and develop a program for solving tasks, to prepare students for further independent work in computer application

Figure 1 **Structure of the Learning Course "Computer Science"**

The "Adaptronics" study program, in addition to basic knowledge of the theoretical and practical issues of the implementation of electrical technologies in various sectors of the national economy, provides students with knowledge about the principles and automation of electrical technologies.The study program "Energy and Electrical Engineering" offers such learning areas as: power supply and electrical equipment; automation of electric power systems; electrical machines and apparatus.

For teaching the first-year students, two study schemes were used, based on two programming technologies:
- VBA (Visual Basic for Application);
- Arduino platform.

In the first scheme, the VBA (Visual Basic for Application) programming language in MS Excel (Microsoft Ignito, 2020) was used to accomplish the task. The choice was justified by the availability of MS Excel for a wide range of users, which makes it possible not to use additional and expensive software packages. In addition, the VBA programming language makes it possible to develop simple algorithms and is easy to understand. It is also convenient to use it as the first steps of programming for "non-programmers", on the other hand, VBA is an object-oriented language, i.e. provides an opportunity to acquaint students with a new level of programming language.

From 2019/2020 academic year, it was decided to use the second study scheme based on the Arduino hardware platform (Arduino, 2020). It is a modern, developing and accessible platform for both beginners and those taking their first steps in programming, and for professionals. The Arduino platform is a combination of the of rapid development environment Arduino IDE and

prototyping modules based on microcontrollers (Engineering Experiences, 2020; Hurtuk, Chovanec, & Adam, 2017). A huge arsenal of various sensors, detectors, displays, drivers and actuators is available for prototyping and learning. In fact, Arduino is the simplest and most inexpensive electronic constructor for creating ready-made devices from individual modules. The technical kits of the Arduino electronic designer give an initial idea of the principles of operation and control, feedback and signal processing from sensors - this is an ideal option for the first steps in robotics, electrical engineering and learning to program the simplest algorithms.

Further, the authors of the article give an assessment of each study scheme depending on the pedagogical and technical content, and also based on the results of a survey of the first-year students Faculty of Electrical and Environmental Engineering conclusions are drawn, which study scheme is most suitable for professional education.

Advantages and Disadvantages of Study Schemes

As already noted, until 2019, the first scheme was used to conduct the "Computer science" course, that is, the VBA language was used to learn the basics of programming. The substantive (methodical) part of the course includes topics such as branched and cyclic algorithms, processing information in arrays, as well as the user's work with a range of MS Excel cells, creating a dialog box (UserForm) and using Workbook and Worksheet objects to process related information in multiple files.

From a technical point of view, the first study scheme is very simple to implement. Classes were held in a computer class, students worked in MS Excel, solving the proposed problems.

Further examples of tasks for solving in MS Excel are given.

Task 1. *Create a table that stores student grades. Suppose students take 5 exams in a session. Highlight in red the names of students with no marks less than 5. Display this number of students on the screen using the MsgBox function. The solution is shown in Fig. 2 and 3.*

```
1   Public Sub red()
2       studenti = ActiveSheet.UsedRange.Rows.Count
3       k  = 0
4       For i = 3 To studenti
5           pR = 0
6           For j = 5 To 14
7               If Cells(i,j) >= 5 Then
8                   pR = pR + 1
9               End If
10          Next
11          If pR = 9 Then
12              Cells(i, 1).Resize(, 2).FontColor = RGB(255
                    , 0, 0)
13              k = k + 1
14          End If
15
16      Next
17      MsgBox "Parcelto studentu skait ir" & k
18
19  End Sub
```

Figure 2 **Solution Source Code**
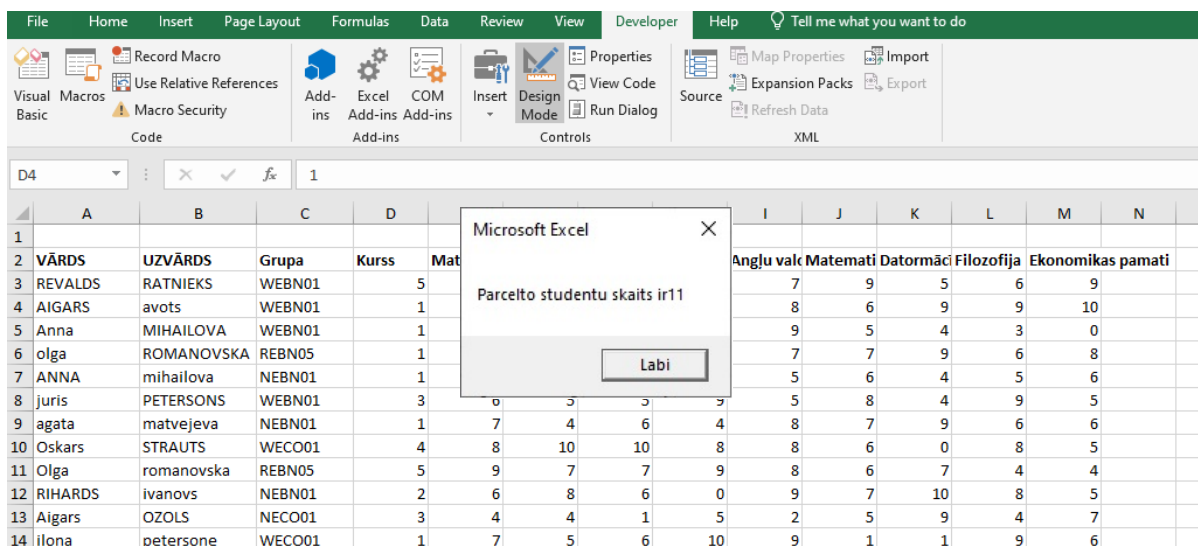
Figure 3 **Created Table**

Task 2. *Using the loop operator DO or FOR, develop a macro function with one parameter n that computes the expression (n >= 1) using Formula:*

$$\frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \cdots + \frac{1}{(2n+1)^2} \tag{1}$$

The solution is shown in Fig. 4 and 5.

```
 1  Public Function LD_3(n)
 2      S = 0
 3      i = 1
 4      Do Until i > n
 5          S = S + (1 / ((2 * i + 1) ^ 2))
 6          i = i + 1
 7      Loop
 8      LD_3 = S
 9  End Function
10  Public Function LD__3(n)
11      S = 0
12      For i = 1 To n Step 1
13          S = S + (1/((2 * i + 1) ^2 ))
14      Next
15      LD__3 = S
16  End Function
```

*Figure 4 **Solution Source Code***

*Figure 5 **Created Table***

Basically, the main purpose of the learning course "Computer Science" was reached. Students, performing laboratory work, received knowledge about programming algorithms and their use in programs. Also, students were given not only knowledge, but also experience in work with MS Excel. But the tasks themselves for laboratory work were associated either with mathematical formulas or the capabilities of MS Excel, i.e. assignments were not related to the real specialty of the first-year students - power and electrical engineering.

The same problem was pointed out by a survey of students, which is conducted every academic year. Data from a survey of students is given in Table 1. As already mentioned since 2019 academic year, the second study scheme based on the Arduino hardware platform has been used.

To the question "As a result of mastering the study course "Computer Science", did you receive useful experience and assistance in mastering other study courses in your specialization?" the answers were divided as follows (Table 1):

*Table 1 **Survey Results***

Academic year	Total number of respondents	Total number of positive answers	Percentage ratio
2017/2018	52	38	73.08 %
2018/2019	55	39	70.91 %
2019/2020	67	58	86.56 %

To the question "Would you like to continue studying the course "Computer Science" students answered as follows (Table 2):

*Table 2 **Survey Results***

Academic year	Total number of respondents	Total number of positive answers	Percentage ratio
2017/2018	52	39	75.00 %
2018/2019	55	40	72.73 %
2019/2020	67	62	92.54 %

Based on these feedback data, the authors concluded that applying the learning scheme, aimed at gaining practical experience in the specialty, is really appropriate and useful for students.

For the technical support of this scheme, the department purchased Arduino kits. The Fig. 6 shows a learning place for students in the specialty Power and electrical engineering.
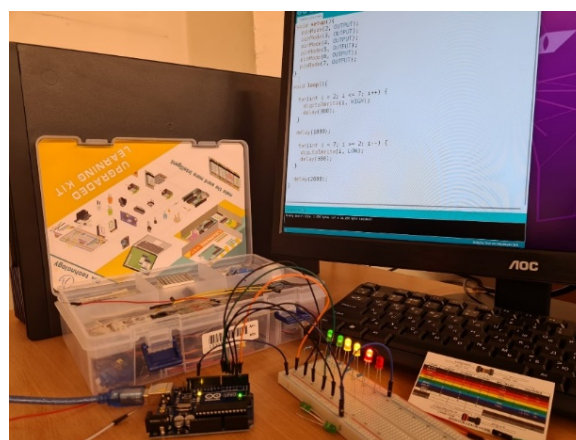
*Figure 6 **Workplace of Students for Performing Laboratory Work***

Classes were also held in a computer class, where each student was provided with an Arduino set, and students worked in the Arduino IDE, solving various applied problems in a laboratory work.

The substantive part of the second study scheme also includes topics: branched and cyclic algorithms, nested loops, information processing in arrays, etc. But the Arduino platform uses C/C++ for programming. Therefore, students additionally mastered the new programming language.

Further examples of tasks for a solution based on the Arduino platform are given.

Task 1. *Use the cycle to output all numbers divisible by 3 without remainder, in the range 1 to 20. Determine the quantity of these numbers and make the LED flash exactly as many times. The solution is shown in Fig. 7.*


```
01.  int skaits = 0;
02.
03.  void setup()
04.  {
05.      Serial.begin(9600);
06.
07.      pinMode(13, OUTPUT);
08.
09.      for (int i = 1; i < 20; i++)
10.      {
11.
12.          if (i % 3 == 0)
13.          {
14.              Serial.println(i);
15.              skaits++;
16.          }
17.
18.          for (int n = 0; n < skaits; n++)
19.          {
20.              digitalWrite(13, HIGH);
21.              delay(1000);
22.              digitalWrite(13, LOW);
23.              delay(1000);
24.          }
25.      }
26.  }
27.
28.  void loop()
29.  {
30.  }
```
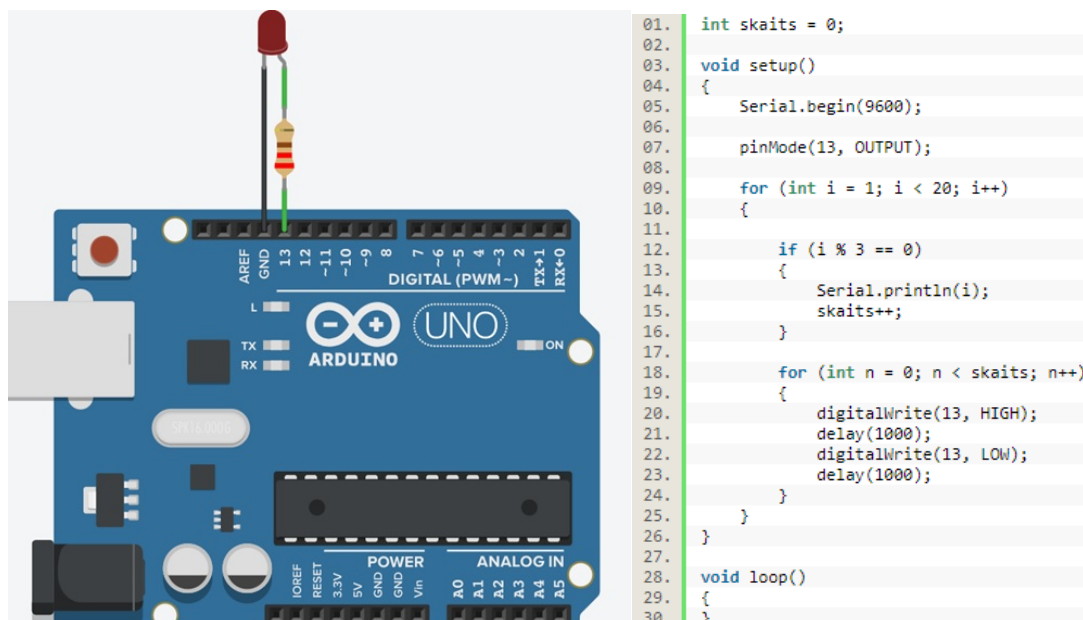
*Figure 7 **Solution Source Code and Created Scheme***

Task 2. *The traffic light should start with the green diode. Turn it on. After the set time (10 sec) the diode starts flashing (three times with an interval of 3 sec). The green diode was turned off and the yellow diode was turned on. After the set time (5 sec) the diode starts flashing (three times with an interval of 3 sec). The yellow diode was turned off and the red diode was turned on. After the set time (10 sec) the diode starts flashing (three times with an interval of 3 sec). The red diode was turned off and the green diode was turned on. The solution is shown in Fig. 8.*

```
01.   const int button = 7;
02.   const int GREEN = 10;
03.   const int RED = 8;
04.   const int YELLOW = 9;
05.   int buttonState = 0;
06.
07.   void setup()
08.   {
09.       pinMode(button, INPUT);
10.       pinMode(GREEN, OUTPUT);
11.       pinMode(RED, OUTPUT);
12.       pinMode(YELLOW, OUTPUT);
13.   }
14.
15.   void loop()
16.   {
17.
18.       buttonState = digitalRead(button);
19.       if (buttonState == HIGH)
20.       {
21.
22.           digitalWrite(GREEN, LOW);
23.
24.           for (int i = 0; i < 3; i++)
25.           {
26.
27.               digitalWrite(RED, HIGH);
28.               delay(3000);
29.               digitalWrite(RED, LOW);
30.               delay(3000);
31.           }
32.           digitalWrite(YELLOW, HIGH);
33.           delay(3000);
34.       }
35.       else
36.       {
37.           digitalWrite(RED, LOW);
38.           digitalWrite(YELLOW, LOW);
39.           digitalWrite(GREEN, HIGH);
40.
41.       ...
```

Figure 8 **Solution Source Code and Created Scheme**

Task 3. *Connect 2 LEDs (red and green) to the circuit. Check numbers within a specified range (numbers are integers (int)). If there are more even numbers turn on the red diode, otherwise - the green. Range limits are entered in the code section, the user has nothing to enter after running the program. The solution is shown in Fig. 9.*


```
01.   int para = 0;
02.   int nepara = 0;
03.   int i = 11; // initial value
04.   int n = 23; // final value
05.   void setup()
06.   {
07.       Serial.begin(9600);
08.       pinMode(13, OUTPUT); // red
09.       pinMode(13, OUTPUT); // green
10.
11.       void loop()
12.       {
13.           for (i; i <= n; i++)
14.           {
15.
16.               if (i % 2 == 0)
17.               {
18.                   para++;
19.               }
20.               eslse nepara++;
21.           }
22.       }
23.       if (para >= nepara)
24.       {
25.           digitalWrite(13, HIGH);
26.       }
27.       else
28.       {
29.           digitalWrite(12, HIGH);
30.       }
31.   }
```
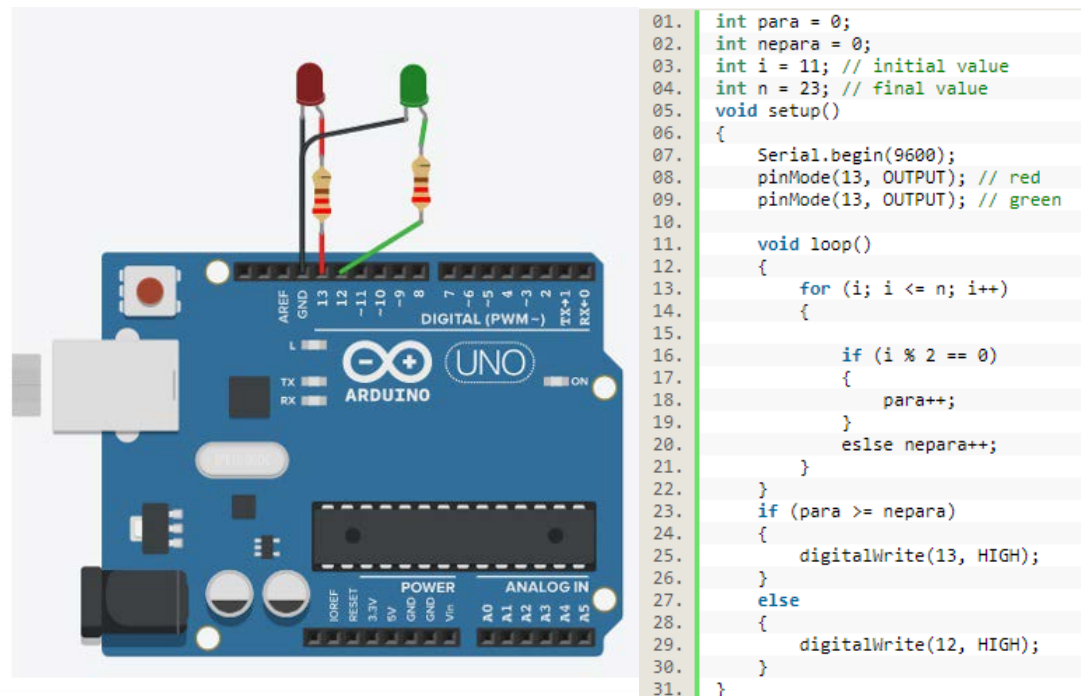
Figure 9 **Solution Source Code and Created Scheme**

Thus, although the proposed tasks for each study scheme allow students to compose the simplest algorithms and solve simple programming problems, the second scheme makes it possible to link the developed algorithms with the students' specialty and provides visual solutions to problems in the form of electrical circuits and boards.

Conclusion

As already mentioned, the ability to solve professional problems is very important for students of any specialty. Tasks when it is necessary to visualize electrical or physical processes require not only knowledge of a programming language, but also the ability to apply such computer technologies as, for example, Arduino. As can be seen, the Arduino IDE allows to display the solution to a problem both in the form of program code and visually in the form of a diagram. At the same time, students independently design the board and see the result of the solution in the form of signal processing (Fig. 6-8).

Using the Arduino platform as an example, the study course "Computer Science" clearly explains the mechanism of interaction between an electrical appliance and a computer, based on reading the initial data directly from the electric sensors (without manual input) for their further processing in the program code and on the output of the work result as a direct execution by the device described in the program code of the algorithm.

The survey of students also showed that they welcome such innovations in the educational process and willingly draw up different schemes.

Based on aforesaid, the authors conclude that the use of the second study scheme is advisable for first-year students of the Faculty of Electrical and Environmental Engineering.

Further work in this direction involves the development and use of a larger number of applied problems, taking into account the specifics of a particular specialty, to be solved in the Arduino IDE.

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CHALLENGES OF ONLINE-EDUCATION: WHAT SOCIETY EXPECTS FROM TEACHERS

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Abstract. *The main idea of the article is to present some characteristics of social expectations of teachers' work that appeared after March 2020 when the whole world found itself in online education. These expectations are rather unified and do not depend on the level of economic development of the country or the degree of involvement in providing educational services online in the pre-Covid period. The article also attempts to analyse the challenges that teachers face while providing educational services online by dividing them in 3 groups: challenges related to students; challenges related to teachers, and challenges related to external factors. As the basis for the research, the results of an anonymous survey of teachers and lecturers from 6 countries were used. The results of the study show that social expectations and social requirements set for teachers and the education system in general by the society in the context of forced and total online education are excessive For writing the article, both theoretical (analysis, observation, reflection, etc.) and empirical (survey, static processing) research methods were used.*
Keywords: *challenges; e-education; online education; psychological unreadiness; social expectations.*

Introduction

The Coronavirus pandemic turned up to be a real challenge for every well-established social schemes and models for organizing life and human activities without exception. On the one hand, protracted quarantine and self-isolation as a social phenomenon showed the vulnerability of medicine, economics, public administration and education as existing systems. However, on the other hand, the need to continue life and work, even in such conditions, led to a sharp appearance or activation of forms that before Corona were only under development.

When after March 2020 the world found itself in the online space as the main accessible reality, many problems of everyday life became sharp and needed to be resolved immediately. One of these problems is the organization of the educational process. Although the combination of "online education + learning process" has been viewed as highly promising since the beginning of the computerization era (early 1990s), for most practicing teachers this type of education remains a wonderful addition to the classroom process (Tuomi, 2018). Recognizing online education as the main source in providing educational services for children who have difficult access to regular school education (hard-to-reach areas of residence, long-term stays in a hospital or prison, congenital or acquired physical or psychological inability for a child to attend educational institutions and children's team, etc.), in narrow-profile training for adult specialists, in gaining additional and highly specialized knowledge (Marr, 2019), etc., this form is not considered by practicing teachers, parents, society as the basic one for all the participants.

The article aims to analyze the existing challenges that emerged during the period of active use of online education as the only form of education, and which arose as a result of the imbalance between the requirements and expectations that society presents to the education system in general and teachers in particular, and those opportunities that are really are available for teachers in the online education space. To determine the size and main positions of this imbalance, an online anonymous survey of teachers, students, parents of students in 6 countries (Ukraine, Latvia, China, Poland, Georgia and the Czech Republic) was carried out.

Literature Review

Today, it is already possible to identify main issues and problems of online education as the main method and form of providing educational services as the world is experiencing this education reality to one degree or another for a year already. They can be presented as following:

- general issues and trends of online space opportunities in the provision of educational services or "cyber education" (machine learning) as a pedagogical trend - present the idea that in the modern world online education is an organic part of the educational process in particular as a result of all spheres of life digitalization in modern society (Tuomi, 2018);
- use of online education opportunities in teaching exact sciences and disciplines (mathematics, physics, chemistry, drawing, astronomy, etc.) - today is probably the most developed problematics as to online

education in general. Since the exact sciences are the most logical and algometric ones, they became natural basis for testing the idea of using online education as a form of providing educational services and a lot of simulators are made all over the world (LeCun, et., 2015);

- online education as additional opportunities for secondary and higher education, highly specialized training and retraining programs for adults - based on the position that modern adolescents (the age of middle and high school, as well as students of higher educational institutions) already have collective learning skills and psychologically are more inclined to individual forms of gaining educational services, online education is almost an ideal form of getting knowledge for them (Priemer et al., 2020);

- disadvantages of online education, especially for teaching languages and educational and pedagogical work with children of preschool and primary school age who do not have formed habits of learning as a special type of activity - scientific research in this area is carried out both in the area of using online education opportunities by parents for daily developmental activities with the child (to learn colors, songs, new words, tactile exercises, etc.), as well as many books for children are published that explain to the child in the form of a fairy tale about online space and its place in the modern world (Pinango et al., 2017);

- artificial intelligence-based programs for self-education and advanced training online - this area was the first one which gained complete comprehensive AI based programs, that are also certified by states and are actively used in the continuing education and vocational training systems (Norvig & Russel, 2013).

Research on other issues (online teaching and educational technologies for the elderly, people with special needs, for studying different sciences and obtaining various skills, etc.) are also underway, but today they are not as massive and fundamental as the above mentioned.

Methodology

While making the research a combination of empirical and theoretical research methods was used, that is typical for scientific studies of this kind. As to the empirical research methods, such ones as observation and comparison to analyze the background of the problematics were used. Among the methods of theoretical research, such ones as abstraction, analysis, synthesis, idealization, induction, mental modeling, ascent from abstract to concrete, etc. were used to predict and substantiate possible development options of online education

technologies and methods from the point of view of society's social expectations as to education in general and teachers` work in particular, challenges of online education as the dominant form of providing educational services.

To determine the existing discrepancy between social expectations and the requirements of society for the educational process online and the real capabilities of teachers and educational institutions in modern conditions (in other words, to identify "problem areas" or "challenges" of online education), an anonymous online survey of various categories of educational process participants based on a questionnaire was carried out: teachers (school and university), students, parents, administration. The sample of recipients for the survey was formed as follows: the questionnaire was proposed for consideration in educational institutions (high schools and universities). In each country, 9 educational institutions took part in the survey: students (represented 3 educational institutions), parents and administration (another 3 educational institutions), teachers and administration (another 3 educational institutions). The results obtained were processed by mathematical methods of calculation and are presented in percentage form in the article. The authors of the article understand that this sample cannot be considered indicative from a scientific point of view, but, according to the authors of the article, it gives an understanding of the issue as a whole, and can also become the basis for further research in this area.

Results

Online education is a part of the distance education system, therefore it meets all the requirements and capabilities of this particular type of pedagogical service. In particular, online education has retained such features that are typical and the same for all forms of distance education, such as:

- auxiliary form of education as to formal one;
- wide usage in non-formal education sector and in the system of industry (narrow-profiled) advanced and vocational training (therefore, initially the sphere of activity of online education is determined by adult education);
- aimed at the transfer of knowledge in the understanding of "information" (more focused on the transfer of information than on the development of practical skills);
- does not require a large number of teaching and learning staff;
- requires a special approach to training teachers who work online (in particular, IT training);

- the opportunity to receive educational services from a team of professionals (teachers from different countries, researchers, practitioners, public figures, etc.) (Hockridge, 2013; Palvia et al., 2018).

It should be noted that even as a form of regular education, online education (in the form of education without the physical presence in the classroom, but through the means of communication) in the world as a social and educational reality began with universities. In 1969, the world's first online university, the Open University of Great Britain, was opened to demonstrate the non-elitism of higher education and its accessibility to all segments of the population (Palvia et al., 2018).

Today, there is a big difference between how society and the education system itself perceive online education, what are its opportunities and tasks. This is very clearly demonstrated by the results of the survey, which was conducted by the authors of this article by the method of anonymous online questionnaire held in 6 countries (Ukraine, Latvia, China, Poland, Georgia and the Czech Republic). 750 people (150 from each country) took part in the survey and they represented various categories of participants in the educational process: parents, students (secondary school graduates and students of higher educational institutions), pedagogical workers (teachers, professors and administration of educational institutions). Recipients were asked to rate 30 statements on a scale from -3 (completely disagree) to +3 (completely agree). The first block of questions was made in order to find out whether the process, goals, objectives, results, pace, etc. of the online education process should differ from the ones in traditional classroom form. For this, in particular, it was proposed to evaluate the following statement: "I believe that the transition of the educational process to the online format should not affect the volume, speed and quality of the material taught''.

Table 1 **The Difference in Views on the Possibilities of Online Education**

	Parents	Students	Teachers
-3 - completely disagree	-	8	81
-2 - disagree	-	20	14
-1 - more disagree, than agree	-	11	5
0 - neither disagree nor agree	6	49	-
1 - more agree, than disagree	11	12	-
2 - agree	21	-	-
3 - completely agree	62	-	-

As it can be seen from the Table 1, the social expectations of society (which are represented by parents) and the direct subjects of the educational process (teachers and students) are fundamentally different. Parents expect from the educational process to preserve all the functions of the offline one (education in the classroom) without taking into account such features of the process as narrowing of pedagogical activity forms, methods of influencing the student, a decrease in the communicative and motivating function of education under these conditions, psycho-emotional burnout of teachers, an increase in the load both on teachers and students due to the introduction of a large number of additional documentation and forms of educational process organization (filling online courses, local educational platforms, etc.) set by the state and administration, etc. (Marr, 2019). Society still expects teachers to achieve high quality and maintain the offline pace of the educational process; using a wide range of forms, tasks, resources, types of educational activities; motivation, monitoring, control of students; taking into account the individual characteristics of each student; self-education and self-improvement to meet the trends that society puts forward.

Also very indicative is the fact that society mainly tries to distance itself from the problems of the educational sphere. A block of questions aimed at clarifying the role of society in the person of parents in the learning process in online conditions that are difficult for everyone showed that parents prefer to leave the educational process entirely to teachers and the state, retaining, however, the functions of monitoring and criticizing of existing practices. The following statement was proposed for the consideration: "Responsibility for the process, results and consequences of online education stays with the teachers". The following results appeared:

Table 2 **Responsibility for the Process, Results and Consequences of Online Education**

	Parents	Students	Teachers
-3 - completely disagree	-	4	93
-2 - disagree	1	15	7
-1 - more disagree, than agree	5	36	-
0 - I don't know	9	39	-
1 - more agree, than disagree	5	2	-
2 - agree	9	-	-
3 - completely agree	71	4	-

This position of the parents demonstrated insufficient information work of educational institutions and the state, which raise questions about the shortcomings of online education, without focusing on its features as a form of providing educational services. As a result, parents elementarily lack the information to correctly understand the processes going on in online education in order to adapt their expectations from children and the education system in general to existing realities and opportunities.

Analyzing the main difficulties (or challenges) of educational work in the online space, which were noted by teachers, administrators of educational institutions and students, all challenges were conditionally divided into 3 large groups, which we consider below.

External challenges

- weak internet or lack of it. The availability, stability and speed of the Internet network are the determining factors in the possibilities of online education and the comfort of this form of providing educational services. Unfortunately, modern realities show that this aspect to a certain extent demotivates teachers and students to constant online communication;
- the discrepancy between the gadgets used and the requirements of online education or their lack. Each country solved the problem of teachers' and students' technical equipment based on its own understanding and financial capabilities. For example, countries such as Israel and Georgia provided interest-free loans for the purchase of a certain class of computer equipment for teachers and parents of students under 20 years old, and also reduced prices (compensating for the difference in cost at the expense of the state). The PR China financed educational institutions to buy a large number of gadgets and offered students the opportunity to rent them (teachers were given gadgets for free from the educational institution). Ukraine urged teachers and parents to resolve this issue by themselves, or teachers could use school equipment on school grounds, following all quarantine requirements. Also, the level of the gadget itself and its functionality plays an important role in providing quality educational services in online education. Modern adolescents prefer mobile phones to other types of gadgets (tablets or computers) (Shi, et., 2020), that also significantly narrows the possibilities and functionality of online education as a type of educational activity.;
- lack of funding to pay for the services of online learning platforms, constructors, libraries, etc. for teachers. Indeed, the development of online education has led to the emergence of a large number of

constructors, libraries and platforms, the work with which facilitates a lesson, allows a teacher to make the lesson brighter and more interesting due to various activities and tasks (Martin, 2019). However, such programs are mostly paid (only demo versions are available for free, which do not provide full functionality or their use is limited in time), and the education budget in most countries does not let compensations for money spent by teachers on specialized programs, constructors or libraries;

- lack of sufficient technical support staff for a teacher. Most teachers, especially those over the age of 45, do not have the appropriate level of technical training to use all the technical possibilities of online education and related software.;

- lack of new standards for calculating hours for the preparation of classes and their conduct, rate scales, courses for teachers, etc. All teachers are faced with the fact that preparation for the lesson now takes many times longer than in the usual classroom format. This leads to a syndrome of constant fatigue among teachers, their dissatisfaction with their work (imbalance between the amount of time spent on preparation and the result achieved in the lesson), apathy for work, etc. (Kluger, 2020).

Student-related factors:

- weak disciplining influence (especially at the initial levels of education). If a student does not want, then he/she will not enter the Internet and will not join the education process. Unfortunately, in conditions of online education, the home environment itself is a demotivating and destructive factor, as it relaxes and distributes a student's attention, reduces his/her perseverance, discipline and efficiency;

- decreased communication function. The lack of opportunities for active communication during long-time online education as the only (or dominant) form of receiving educational services leads to negative factors and qualitative changes in the behaviour of students: children unlearn how to interact with each other and with the team, cease to feel as a part of a team, their personal space and personal distance expand (it becomes difficult for them to find themselves in a classroom where other students can approach them), the level of anxiety increases, etc. China was the first to encounter such manifestations on a massive scale among secondary school and university students and today it has an active policy of resocializing its youth (Shi & Yaroschchuk, 2020);

- decrease in motivation and interest in communication because of the educational activity forms` narrowing. Students are not interested in experiencing a narrow range of educational activities, since the group forms of work that are traditionally used in the classroom are difficult to be used in the context of online education. For the most, in online education reproductive forms of tasks during a lesson are used with an emphasis on individual ones (question-answer, speech, presentation, lecture) and a large number of homework (essays, self-familiarization with the material, etc.).

Teacher-related challenges:

- psychological unpreparedness and lack of habit of a teacher to see / hear him/herself online and (especially) in the recording. There are very few people in the world who are absolutely satisfied with themselves and teachers are also very critical of their appearance and natural data (voice, facial expressions, movements, etc.) (Ding & Kalashnyk, 2020). The camera brightens up our flaws and shows them to us in full. The "audience effect" negates this factor and allows teachers to see themselves in the teaching process as they want to;
- psychological unwillingness to change one's own concept and model of professional activity to comply with the idea of distance and online education. As mentioned above, most teachers acquired professional skills in realities that were not related to computer education and a large number of online opportunities. They themselves studied and underwent professional development in other conditions, as a result of which they developed professional algorithms and skills, which they considered to be enough before the transition of education to the online space. Therefore, teachers came to online education with their well-established educational stereotypes, algorithms, representations and models. Therefore, one of the main tasks for teachers today is to adapt their skills and models to the requirements of the online process, as well as to understand the difference between the principles, objectives, goals, mechanisms of offline and online learning as forms of providing educational services (Adedoyin & Soykan, 2020);
- narrowing of methods of pedagogical influence (monitoring, control, motivation ...) and forms of activity;
- lack of habits and skills of advanced training on online education (self-education, self-motivation, centralized system of advanced training);
- lack of a system of psychological support for teachers and students to solve their problems associated with professional burnout and professional deformation.

These are far from all the challenges that society faced in connection with the transition of the education sector to the online format. And now the most important thing is to establish a dialogue between society and the education system, to balance the possibilities of online education and social expectations of society.

Conclusions

The system of providing educational services only in online format is currently in its infancy. The COVID-19 pandemic and the forced lockdown brightened the practical aspects of the process, which provoked the emergence of new forms, methods, practical approaches in education (as a positive), but also clarified the existing problems and shortcomings of the existing education system, the unpreparedness of teaching staff and society as a whole for such an educational reality. This reality has caused many challenges for society and overestimated requirements for teachers and the education system as a whole is just one of them. The reason for this is the imbalance between the possibilities of online education and the social expectations and requirements of society, which were formed on the basis of knowledge transfer offline process. To work with these challenges positively it requires an active dialogue between society and the education system, more information about the features and practical mechanisms, as well as goals and objectives of online education as a form of providing educational services. Also, a lot of work is required to change the approaches to training, retraining and psycho-emotional support of teachers in order to quickly match them with the possibilities of online education.

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INOVĀCIJAS VALODU APGUVĒ
Innovation in Language Education

РОЛЬ УЧЕБНЫХ СТРАТЕГИЙ В ПРОЦЕССЕ ОВЛАДЕНИЯ БУДУЩИМИ ПЕДАГОГАМИ АНГЛИЙСКИМ ЯЗЫКОМ ДЛЯ СПЕЦИАЛЬНЫХ ЦЕЛЕЙ

The Role of Learning Strategies in the Process of ESP Acquisition of Intending Educators

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Abstract. *The article is dedicated to the problem of using learning strategies in the process of ESP acquisition of intending educators. The authors analyzed the methodological literature on the research topic, on the basis of which the definitions and main characteristics of learning strategies, as well as the implicit and explicit ways of using the strategies in the process of ESP acquisition of intending educators, are presented. R. Oxford's explicit model of using the instruction-based learning strategies is considered in detail: an algorithm for its use is presented, as well as the basic rules that should be followed in the process of using the model. During the experimental teaching of ESP of intending teachers, R. Oxford's explicit model of using the instruction-based learning strategies was tested. At the beginning and the end of the experimental training, the questionnaires were conducted to establish the level of proficiency in the learning strategies, as well as the control testing was performed to define the level of ESP acquisition of intending educators. The results of the research confirmed the effectiveness of the used model, which showed an increase in the level of proficiency in the strategies: effective memorization, mental processes, compensatory ability, organization of education and its assessment, management of emotions and collaboration with other students. In turn, the increase in the level of proficiency in the learning strategies was positively reflected in the level of ESP acquisition of intending educators.*
Keywords: *ESP acquisition, intending educators, learning strategies, explicit model, implicit model, level of language acquisition.*

Введение
Introduction

Использование различных стратегий в изучении иностранного языка является необходимой составляющей эффективного овладения этим языком. Применяя различные стратегии, студенты учатся брать ответственность за свое обучение, становятся более самостоятельными и целеустремленными. Придерживаясь мнения многих исследователей данной проблемы, мы склонны утверждать, что правильно подобранные стратегии помогают студентам контролировать собственное обучение, формировать языковые навыки, развивать речевые умения, усиливая тем самым уверенность и мотивацию к изучению языка. Приоритетом для преподавателя является подбор соответствующих методик и стратегий обучения, научить студентов ими правильно пользоваться, чтобы повысить свой уровень автономности и организованности в изучении иностранного языка.

В обучении иностранному языку для специальных целей учебные стратегии рассматриваются как саморегулятивные средства, направленные на достижение и развитие коммуникативных навыков. Стратегии имеют сложный, комплексный характер. Это целая группа действий, организованных специально для того, чтобы достичь конечной цели. Стратегия является долгосрочной и предусматривает постепенный отбор последовательных промежуточных целей, которые подчинены общей конечной цели, и средств ее правильного применения (Ellis, 1994; Oxford & Cohen, 1992).

Активное применение учебных стратегий в изучении будущими педагогами английского языка для специальных целей предполагает следующее: сделать обучение более эффективным; повысить мотивацию и уверенность; сформировать автономию и независимость; показать взаимодействие стратегий изучения иностранного языка с другими дисциплинами; сделать процесс обучения открытым и понятным; формировать ответственность; научить самоанализу; обучать модифицировать задачи.

Поэтому *целью* данного исследования является определение уровня владения стратегиями будущими педагогами в процессе изучения английского языка для специальных целей. *Основными заданиями* исследования являются: теоретическое обоснование представленной методики, ее практическое применение, а также анализ полученных данных и определение влияния стратегий на результаты обучения будущих педагогов в процессе изучения английского языка для специальных целей.

Обзор литературы
Literature Review

Первые попытки классификации учебных стратегий по изучению языка начались в 1970-х годах, прежде всего, под влиянием прогресса в когнитивной психологии. Большинство исследований, проведенных по стратегиям изучения языка, сосредоточены на том, чтобы обнаружить, что нужно делать «успешному студенту» (a good learner) для эффективного изучения иностранного языка. Е. Венден и Дж. Рубин описали стратегии обучения иностранному языку как «любые операции, шаги, планы, процедуры, используемые обучающимися, чтобы облегчить получение, хранение, поиск и использование информации» (Wenden, & Rubin, 1987). Исследователи Дж. Ричардз, Дж. Платт и Х. Платт утверждали, что «стратегия обучения – это целенаправленное мышление и поведение студента во время обучения, помогают ему найти, понять и запомнить новую информацию» (Richards, Platt, & Platt, 1992, с. 209). С этим определением перекликается дефинитивная характеристика, предложенная Дж. О'Малли и А. Чамот, которые понимают стратегии обучения как «особые мнения или поведение, используемые людьми, чтобы понять, изучить или сохранить новую информацию» (O'Malley & Chamot, 1990, с. 1). Исследователь Р. Эллис определяет стратегии овладения языком как процессы, с помощью которых студент аккумулирует новые правила и автоматизирует уже имеющиеся знания через переработку воспринятого и упрощения его с помощью приобретенного опыта (Ellis, 1994).

Исследовательница Р. Оксфорд подчеркивала: «стратегии особенно важны для изучения языка, поскольку они являются инструментом стимулирования самостоятельной активности, которая важна для развития коммуникативной компетентности» (Oxford, 1990, с. 6). Именно Р. Оксфорд принадлежит дефиниция, которая получила положительный резонанс в профессиональной среде, и стала наиболее цитируемой в научно-методической литературе. По определению авторитетной исследовательницы учебные стратегии овладения иностранным языком – это «конкретные действия, предпринятые студентом, чтобы сделать обучение более простым, быстрым, приятным, самостоятельным, эффективным, и легко применяемыми в новых ситуациях» (Oxford, 1990, с. 8). Это на самом деле отражение того, что студент намерен делать и конкретных действий, которые он может предпринять. По мнению Р. Оксфорд, применение стратегий является полезным и результативным, если: а) стратегия хорошо сочетается с целью и задачей овладения иностранным языком, б) стратегия соответствует индивидуальному учебному стилю студента, и в) студент эффективно использует стратегию

и объединяет ее с другими соответствующими стратегиями (Oxford, 1990, с. 8).

Итак, стратегии обучения рассматриваются как особые способы обработки информации, улучшающие понимание, изучение или сохранение информации. Кроме того, Э. Кохен утверждает, что стратегии обучения иностранному языку – это процесс сознательного выбора студентом действий, к которым он прибегает, чтобы лучше учиться или усовершенствовать использование иностранного языка путем хранения, воспроизведения и применения информации об этом языке (Cohen, 1990). Так, К. Фаерч и Дж. Каспер подчеркивают, что сама стратегия обучения является «попыткой развивать в себе лингвистическую и социолингвистическую компетентности средствами изучаемого иностранного языка» (Faerch, & Kasper, 1989).

Анализ методических исследований (O'Malley & Chamot, 1990; Oxford, 1990; Oxford & Leaver, 1996; Grenfell & Harris, 1999) показал, что инструкции по применению учебных стратегий нужно предоставлять эксплицитно, интегрируя их в практический курс изучения иностранного языка, поскольку это дает возможность студентам практиковать учебные стратегии в аутентичных учебных заданиях, а задачей преподавателя является направлять образовательный процесс на достижение учебных целей. В отличие от имплицитного представления стратегий, которое не дает студентам специальных указаний относительно цели обучения (зачем учиться), эксплицитные инструкции вырабатывают сознательное отношение к применению стратегий, представляют стратегию, моделируют ее практическое использование, помогают оценить ее эффективность.

Методология
Methodology

В научно-методической литературе (Person, & Dole, 1987; Oxford, 1990; Chamot, 2005; Cohen, 2000; Grenfell, & Harris, 1999) представлены различные эксплицитные модели овладения стратегиями на основе инструкций в процессе обучения иностранного языка.

Для нашего исследования мы выбрали Модель Ребекки Оксфорд (Strategy Training Model – STM, 1990), которая имеет пошаговую процедуру применения и является гибкой с точки зрения процедуры, то есть каждый шаг может быть изменен в соответствии с заданиями, содержащие различные потребности и намерения (Oxford, 1990).

Реализация модели состоит из следующих шагов:

1. Студентов просят окунуться в аутентичное языковое задание и выполнить его без инструкций и указаний по учебной стратегии со стороны преподавателя.

2. Преподаватель помогает студентам оценить применяемую стратегию.

3. Преподаватель предлагает и демонстрирует полезные учебные стратегии, он указывает на необходимость большего самоуправления и озвучивает ожидаемые результаты, убедившись, что студенты знакомы с рациональностью используемой стратегии.

4. Преподаватель предоставляет студентам время для практического применения новых учебных стратегий по языковым или речевым заданиям и показывает, как указанные стратегии могут применяться в других заданиях.

5. Преподаватель обеспечивает практику использования приемов с новыми заданиями и позволяет студентам делать выбор относительно учебных стратегий, которые они будут использовать для выполнения заданий по изучению языка.

6. Преподаватель помогает более ответственным и самостоятельным студентам понять, как оценить успешность их учебной стратегии и измерить их прогресс.

В процессе применения указанной модели, репертуар стратегий овладения иностранным языком формируется каждым студентом индивидуально и может оставаться неизменным или расширяться за счет овладения новыми стратегиями. В процессе инструктирования студентов по применению учебных стратегий следует придерживаться основных правил: 1) студентам следует объяснить важность использования учебных стратегий в процессе изучения иностранного языка; 2) необходимо показать преимущества применения учебных стратегий для повышения эффективности обучения; 3) каждая стратегия должна получить название (она не обязательно должна совпадает с официальным названием, которое используется в научно-методической литературе, например, «избирательность внимания» можно переформулировать как «обращай внимание на главное»), это повышает уровень осознания студентами своих когнитивных процессов, помогает напомнить о необходимой стратегии при вопросе предоставления помощи со стороны преподавателя; 4) следует предоставлять студентам возможность практиковаться в применении соответствующих учебных стратегий, выполняя различные задания; 5) важно научить студентов оценивать успешность использования той или иной учебной стратегии для достижения желаемого результата; для этого

нужны обсуждения и анализ примененных стратегий после выполнения учебного задания, одновременно важно побуждать студентов переносить усвоенные учебные стратегии на выполнение новых заданий.

Итак, на основе проведенного анализа научно-методических источников по теме исследования определяем основные пути освоения студентами учебных стратегий в процессе обучения будущих педагогов английскому языку для специальных целей: 1) введение в структуру практических занятий по английскому языку эксплицитного инструктирования по использованию языковых учебных стратегий; 2) диагностика уровня владения учебными стратегиями с помощью анкеты Р. Оксфорд (Strategy Inventory for Language Learning, Version 7.0) и ознакомление с репертуаром стратегий на основе предложенного преподавателем списка стратегий (Language Strategy Use Survey, по Э. Кохену), с помощью которого студент определяет, какие учебные стратегии и в какой мере он будет применять в различных видах речевой деятельности; демонстрация преподавателем применения учебных стратегий с комментариями и учетом индивидуального учебного стиля; 3) применение эксплицитной модели овладения учебными стратегиями на основе инструкций и использования учебных стратегий студентом с общими комментариями преподавателя и студента; 4) самостоятельное применение освоенных учебных стратегий, дальнейшее расширение репертуара учебных стратегий; 5) самооценка и рефлексия студентом процесса и результата, выстраивание стратегической траектории на перспективу.

Исследование проводилось среди 58 студентов (35 студентов женского пола и 23 студентов мужского пола) первого курса Винницкого государственного педагогического университета имени Михаила Коцюбинского специальности математика, информатика, филология, психология, изучающих английский язык для специальных целей. Обучение проводилось в течение двух семестров 2019-2020 академического года и осуществлялось без специального отбора студентов, в стандартных условиях обычного учебного процесса в подгруппах по 14-15 студентов (4 подгруппы). Со студентами экспериментальных групп было проведено вступительную беседу, на которой им сообщили цели и задачи экспериментального обучения и объяснили, что полученные результаты анкетирования не повлияют на их оценки.

В процессе экспериментального обучения все студенты экспериментальных групп работали по одним учебными материалами; срезы знаний проводились в виде контрольных тестов по аудированию, говорению, чтению и письму; все студенты были оценены по одинаковым

критериям, которые соответствуют уровню владения языком B1 по CEFR, и проводились в начале и конце экспериментального обучения.

Уровни применения учебных стратегий в процессе изучения иностранного языка для специальных целей определены по результатам проведенного анкетирования, в котором использовано адаптированную версию 7.0 анкеты Р. Оксфорд «Репертуар стратегий в изучении языка» для иностранцев, изучающих английский язык (Oxford, 1990).

После завершения обучения с использованием эксплицитной модели Р. Оксфорд по овладению учебными стратегиями, студентам было предложено пройти повторно анкету Р. Оксфорд, для определения изменений уровня владения учебными стратегиями будущими педагогами в процессе изучения английского языка для специальных целей.

Результаты исследования
Results of the Research

Анкета Р. Оксфорд «Репертуар стратегий в изучении языка» содержит шесть категорий стратегий, которые охватывают ответы на пятьдесят вопросов по пятибалльной шкале Ликерта (5 – всегда использую, 4 – обычно использую, 3 – использую время от времени, 2 – обычно не использую, 1 – никогда не использую), среди которых: стратегии эффективного запоминания (категория А, 1-9 вопросы), стратегии использования всех ментальных процессов (категория В, 10-23 вопросы), компенсационные стратегии (категория С, 24-29 вопросы), стратегии организации и оценки обучения (категория D, 30-38 вопросы), стратегии управления эмоциями (категория E, 39-44 вопросы), стратегии обучения в сотрудничестве с другими (категория F, 45-50 вопросы).

Ответы на каждый вопрос (от 1 до 5) в каждой категории добавлен и разделен на общее количество утверждений соответствующей категории для получения средних значений. Согласно анкете Р. Оксфорд *высокий уровень* владения стратегиями в изучении языка охватывает значения средних показателей 5,0–4,5 (всегда использую) и 4,4–3,5 (обычно использую); *средний уровень* находится в пределах 3,4–2,5 (иногда использую) и 2,4–1,5 (обычно не использую); *низкий уровень* имеет значение средних показателей 1,4–1,0 (никогда не использую).

По результатам анкетирования использования стратегий в изучении английского языка для специальных целей в начале экспериментального обучения среди 58 студентов только 11 первокурсников имеют показатели средних значений высокого уровня более 3,5, но только в четырех из них значения приближаются к 4 (4,0 4,1, 4, 1, 4,4). Следовательно, эти студенты обычно используют стратегии обучения языку, но не всегда. В то же

время, 12 студентов почти не используют стратегии изучения языка, поскольку показатели средних значений их ответов является ниже 2,4.

Результаты анкетирования показали, что владение стратегиями будущими педагогами в изучении английского языка в начале экспериментального обучения было развито на среднем уровне. Хуже развитым оказалось умение пользоваться стратегиями управления эмоциями. Стоит отметить, что только четыре студента приблизились к показателю среднего значения 4 в этой категории, то есть студенты не умеют или редко используют стратегии самоуспокоения, поощрения, самоанализа и поведения, не обращаются за советом к преподавателю или другому человеку в отношении собственного эмоционального состояния.

Самые высокие показатели средних значений были зафиксированы в категории использования стратегий в сотрудничестве с другими. Среди ответов на утверждение этой категории, выделены следующие: в случае, если что-то непонятно, попробовать обратиться к собеседнику с просьбой повторить то, что было сказано (медленнее); выполнение заданий по практике речи с другими студентами; попытки задавать вопрос по-английски; желание узнать культуру носителей языка. В то же время, высокие баллы получили утверждения об обращении за помощью и желание, при наличии ошибок, быть исправленным преподавателем. То есть студенты считают, что в случае возникновения проблемы им лучше попросить помощь у преподавателя, чем самостоятельно искать способы ее решения, а также предпочитают контроль со стороны преподавателя или взаимоконтроль, а не самоконтроль.

Анализ результатов анкетирования свидетельствует о целесообразности проведения экспериментального обучения с помощью эксплицитной модели Р. Оксфорд основываясь на инструкциях, с целью повышения уровня владения стратегиями изучения языка для развития профессионально ориентированной англоязычной коммуникативной компетентности. После экспериментального исследования было проведено повторное анкетирование студентов.

В конце экспериментального обучения на основе эксплицитной модели Р. Оксфорд на основе инструкций, уровень владения стратегиями в изучении английского языка для специальных целей по всем категориям анкеты достиг высокого уровня. Увеличение средних показателей по категориям (A, B, C, D, E, F) представлено в таблице 1.

Таблица 1. **Сравнение средних значений показателей уровня владения стратегиями в изучении английского языка в начале и в конце экспериментального обучения**
Table 1. **Comparison of Mean Values of Strategies Acquisition in Learning English before and after Experimental Training**

№	Категория	Кол-во	Среднее значение в начале	Среднее значение в конце	Прирост значения
A.	Стратегии эффективного запоминания	58	2,94	3,84	+0,9
B.	Стратегии использования всех ментальных процессов	58	2,92	3,89	+0,97
C.	Компенсационные стратегии	58	3,14	4,32	+1,18
D.	Стратегии организации и оценки обучения	58	3,05	4,01	+0,96
E.	Стратегии управления эмоциями	58	2,66	3,61	+0,95
F.	Стратегии обучения в сотрудничестве с другими	58	3,16	4,54	+1,38
	Среднее значение по всем категориям	58	2,97	4,04	+1,07

Следовательно, повышение уровня владения стратегиями в изучении английского языка для специальных целей будущими педагогами произошло по всем категориям, в среднем на +1,07. Самый высокий прирост (+1,38) наблюдается в категории «Стратегии обучения в сотрудничестве с другими».

В то же время, согласно результатам контрольного теста определения уровня знаний, который проводился в начале и в конце экспериментального обучения, процент студентов с низким уровнем владения англоязычной коммуникативной компетентностью уменьшился во всех видах речевой деятельности, а именно: в аудировании составлял 31%, в монологической речи – 36%, в диалогической речи – 33%, в чтении – 26%, а в письме – 41%.

Чтобы убедиться, что разница в результатах, полученных до и после экспериментального обучения, является статистически значимой и как переменные (баллы по тесту по английскому языку и уровень усвоения стратегий при обучении будущих учителей английскому языку для специальных целей), мы применили Коэффициент корреляции Пирсона: *r=0,9876*. Положительная корреляция показывает сильную взаимосвязь между двумя переменными. Значение *t* равно -6,678, а значение *p* равно 0,000028, что означает значительную корреляцию между переменными.

Результат значительный при *p* < 0,05. Результаты показывают, что освоение стратегий при обучении будущих учителей английскому языку для специальных целей может быть полезным как в развитии коммуникативных навыков английского языка, так и академических достижений.

Проведенное исследование показало, что успешные студенты взвешенно подходят к выбору стратегий, в зависимости от конкретных задач, контекста или насущных проблем. Более эффективными в изучении иностранного языка являются те студенты, которые используют стратегии должным образом, с большим разнообразием, и таким образом, чтобы они помогали более оптимально выполнять задачи, что подтверждают и другие исследования (Chamot & Kupper, 1989). Более того, результаты обучения показали, что студенты, которые успешно осваивают иностранный язык, демонстрируют большую гибкость при выборе целесообразных стратегий обучения, как и в исследовании Эллис (Ellis,1994).

Выводы
Conclusions

Главная задача в инструктировании студентов по применению учебных стратегий – это предоставить им инструменты для выполнения необходимых действий: самодиагностика, определение сильных и слабых сторон в процессе обучения; осознание того, что эффективно помогает при изучении иностранного языка; формирование навыков и умений, которые способствует успешному решению поставленных проблем; экспериментирование, то есть применение уже известных и новых стратегий обучения; принятие решения о применении учебных приемов для решения поставленной проблемы; необходимость осуществления самоконтроля и постоянного мониторинга своей учебной деятельности; переноса «успешных» учебных стратегий на новое учебное содержание.

Итак, необходимость и важность овладения студентами эффективными учебными стратегиями изучения иностранного языка основывается на положениях: 1) студенты с высокой учебной активностью более успешны в обучении: студенты сознательно организуют и интегрируют новую информацию в уже сохраненную в памяти, имеют большее количество когнитивных связей, поддерживающих понимание и воспроизведение, чем те, чья учебная активность ограничивается заучиванием наизусть; 2) стратегиям можно научиться. Более успешными являются студенты, которые владеют стратегиями и имеют возможность их применять; 3) учебные стратегии могут быть расширены и перенесены на другую деятельность; 4) усвоение иностранного языка в академических

условиях с помощью учебных стратегий будет более эффективным, поскольку имеет много общего с решением проблемной ситуации в родном языке.

Студенты, применяя учебные стратегии для решения определенной задачи или проблемы, должны обладать метакогнитивными знаниями о своих подходах к обучению, хорошо понимать суть задания, сформировать умение подобрать учебные стратегии, которые лучше всего отвечают как требованиям задания, так и учебным возможностям самого студента.

Таким образом, применение учебных стратегий облегчает и улучшает процесс обучения английскому языку для специальных целей. Повышение уровня владения стратегиями позитивно отображается на уровне владения иностранным языком для специальных целей. Развитие указанных умений у будущих педагогов обеспечит их способность к саморазвитию и самосовершенствованию в течение жизни.

Summary

Using different strategies in learning English is a necessary component of effective ESP acquisition. By applying various strategies, students learn to take responsibility for their learning, become more independent and purposeful. Well-chosen strategies help students monitor their own process of learning, develop language and speech skills, thereby increasing confidence and motivation to learn a foreign language. The priority for the teacher is to choose the appropriate learning methods and strategies, to teach students to use them correctly in order to increase their level of autonomy and organization in learning ESP.

The results of study confirm that if the learning strategies are clearly defined and successfully mastered by students, then this improves the development of skills and abilities in ESP acquisition. Foreign language teachers can play an active and important role in advising students on how to apply learning strategies to solve various assignments, as well as continually expand the range of strategies to improve language and speech skills in those professional areas that require proficiency in English.

The active use of learning strategies in ESP acquisition by intending educators involves the following: to make teaching more effective; increase motivation and confidence; form autonomy and independence; show the interaction of strategies for learning a foreign language with other disciplines; make the learning process open and understandable; form responsibility; teach introspection; teach to modify tasks.

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DEVELOPING STUDENTS' FACILITY IN COMMUNICATIVE INTERACTION TECHNIQUES OUTSIDE THE LANGUAGE LEARNING CLASSROOM AT NON-LINGUISTIC FACULTIES

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Abstract. *The article focuses on some new insights into the effects of students' communicative interaction in the language learning process. The study offers some modes of utilizing the extra-curricular activities potential for generating an interaction environment where students venture into true communication. The syllabus of students' interaction within their extra-curricular activities has been defined in the study in relation to the video conferencing technology. We have expanded the range of educational offerings while introducing some components of video conferencing into students' communicative learning: virtual meeting rooms, discussion forums, screen sharing. The topicality of the study consists in insufficient number of scientific works on aspects of students' communicative interaction within extra-curricular activities in language learning. Hence the aim of the study is to propose theoretical justification and methodological development of utilizing the interaction potential within extra-curricular activities for students' communication training. Following the aim we have examined characteristics of students' communicative interactions within extra-curricular cases in language learning. We have elaborated some techniques and devices, identified some ways of generating communicative interaction dynamics for furthering students' communication training. We have verified the findings in our experimental practical work and have revealed the significance of students' interactions within extra-curricular activities for facilitating their communication potential in language learning.*
Keywords: *non-linguistic faculties, language learning process, extra-curricular activities, video conferencing technology, communication training, communicative interaction, task-based learning, techniques and devices.*

Introduction

Communication training is considered to be an important component in contemporary management education programs (Bavina, 2006; Denisova, 2004 and others). Foreign language teaching at faculties of management is based on communicative activities and can facilitate students' communication training. Scientists focus their research on students' communication training in foreign language teaching (Abdrahmanova, 2007; Gorbunova, 2008; Chunihina, 2013; Denisov, 2007; Shukurova, 2006), yet they devote it to language classroom

teaching only. However, the time for language study is usually limited within rigid timescales at non-linguistic faculties. In our study we propose ways of utilizing the reserves of students' extra-curricular activities in foreign language teaching. There are no comprehensive studies that would reveal stages, methods, ways of communication training outside the language learning classroom. Our study examines some modes of utilizing extra-curricular activities potential for generating a communicative interaction environment where students venture into true communication.

Communicative interaction aspects in language learning in the university environment are examined in many works (Bim, 2001; Zimnyaya, 1984; Mil'rud & Maksimova, 2000). Rubinshtejn S. L. defined interactions as a mutual influence process which determines the structure and the properties of a system (Rubinshtejn, 1976). Scientists consider foreign language contexts for communicative interaction situations (Bim, 2001; Mil'rud & Maksimova, 2000), issues of organizing communicative interactions in the language learning process (Haleeva, 1989), examine skills within communicative interactions targeted at handling tasks (Bim, 2001). Communicative interactions are defined in scientific papers as coordinating activities aimed at achieving common targets within handling joint tasks (Chunihina, 2013). Information search, opinions positioning, topic expanding, information transfer, problem solving are expected to be targets within communicative interactions (Denisov, 2007). In our work we adhere to the view that communicative interactions involve establishing and maintaining contacts between individuals by means of the language facilities. A communicative contact occurs each time within the communicative interaction and involves information exchange to attain designated targets.

Communicative interaction issues within extra-curricular cases in language learning still seem to remain in many respects open for research. The most characteristic of exchanges in the context of the students' extra-curricular cases is a sense of purpose. Language is used to achieve a target and its successful use is seen in terms of a successful outcome to the event elaboration. It follows that performance objectives take priority over language learning for its own sake. It should be noted here that much of the language needed by management professionals would be transactional: getting what is necessary and persuading others with the course of actions proposed.

Hence the topicality of the study consists in insufficient number of scientific papers on aspects of students' communicative interactions within extra-curricular cases in language learning.

The aim of the study is to propose some theoretical justification and methodological development of utilizing the interaction potential within extra-curricular cases for students' communication training in language learning.

The object of the study is the process of organizing extra-curricular interactions in students' language clubs at faculties of management. The subject of the study is the process of developing students' communication potential in their interactions within extra-curricular events elaboration at faculties of management.

The tasks of the study consist in:

− examining characteristics of students' communicative interactions within their extra-curricular cases in language learning;
− elaborating techniques and devices of generating communicative interaction dynamics for furthering students' communication training;
− approbating the findings within students' extra-curricular cases at faculties of management.

The following research methods have been applied in our study: scientific literature analysis, work experience analysis, pedagogical observation, pedagogical experiment, data analysis.

Methodology and Empirical Research

Our study offers some modes of utilizing the extra-curricular activities potential for generating an interaction environment where students venture into true communication. The syllabus of extra-curricular activities in our experience has been structured in relation to students' events elaboration and performance in the language club within distance learning technologies.

Characteristics inherent in any pedagogical technology are described in many research papers. They are the cyclical nature of actions, repeatability, logical sequences of actions, rationing of interaction (Bavina, 2006). In foreign language teaching pedagogical technologies are described as specially organized, time-based procedures for teaching communicative skills and as based on a system of goals, content, methods, means and forms of communication training (Levchenko, 2005). Communication training in foreign language teaching of today tends to integrate elements from various technologies, communicative interaction being the key element of the learning process.

Distance learning technologies are being examined by contemporary scholars. Bates (1991) singles out three generations of distance learning associated with the historical development of production, distribution and communication technologies. The main focus of the first two generations of distance teaching consisted in the production and distribution of teaching materials. The third generation, in his opinion, is based on new technologies of interactive communication (the facilities of new telecommunication and

computer technologies). New communication technologies are considered to blur the distinction between traditional and distant learning. They have potential uses in both situations (Bates, 1991).

In our work we utilize a video conference learning scheme in accordance with the ideas of contemporary scholars. Lynne Coventry (2007) introduces a video conference learning framework. It includes active construction of knowledge, peer interaction, development of oral explanation skills, motivating feedback received from others. Lynne Coventry's model emphasizes the importance of construction and dialog and the dialog is defined as learning through discussion and reflection and as a fundamental component of video conference learning (Coventry, 2007).

The extra-curricular activities sessions in our experience were carried out in virtual Zoom setups. We consider Zoom as an effective video conferencing tool to hold virtual language club sessions. We utilize multiple features provided by Zoom: screen sharing, live chats, video recording and others.

The basic fabric of the club activities was handling tasks within real situations of students' events elaboration. Setting up the task thoroughly was essential to guide the club participants in the situations they were to deal with, in the things they were to communicate. Each task would rely on much input from the participants (on their research materials) and on the teacher's frameworks. Handling tasks was associated with obtaining the interaction product and, for that purpose, with generating a conversation. Such performance areas as structure, process, function, cause, effect, advantage were involved. Within them the language of clarifying, restating, confirming, concluding was of significance.

Each task related to the overall objectives of the case. Depending on the stage of the event elaboration process the tasks included the following activities:
1) identifying themes, submitting hypotheses, discussing resources;
2) creating teams, forecasting actions, discussing materials;
3) integrating ideas, allocating actions, developing scenarios;
4) mastering language materials and speech behaviour;
5) analyzing the experience.

The sequence has been borrowed from one of the instruction cycle models elaborated by John Gibbons. The model characterizes the stages through which language learning activities usually proceed and the order in which the stages occur:
1) the introduction to the task and to the performance itself orients learners towards the topic and the situation;
2) the preparation includes organizing resources, constructing the environment, positioning participants, identifying materials;
3) the performance stage relates to the model elaboration and actual doing of the activity;

4) the feedback and the follow up stages are stages where the problems are worked on and the input for another cycle is formed (Gibbons, 1984).

Thus students' communicative interactions took place at each stage of the process. Each time it was aimed at handling the task and creating the targeted communicative product.

In the beginning the teacher would give an agenda for the session by screen sharing visuals. It was essential to use plenty of pictures, videos, documents, graphs, which would create a better understanding of the task and its topic. That gave the participants a better idea of what was to be covered, of the activities they were to be engaged in.

Then Zoom's breakout rooms feature was utilized to assign the participants into groups for a designated period of time so that they could interact within handling the designated task together.

In scientific papers we find descriptions of strategies for group dynamics (Kral, 1997). In our experience we often applied three of them: "Dyad", "Small Group", "Unified Group". Each task handling session started with "Dyad" activities in breakout rooms. "Dyad" activities gave participants an opportunity to work one-to-one with the peer in the session. Through these activities peers began to feel more comfortable in sharing and discussing their findings and ideas. Each dyad would discuss, for example, their research findings for at least ten minutes to outline the most important points. In the two-way communication each of the participants could use the option to speak and to position ideas for a substantial period of time.

Participants were usually aware of the necessary skills for a successful group cooperation: how to get information from the interlocutor, how to respond to questions, how to generate phrases and question forms. They usually tried to process the skills they had practiced in their regular classes and to integrate them into extra-curricular interactions with their peers.

After the dyads were brought back to the original call the breakout rooms facility was used to combine dyads into small groups of four to expand the interaction for handling the task. Each small group in its turn was taken to its breakout room for a period of time to interact. In breakout rooms participants incorporated into their discussion various virtual elements such as visuals, documents, messages. They shared the screen presenting their files and outlining their ideas. They also used the whiteboard feature to explain the key issues. The teacher joined each small group room and facilitated the discussion. The group handled the task in a given time and reported back to the original call.

At the last stage of the task within the "Unified Group" strategy, the participants worked together to integrate the most important findings and ideas into a unified product, the output for the designated task (e.g. the event script).

The participants used the Zoom feature of "raising hands" to enter the interaction. They had an opportunity to utilize annotation tools to highlight particular corrections and to comment on particular areas, just sharing the screen and the whiteboard facility. Thus they could view and edit documents. They could also record and save segments of the session and re-watch or reread them when it was necessary.

Before learners embark on the club interactions they should familiarize themselves in their regular classrooms with major language patterns to be able to form meaningful utterances in their talk.

In Clifford Prator's research we find descriptions of major phases in language teaching, specifically, manipulative and communicative ones (Prator, 1965). Manipulative activities are supposed to give learners mastery of language patterns but sometimes leave them unprepared to carry on a basic conversation outside the class. Conversation is defined in scientific papers as the interchange of information by spoken words (Dobson, 1992).

In our study we consider guided conversation practice to be a reliable route to true communication. Within the club sessions learners maintained a controlled interaction in which they conversed using their research materials and frameworks imposed by the teacher. In scientific literature certain didactic structures are introduced and examined. They are called frameworks and can be considered as activities schemes used to encourage learners' interaction to help them to generate language and to build conversations. At later interaction stages framework supports can be gradually removed and learners can gradually enter their free communication (Ellis & Johnson,1996).

This is an example of the framework used in our study within students' extra-curricular cases for practicing the language of alternatives (Table 1).

*Table 1 **Advantages and Disadvantages Interaction Framework***

Problem			
Small group A solution		Small group B solution	
Advantage	Disadvantage	Advantage	Disadvantage
Advantage	Disadvantage	Advantage	Disadvantage
Advantage	Disadvantage	Advantage	Disadvantage
Evaluation			
•		•	
•		•	
•		•	
Conclusion			

The teacher suggested at the outset that, while handling the task the participants were to follow the procedures outlined in the framework. One participant was to control the procedures writing down proposals as they were being made.

In the carefully controlled conversation format a list of techniques and devices was applied (Dobson, 1992). Questions and answers aspect was of the utmost importance in generating conversation dynamics. Questions and answers in communicative interactions of the club participants related to real situations. Actual information was sought and factual replies were expected in the conversations.

Another aspect of conversation dynamics was connected with building comments on one another (Dobson, 1992). For example, a speaker made a comment in response to a comment just given by his interlocutor or he formed a series of comments (or even a short monologue). His interlocutors responded with comments or questions of their own. Occasionally speakers began one statement and then switched to another, each time signaling the next intent with special expressions.

Thus in conversations interlocutors had to follow some conversation strategies. Conversation strategies were means of keeping interactions continued. Researchers propose lists of conversation strategy signals, gambits being one of the signals. Gambits are words or phrases that help learners to regulate the flow of the talk and to get the success of it. They are remarks intended to start a conversation, to make a telling point, to introduce a topic, to make a calculated move, to expand the subject, to structure turn-taking (Ellis & Johnson, 1996).

Some conversation strategy signals processed within students extra-curricular cases are introduced in Table 2.

*Table 2 **Conversation Strategy Signals***

Some functions	Some gambits
Various aspects of a topic	First of all, it is important to note, a word must be said about, another thing is, believe it or not, to be realistic, to illustrate the point, a case in point is, etc.
Giving opinions	I think, my guess is, I am sure that, to my mind, I personally believe, it seems to me, let me tell you, I am certain, I rather think that, as I see it, in my case, etc.
Action strategies	We must bear in mind, we mustn't forget, we have to remember, now let us look at, I can't accept your idea, I can see your point of view, why don't we do the following, what we have in mind is, here is what we shall do, etc.

Subject expansion	In addition, I might add that, there is also, moreover, the main advantage is, besides, afterwards, furthermore, what is more, consequently, in case of, and another thing, the reason why, etc.
Giving arguments	Let me give an example, to illustrate this point let us consider, it has an advantage over, in fact, I'd like to give some details about, you do realize that, the point is that, as an example, for one thing, ordinarily, etc.
Prioritizing	Primarily, the main point is, essentially, of a primary concern, is worth considering, in most cases, notably, chiefly, mainly, it has an advantage over, I tend to favor, it is important to view, it is worth to introduce, above all, namely, etc.
Conclusion	On the whole, for the most part, as a matter of course, by and large, to sum up, in brief, to go over the main points, that covers the task, in general, in conclusion, finally, lastly, let us conclude, to summarize the ideas, etc.

Thus for each performance area a bank of the key functions and selected language was given to back learners performance.

Experiential Learning and Research Results

In our study the experimental work was conducted over a period of March 2020 – December 2020 and incorporated approbating some extra-curricular interaction aspects within the students' event elaboration at faculties of management. Empirical training was organized for a 10-person experimental group of the language club members. The learners of the experimental group underwent task-based learning within the students' extra-curricular case. 80 minutes training periods were conducted twice a week for one term. The learners of the control group were taught only by traditional teacher-based methods.

The level of English for all the learners engaged was estimated between B1 and B2 according to the standards of the Common European Framework of Reference for Languages. At the initial and at the final phases the learners of both groups were asked to interact in pairs on the proposed communicative task. The learners of both groups demonstrated a similar moderate level of the communicative interaction skills (dialogue and polylogue skills) at the initial phase. A comparison of the initial and the final evaluation demonstrated that though at the initial phase the results of the two groups differed insignificantly, at the final phase the learners of the experimental group obtained higher scores.

The emphasis was on evaluating the success of the communicative interaction:
- if the learners were active within handling the task;

- if the learners were cooperative within handling some aspects of the task;
- if the learners were not cooperative within handling the task.

The interaction process was video recorded and then transcribed. The performance progress scale applied within the experiment was based on findings from scientific works (Ellis & Johnson,1996). An example of a performance progress scale utilized in our study is shown in Table 3.

Table 3 **Performance Progress Scale**

Progress level 1
The learner can handle long periods of interactions. His messages are well organized. He uses a wide range of the language patterns adequate for the needs of the interaction. He has full command of the language patterns. Each new point is clearly signaled by him.
Follow up. The learner is a competent speaker who will mainly need to work on increasing the range and accuracy.
Progress level 2
The learner is able to maintain interactions. A number of designated language patterns are known to him. He uses them with confidence in all but the most demanding situations. His communication is effective on most occasions. But he sometimes has to talk around an idea.
Follow up. The learner will need to work on the accuracy of the structure and vocabulary and the appropriacy of different kinds of language.
Progress level 3
The learner can "survive" in a communicative interaction but he is rather limited in the designated language patterns. He is sometimes unaware of the nuances of careful choice of language patterns. His responses are generally short with little elaboration.
Follow up. The learner has a long way to go to increase his communicative effectiveness in interactions.

The performance progress scale was developed with regard to the learners utterances (the number of the language items to convey the right meaning). The language items examined were those of the most common language patterns referred to as conversation strategy signals (gambits). To carry out the evaluation we determined the learners' communicative interaction entry and exit progress levels. For that we used video recordings which helped us to observe how the learners' progress matched the performance scale points.

Observing the learners' communicative interaction in both groups we noticed much more attempts with the club participants to use gambits as language tools to regulate the smooth flow of the conversation in the end of the experiential work (Table 4).

Table 4 **Recycling Target Language Patterns in the Control and Experimental Groups**
(cases count)

Control group (average number of cases at the assessment sessions)		Experimental group (average number of cases at the assessment sessions)		Dynamics from pre-experiment to post-experiment testing (average number of cases at the assessment sessions)	
Pre-	Post-	Pre-	Post-	CG	EG
8	14	16	30	6	14

The data obtained show higher increment in the number of the recycled language patterns in the learners' communicative interaction in the experimental group as compared to the control group which gives evidence as to the effectiveness of the guided communicative interaction technique within students' extra-curricular cases (Figure 1).
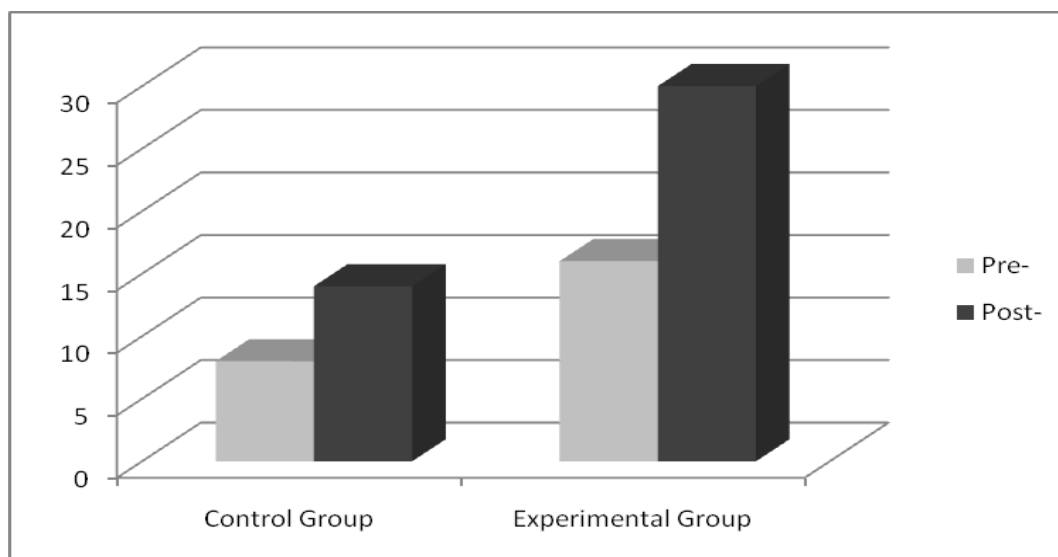
Figure 1 **Dynamics in Recycling Target Language Patterns in the Control and Experimental Groups (cases count)**

Thus having performed in the language club during a designated period of time the students on the whole have contributed to the development of their conversation potential. They demonstrated a stronger confidence in speaking than their counterparts in the control group.

Conclusion

In our study we have explored some effects of students' communicative interactions for their communication training in the language learning process.

To adjust to fast changing needs of labor markets university graduates should be prepared for the dialogic character of the contemporary professional environment. However, as experience shows, university students at non-linguistic faculties often lack skills for foreign language communicative interaction outside the language learning classroom. The presence of the problem is recognized in many scientific publications.

As literature analysis also evidences, the potential of extra-curricular activities in language learning seems to be underscored as a means of solving the problem. In our study a pattern of extra-curricular activities applied to a mini-group of the students' language club was integrated into the study process in the natural academic setting at faculties of management.

The experiential training gave insight into how the students interacted with each other while tackling the target tasks of the extra-curricular case. The study helped to elaborate strategies and to design some schemes for students' communicative interactions within extra-curricular cases. It enabled us to offer some guidance as to how to design frameworks for building conversations and generating the targeted language. We have elaborated some techniques and devices for furthering students' communication training within their extra-curricular interactions in language learning.

Some technological issues were considered and applied. We managed to expand the range of educational offerings while introducing some components of video conferencing into students' communication training. There we identified some ways of generating communicative interaction dynamics for furthering students' communication training.

Thus, we have proposed some theoretical justification and methodological development for utilizing students' interaction potential within their extra-curricular activities in language learning. We have verified the findings in our experimental practical work. The data obtained in the experiential learning period indicated positive dynamics in the students' performance progress within their extra-curricular interactions. Those who performed tasks within the extra-curricular case presented their arguments in a more proficient manner, provided sufficient supporting materials to illustrate their arguments, used more relevant language clichés. In this way we have found some evidence of the significance of students' extra-curricular interactions for developing their communication potential in language learning at non-linguistic faculties.

As the size of the sample was rather small it cannot exemplify the students' community at large. So we consider this study as an exploratory investigation to identify most significant issues and trends for our further research.

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DIASPORA FAMILY VIEWS ON LEARNING LATVIAN IN DISTANCE LEARNING CLASSES BY THE LATVIAN LANGUAGE AGENCY

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Abstract. *8% of the population whose native language is Latvian live outside Latvia in many countries of the world. With the concern for the preservation of Latvian it is disturbing that less than a half of Latvian diaspora families speak Latvian at home, therefore children have a weak proficiency of Latvian or lack it altogether. What is positive about the present situation is that almost all Latvians living in foreign countries wish their children to learn Latvian and choose distance learning classes for language acquisition and improvement, including those provided by the Latvian Language Agency (henceforth – LLA). The aim of the present research is clarifying the motivation of diaspora families to choose for their children distance learning classes of Latvian provided by the LLA and investigating the views of the families on the role of distance classes in the process of learning Latvian. For research data collection, a digital survey questionnaire was compiled and e-mailed to all families participating in distance classes of learning Latvian organized by the LLA in different countries of the world. The research reveals that the majority of the surveyed family children do not attend weekend Latvian schools and prefer regular, systemic language learning classes under the guidance of professional teachers from Latvia. The families admit that distance classes are a convenient mode of language learning, yet the greatest challenges in teaching and sustaining Latvian outside Latvia are the lack of the Latvian linguistic environment and lack of time for engaging with the child, whereas those in distance learning are children's busyness and lack of motivation for language learning.*
Keywords: *diaspora, Latvian language learning, distance learning classes.*

Introduction and Literature Review

The relevance of the topic is determined by the aim of the document "Latvia's Sustainable Development Strategy until 2030", which highlights the need to preserve and develop Latvia's cultural capital and promote a sense of belonging to the Latvian cultural space by developing a competitive national identity based on public creativity. The strategy states that in the context of global and European cultural diversity, it is important for Latvia to preserve and develop its identity, language, national cultural values, and way of life. Modern national

identity, which can be interpreted in a broader sense, includes all Latvians who feel belonging to the Latvian cultural space (Latvija 2030, 2010).

According to the data of 2011, the number of native speakers of Latvian reaches 1.55 million, and only 1.16 million of them live in Latvia, the rest live in various countries of the world (Vanags, 2020). The study "State Language Situation in Latvia: 2016 - 2020" indicates that while living abroad, the use of Latvian among Latvians decreases and functionally narrows. Before leaving Latvia, Latvian emigrants had weaker English and other home country's language skills, but while living in exile, their skills of different languages gradually improve, but at the same time Latvian skills deteriorate in all age groups. The data obtained in this study show that 41% of children have poor or no Latvian skills, and only 46% of families living outside Latvia speak Latvian as a spoken language at home (LVA, 2016). At the same time, almost all Latvian parents living abroad want their child to speak Latvian, and 6–7% of diaspora parents choose distance learning classes for their children to learn and improve their Latvian (LVA, 2020). This study also reveals that Latvian children whose families use distance learning have significantly better Latvian skills than those who do not use distance learning opportunities (Ministry of Education and Science, 2020).

In 2016, the Latvian Language Agency (hereinafter - LLA), which is responsible for promoting Latvian learning worldwide, accepted the challenge - to provide children and young people anywhere in the world with the opportunity to learn and improve Latvian. In addition, not only to provide an opportunity to learn and practice independently, but to do it more purposefully - together with the teacher, using a wide base of learning resources and tasks (Kazāka & Gribusts, 2018). Since then, LLA has been offering distance learning classes for learning Latvian in distance learning for 7–15-year-old diaspora children, using online classes as the main form of study. The aim of the paper is to analyse the motivation of the families of distance learning students to choose Latvian distance learning classes offered to their child by LLA and to evaluate the importance of the offered distance learning classes in the Latvian acquisition process.

An online questionnaire was used in the study to collect qualitative and quantitative data. The electronic questionnaire was sent to the families of 200 LLA distance learning students learning Latvian in the diaspora in 36 countries around the world.

The study identified the biggest challenges for families of distance learning students in teaching and maintaining Latvian outside Latvia, the ways in which each family promotes language maintenance, why they choose distance learning classes, which are motivating and disruptive conditions for a child learning Latvian in distance learning classes.

Methodology

An online questionnaire was used to collect data in the study. The survey was conducted in December 2020 and January 2021.

The online questionnaire was chosen as the most appropriate form of the survey because the respondents are located in different countries of the world, and all respondents have access to the Internet and relevant technologies, as it is mandatory for LLA when parents apply for distance learning. The questionnaire included questions in which parents (1) expressed their opinion on whether they were satisfied with their children's Latvian skills and at what level they would like them to be; (2) indicated the types of language learning and the challenges in language learning; (3) substantiated the choice of distance learning classes organized by LLA; (4) evaluated and substantiated whether and why LLA classes have met their expectations, made recommendations for the improvement of these classes. The questionnaire included both closed, partially open, and open questions for obtaining qualitative and quantitative data. Thematic analysis was used to compile qualitative responses, assigning codes to the responses, grouping them accordingly, and finally quantifying them (Braun & Clarke, 2006; Pipere, 2016).

The questionnaire was sent to the families of 200 LLA distance learning students studying Latvian in the diaspora in 36 countries around the world. Questionnaires were completed and submitted anonymously by 107 or 53.5% of respondents, representing 30 countries. Most respondents are from Great Britain, Ireland, the USA and Canada (Fig. 1) - from the countries where the largest Latvian communities live (Ministry of Foreign Affairs of the Republic of Latvia, 2015).
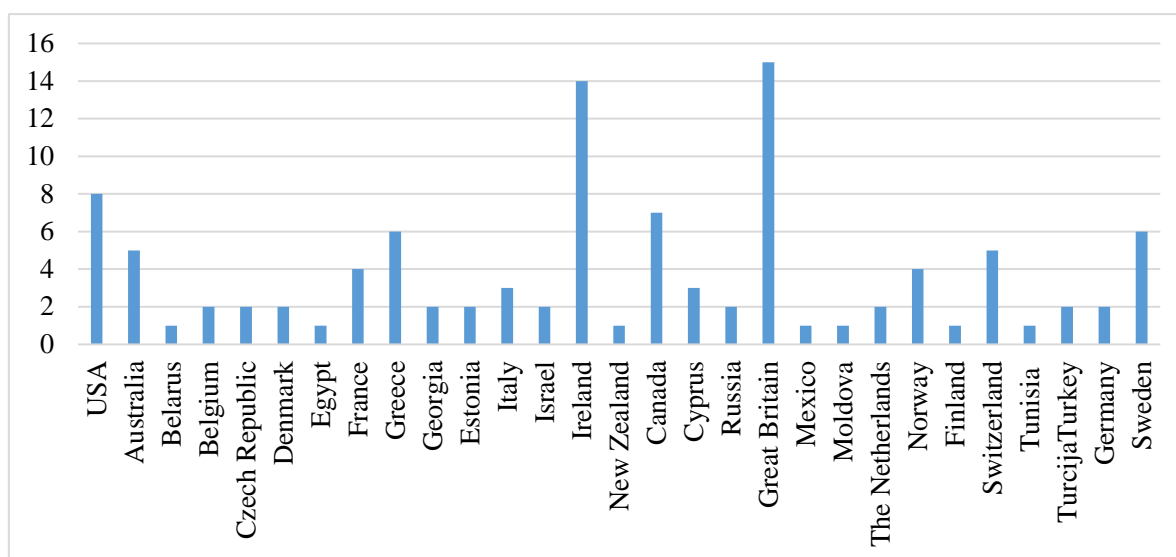
*Figure 1 **Countries Represented by the Respondents***

Respondents represent parents of children of different ages (7-15 years), mostly 8-11 years old (Fig. 2), which is in accordance with the age distribution in the groups of LLA distance learning classes.
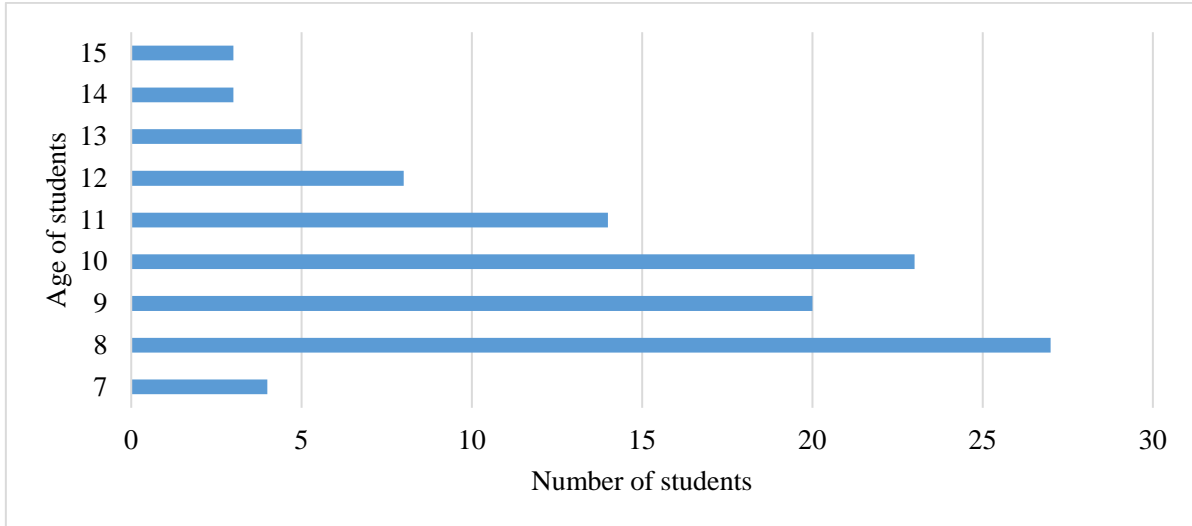
Figure 2 Age of Students

Research Results

The answers of the respondents confirm that the majority of the surveyed parents' children or 71% were born outside Latvia, but the remaining 29% - in Latvia. Most of the respondents are satisfied with their children's Latvian skills, but it is influenced by regular distance learning - in the first, second, third, or fourth year.

Figure 3 Parent's Satisfaction with Their Child's Language Skills (percentage)

Parents' satisfaction with children's language skills differs for parents whose children were born outside Latvia and those whose children were born in Latvia (Fig. 3). The percentage of parents who are completely satisfied with their child's Latvian skills is greater among the one's whose child was born in Latvia, while the majority of parents of children born outside Latvia are dissatisfied with the child's Latvian skills.

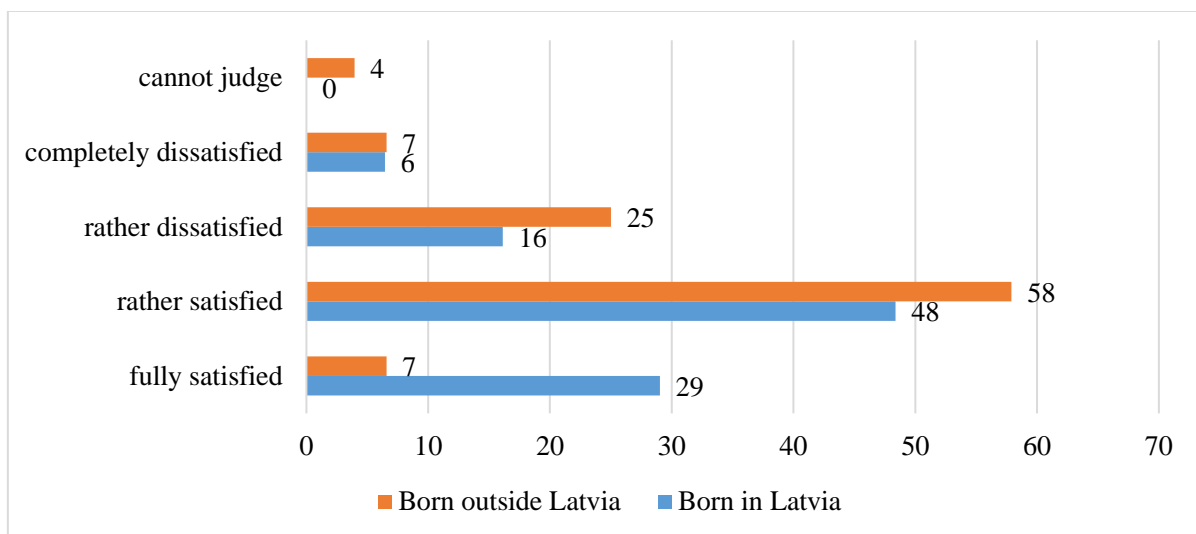Parents' satisfaction with their children's Latvian skills is in line with the data of the study "Language Situation in Latvia: 2016–2020" implemented within the state research program where (Ministry of Education and Science, 2020; LVA, 2020) Latvian children whose families use distance learning have significantly better Latvian skills than those who do not use distance learning opportunities.

Diaspora families apply their children for Latvian distance learning classes so that the children acquire, maintain, and improve their Latvian skills. Why is it important for parents living outside Latvia that the child understands Latvian? In the diaspora, the language of the host country is needed on a daily basis at school or work, in social communication, and the use of Latvian is gradually decreasing. As the most important respondents indicate the factor: language is necessary for communication with Latvian-speaking relatives and friends (84%). Part of the diaspora regularly spend their holidays in Latvia, but relatives (often grandparents) and friends do not know the language of the respective home country, and, of course, prefer to speak their native language. Communication with relatives and friends is also done online through calls and video calls. The second most important factor - parents note that language is important for preserving Latvian identity (80%). This is understandable, because the basis of national identity is formed by the Latvian language and cultural space, and they strengthen belonging to the nation and the state of Latvia (Latvija 2030, 2010). One of the respondents writes: *Latvian culture is unique; if my daughter wants to look deeper into it, Latvian will be the bridge that will take her into this beautiful, inexhaustible and enriching world of the Latvian heritage.* As the third most important factor, parents note the possibility that the child may one day return to Latvia, such an option is considered by 61% of respondents. 14% of respondents also indicate other reasons, such as, *would like to speak Latvian with my child; it is important for me to speak to the child in the language I know best; it is possible that the child will one day study at a Latvian university; the more languages you know, the better; language is value.*

It could be assumed that in the diaspora, where the home country's language is used on a daily basis, Latvian skills at conversational level could be sufficient, however, the questionnaire results show that 70% of respondents have high requirements - want a child to speak Latvian fluently, 29% of respondents want their child to understand and be able to communicate in Latvian at the level of

conversational language, only 1% of respondents do not care at what level language skills will be acquired.

Although all respondents have chosen distance learning classes for learning Latvian, there are other ways and opportunities to acquire, maintain and improve Latvian skills. Other options most often marked in the questionnaire are (Fig. 4): 1) read books, watch movies, play games / computer games, listen to music in Latvian (65% of respondents), 2) family tries to spend as much time as possible in the Latvian environment, attend Latvian events in the host country, celebrate Latvian annual customs and public holidays at home (62 % of respondents), 3) the child participates in camps in Latvia and/or goes to Latvia on holidays, meets Latvian-speaking relatives, friends (61% of respondents).
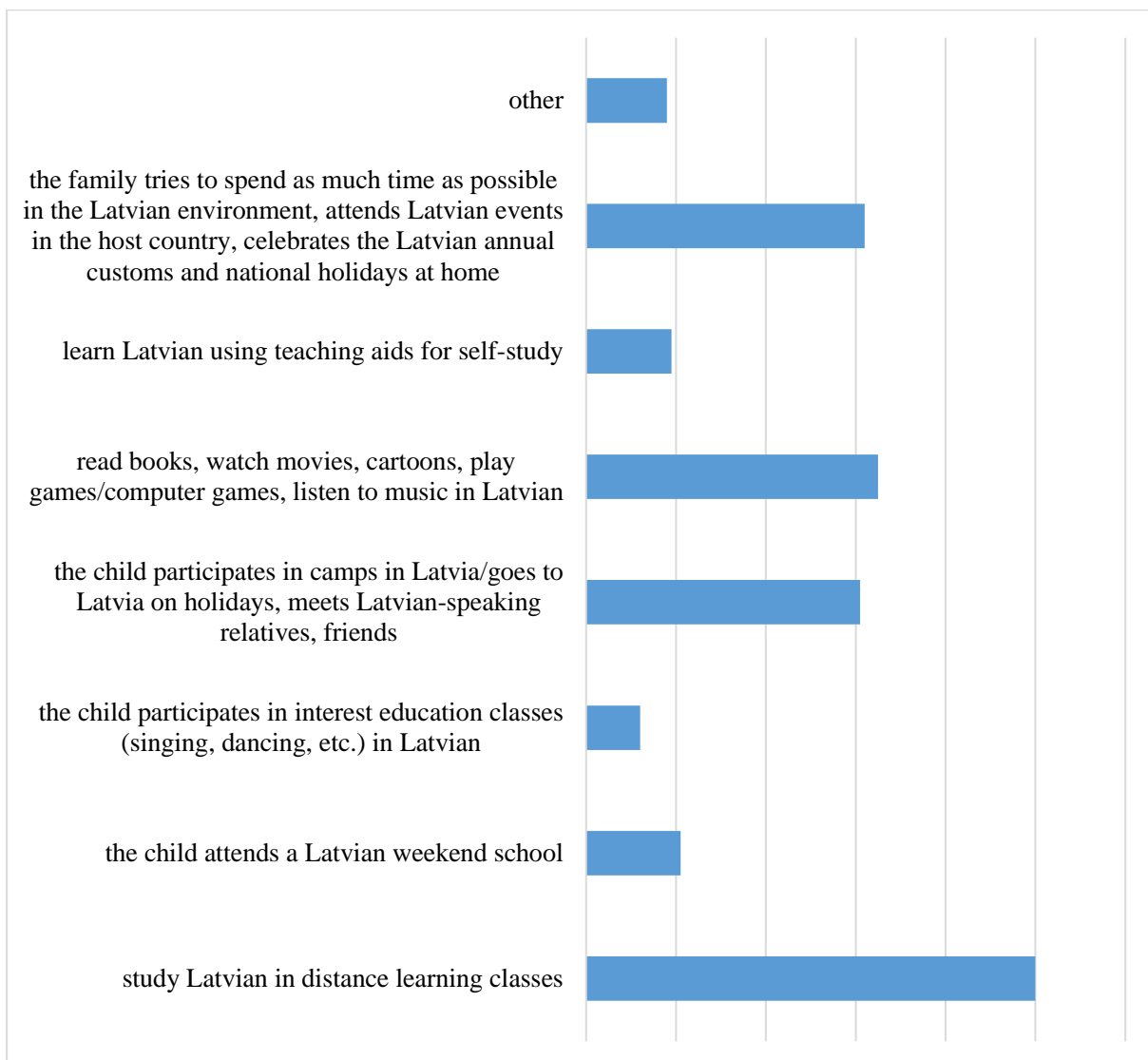

Figure 4 **How Do Diaspora Children Learn and Maintain Latvian?**

Language learning requires a Latvian environment, so diaspora families try to attend classes and events in Latvian diaspora organizations. The study shows that only 21% of respondents' children attend Latvian weekend school. Some parents point out that there is no Latvian community nearby, others that there are no classes for children their age at the weekend school, still others – that getting to the weekend school takes a lot of time, but parents lack it.

18% of parents indicate other ways, especially emphasizing that they speak Latvian or only Latvian with their children in the family, indicate that they watch Latvian TV programs, study not only in the classes offered by LLA, but also in distance learning at a Latvian comprehensive school.

Better results in language skills could be achieved by combining all or some of the above options, but many families do not have this possibility. The study reveals that children of 6 respondents learn Latvian only in distance learning classes, 1 child - only in distance learning classes and a mother tongue lesson in a Swedish school once a week, 1 child that only in distance learning and using self-study tools. These respondents account for 7.5% of all respondents.

In the questionnaire, respondents also note the biggest challenges in teaching and/or maintaining a child's Latvian skills outside Latvia. The easiest way to learn a language is in its natural environment, but the biggest challenge is the lack of a Latvian environment (72%). Diaspora families look for the Latvian environment in Latvian weekend schools, but 29% of parents indicate that they do not have such opportunities. The Latvian environment would be available daily in the family, but 39% of respondents indicate that they lack time for activities with the child. Finally, the challenge is the child's lack of motivation to learn Latvian. This is indicated by 32% of respondents. It should be noted that the parents of these children themselves want the children to learn Latvian because they have enrolled their children on distance learning classes and this survey shows that their expectations about the level of language acquisition are quite high or high. It is difficult for a child to find and maintain this motivation on his/her own, because he/she lives in a different language environment in the home country and mostly uses the language of his/her home country. Other challenges mentioned by respondents include: child's busy schedule and heavy school load, fatigue, peculiarities of adolescence, lack of financial means to travel to Latvia or to purchase books, cultural content (films, theatrical performances, television programs, etc.) cannot be accessed online due to copyright restrictions.

Respondents provided many answers to the question why parents have chosen Latvian distance learning classes offered by LLA. These responses are categorized and quantified:

1) As all respondents have chosen Latvian distance learning classes, it must be concluded that their main wish is for the child to have the opportunity *to learn Latvian*. This was also confirmed by the answers

to other questions. The results of the questionnaire reveal that 55% of respondents emphasize this goal, indicating that it is important to learn Latvian, for example, maintain and improve language skills, improve vocabulary, improve writing skills, improve grammar knowledge.

2) The study shows that 40% of respondents indicate *expectations about the quality of classes under the guidance of a professional Latvian teacher*. Parents emphasize that they want regular, high-quality training under the guidance of a professional Latvian teacher who *speaks correct Latvian*. This desire can be partly explained by the fact that in the diaspora Latvian schools the parents themselves work enthusiastically as teachers, and only some of them have pedagogical education, not all of these teachers have good Latvian skills, as well as most often integrated classes in Latvian and measures for the care of Latvian traditions take place, but less emphasis is placed on the systematic acquisition of the Latvian. Some parents mention that Latvians in the diaspora speak "*with an ancient connotation*", as well as that "*the language of the home country dominates and the family no longer speaks good Latvian",* but they would like to learn modern and correct Latvian. A professional educator would replace or supplement the parents' contribution when the children grow up, when the parents no longer have authority, and in a situation where the parents' language skills are insufficient.

3) 47% of all respondents indicate *the need to study in a Latvian environment together with their peers*. In distance learning classes, groups are made up of children of a similar age who live in different countries but are in a similar situation. This is an opportunity to be in the Latvian environment and see that Latvian is used not only in the child's family. Students have the opportunity to make Latvian-speaking friends. Respondents reveal that there is no diaspora organization nearby or there are no age-appropriate groups in the Latvian school, or the children in the Latvian school speak almost no Latvian.

4) 10% of respondents choose distance learning classes to create interest in the child in Latvian, create *motivation* to speak Latvian.

5) In turn, 8% of the surveyed parents highlight the encouragement of child's *interests in Latvia, Latvian history, culture, Latvian, Latvian traditions* as important. One of the respondents writes: *Perhaps in a unique combination with other knowledge, at the same time knowing Latvian, a child can make a unique contribution to Latvia in his/her life.*

6) 6% of the respondents show that parents consider re-emigration opportunities in the future, including studies in Latvian universities, which is the *practical use of the language in the future.*

7)   Other respondents' answers show that parents have chosen distance learning because they have heard positive feedback, because it is convenient to study online without leaving home and without spending a lot of time, because the classes are free and take place in small groups.

The majority of respondents (55%) express the opinion that their expectations for the chosen form of study - distance learning - are fully met, there are no parents whose expectations were not met at all. Families value the highest (Fig. 5) convenience and accessibility (83%) – they do not have to spend time and expenses on the road, and the professional work of teachers (82%).
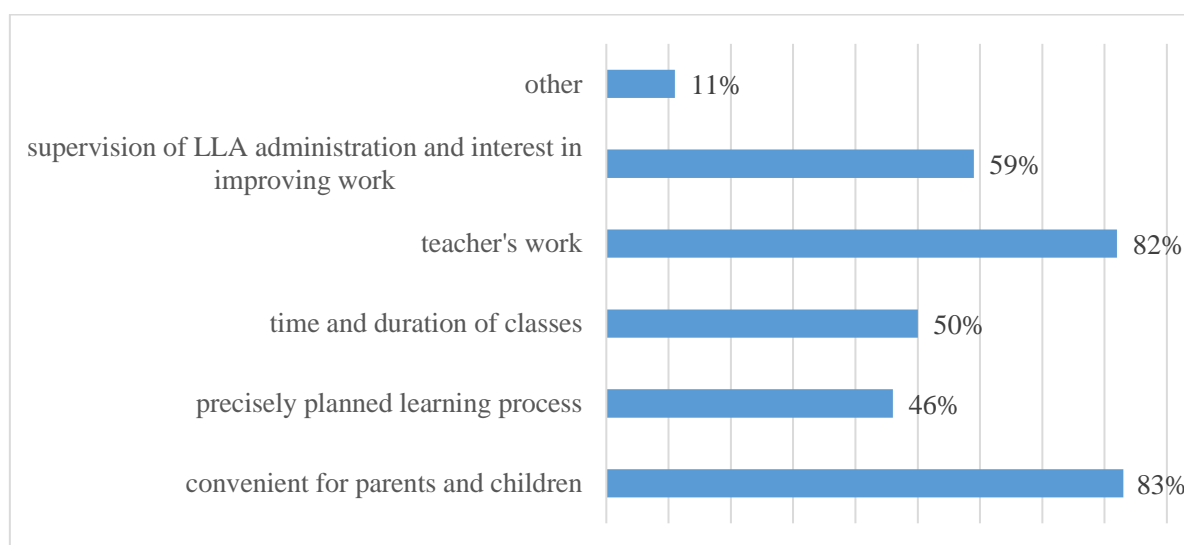
*Figure 5 **What Satisfies Parents in Distance Learning Classes the Most?***

The supervision and interest of the LLA administration in improving the work (59%), the appropriate time and duration of classes (50%), as well as the precisely planned learning process (46%) are also highly valued. Among other satisfactory conditions in the classes, the respondents mention teachers' enthusiasm, positive attitude, parents' meetings, recommendations, advice for parents, the involvement of parents in language learning, small groups, cooperation with the teacher, diversity in classes, classes are free, Latvian traditions and culture are acquired, special days are celebrated. What was said by one of the respondents reveals the fulfilled expectations: *When I started training 4 years ago, I could not even realize how much the benefit would be.*

When evaluating the disturbing conditions in distance learning classes, the respondents highlight (Fig. 6) the lack of motivation of the child (34%) and the child's busyness at school and interest education, thus fatigue (27%). 28% of respondents point to problems with technology and internet speed, but when applying for classes, families were informed about the prerequisites for successful

online classes. Other reasons are also mentioned, for example, that the class is boring, that the texts are too complicated, that they cannot fit into the rhythm of the online lesson, that there is too much free time in the online lesson. These observations point to the opportunities and the need to improve the quality of online lessons by improving teachers' competence. If a student is forced to work with learning content that does not correspond to his/her language skills, cognitive productivity decreases, self-esteem deteriorates, the student is unable to control his/her activities, worry about failure, emotional tension occurs, and it also reduces learning motivation and self-esteem (Anspoka, 2010).
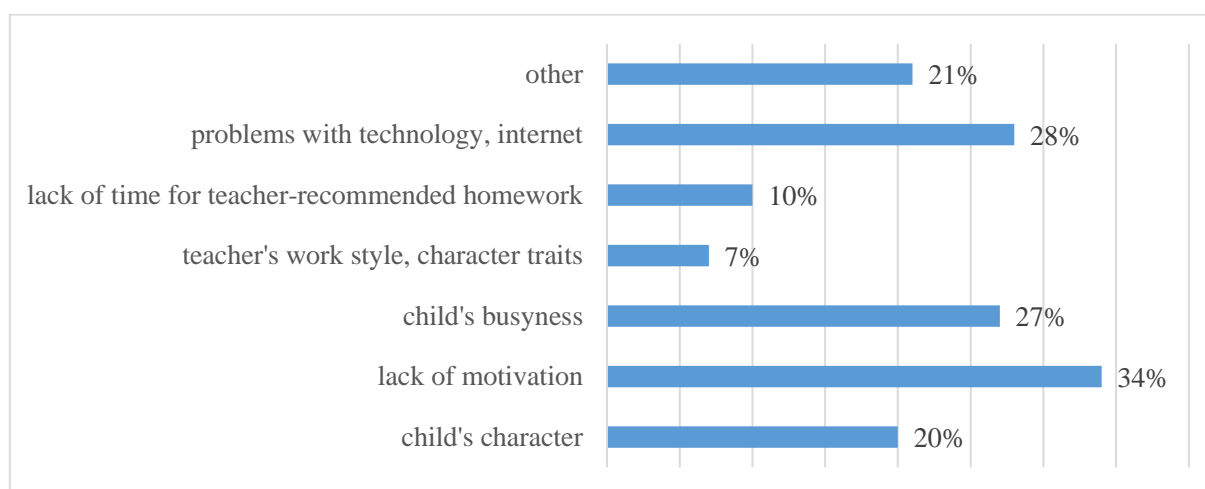
Figure 6 **What Hinders a Child in Distance Learning Classes?**

Respondents also provided recommendations for organizing distance learning classes. Among the recommendations are an enormous amount of thanks for this offer and the work of the teachers. These recommendations are categorized and quantified:

1) Most (9%) respondents have expressed an opinion about homework. The recommendations are varied and contradictory: there are views on the need for them as well as against homework, as both children and parents are busy; there are opinions about what kind and on what topics homework they would like to have and where to place and summarize them.

2) 7% of respondents express an opinion on which language basic skills should be given more attention. One wants to spend more time talking, another wants to read, another wants to focus more on developing writing skills.

3) It is important for parents (7%) to receive more frequent feedback on the child's progress, level of knowledge. Therefore, parents recommend

more frequent online meetings, want to receive observations, suggestions and just talk about the language teaching experience.

4) Respondents (6%) have expressed an opinion that indicates the need to differentiate work and facilitate the content – there are too complex texts, too complicated formulations of task and questions, children have different levels of knowledge and a different pace of work. Parents point out that if it is too difficult, motivation is lost.

5) Parents (4%) want to get acquainted with the planned curriculum, the results to be achieved, follow it and get involved in the learning process outside of class.

6) Parents want (4%) that teaching materials are available after class. This would allow parents to both keep track of what the child is learning and to get involved outside of the class. The digital platform used for distance learning has this possibility, so teachers should be encouraged to use it.

Among the recommendations are many different wishes, including the formation of new groups, so that more children in the diaspora have this opportunity to learn the language. Parents also want the opportunity for their children to meet in person - in camps that have been organized in the past, but currently such opportunities are not available due to Covid-19 restrictions.

Conclusions and Discussion

Research on the Latvian language situation confirms that Latvian skills of diaspora children have been deteriorating in recent years, especially for younger children and children born outside Latvia. At the same time, almost all Latvian parents living abroad want their child to speak Latvian, and 6-7% of diaspora parents choose distance learning classes for their children to learn and improve their Latvian, and Latvian children whose families use distance learning have significantly better Latvian skills than those who do not use distance learning opportunities. Most parents of LLA distance learning students want their children to be fluent in Latvian.

Diaspora families use various ways and opportunities to maintain and improve children's Latvian skills, but for 7.5% of families, distance learning is almost the only option. This determines the need for greater availability of classes and pedagogical efficiency.

Children of the diaspora families are enrolled on distance learning classes in order to improve Latvian skills in planned, regular, high-quality classes in a convenient and modern way under the guidance of professional Latvian teachers together with Latvian-speaking peers. It is important for parents that their children develop a correct and modern Latvian. Diaspora families see distance learning

classes as an opportunity to be in the Latvian environment and expand knowledge about Latvia, Latvian history, culture, Latvian traditions. The distance learning teacher is the one who ensures the connection with Latvia.

Diaspora families' expectations of distance learning have largely been met. Some families have applied for distance learning classes after positive feedback.

The study also reveals obstacles to language learning. The main ones are the child's lack of motivation to learn the Latvian, high workload at school and interest education, as well as too complicated learning content and insufficient differentiation of the study process during classes. Although in general parents are very satisfied with the quality of classes and the impact on the development of children's language skills, the parents' recommendations also point to the possibilities to improve the quality of classes and improve cooperation with parents.

The research raises topical questions for further research – what is the motivation of diaspora students to learn the Latvian from the student's point of view, how can it be improved and what are the specific pedagogical competencies of Latvian distance learning teacher for diaspora children to provide more effective and motivating classes.

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THE ACQUISITION OF RUSSIAN GRAMMAR CASES BY BRAZILIAN STUDENTS

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Abstract. *The analysis of Russian discourse in the proficiency levels B1 and B2 points out to Brazilian students' assimilation problems regarding the grammar cases. Such problems are interpreted based on the structural comparison between the verb-object relations in Portuguese and Russian: - the verb and object may be connected directly or through a preposition; - the meaning is also intermediated by the grammar cases. To establish interlinguistic equivalents, they are compared structures with similar meaning in the native language compared to the learnt one. The research aims to understand through an empirical approach to Brazilian students' difficulties when learning grammar cases regarding their native language interference. The authors recorded interviews with Brazilian students in the referred proficiency levels, which were considered under the typological comparison; a questionary answered by the same students was then implemented to confirm such difficulties. The results indicate the structural divergence and consequent difficulty of Brazilian students to acquire the Dative and the Instrumental cases when a preposition does not intermediate the verb-object relation.*
Keywords. *Russian as a foreign language, grammar comparison, grammar cases, typological comparison, Brazilian Portuguese.*

Introduction

The acquisition of grammar cases is a well-known difficulty for students of Russian as a foreign language (RFL). Not only the noun endings need to be assimilated, but also the corresponding meaning. Although frequently, the meaning aspect is left on the second plain due to complexity, both must be equally reinforced. It is precisely through the meaning that the structures to be learned can be understood and apprehended by the student, who inevitably comes to compare the constructions in the learning language to the ones in his/her native language. In this way, the structural comparison based on meaning equivalents is the key to understanding the students' difficulties in learning Russian grammar cases.

In methodological practice in the study of cases, two ways are proposed: from form to content and from content to form. Proponents of the communicative-activity approach suggest studying cases from meaning to form (inductive path), for example, first show the text (phrase), tell what it is: I do not have a dictionary (negation of something). Then talk as it is expressed: from meaning – to form – and again with meaning (Akishina & Kagan, 2008). Supporters of the conscious-practical and nationally oriented methods are offered when the case study goes from form to meaning (deductive way). For example, V. N. Wagner advises when studying the first case forms – Prepositional, Accusative cases – go from meaning to form. When introducing the mentioned cases go from form to meaning (Vagner, 1995). We believe it is advisable to use the inductive path (from examples to rule) when explaining grammatical material to speakers of typologically close languages.

From our point of view, the effectiveness of mastering the Russian case system requires a conscious understanding meaning expressed by certain case forms, the formation in the minds of students of a connection between the form specific case and its meaning, understanding the syntactic function of Russian nouns in a sentence. And the shortest and most reliable way to disclose the case systems are a comparison with the native language of students.

Literature Review

The apprehension of Russian grammar cases was approached by the authors of this article in another paper "Linguistic errors of Brazilian students when learning Russian as a foreign language (basic level)". In this work the typological comparison points out to the potential problem of acquisition of grammar cases, when they differ the equivalent in Portuguese from the structure in Russian, e.g. a verb object is indirect in Russian and direct in Portuguese (Budnik, Medina & Medina, 2020).

According to L.S. Kriuchkova in the students' conscience are already formed the concepts of time and space, actions, subject and object of the action, quantity, reason, finality, consequence, reality and irreality. However, such concepts are expressed differently in their native language. That is why the student must study the morphological specifics of the studied language and reflect on the semantics of each linguistic form and its functional characteristics (Kriuchkova, 2017). Such cognitive acquisition, naturally, occurs in a different way to students of each nationality, due to their particular linguistics concepts.

The analysis of Russian textbooks directed to Brazilian students reveals the inefficiency of grammatical explanations, including the ones regarding grammar cases, as already exposed in our previous work. The textbooks "Self-Tutorial of Russian" (Dolenga, 1955), Oliveira's "Russian language course" (Oliveira, n. d.),

N. Potapova's "Short Russian Language Course" (Potapova, 1961) and T. Castro's "Speak Russian" (Castro, 2005) present basic methodological issues, as exposed in our last cited work (Budnik, Medina & Medina, 2020, p. 506).

Methodology

In order to compare semantic and functional characteristics to the language acquisition of Russian by Brazilian students, we compared the verb-object meanings from the studied with the ones from the native language. The meanings classification elaborated by I. P. Kuzmin and N M. Lariokhina in the compilation of exercises "Padezhi! Ah, padezhi!", not directed to a specific nationality, was applied to the meaning equivalents in Portuguese.

The meaning comparison between the verb-object relations in Portuguese and Russian points out to Russian's particularity of the indirect compliment without a preposition, which concerns the grammar cases genitive, Dative, and instrumental. Such meanings were chosen in order to prove the grammar interference from Portuguese in the acquisition of Russian.

The grammatical interference was checked in two stages. The first was an interview in which the students were stimulated to talk spontaneously and eventually used the targeted structures. The second one was a questionnaire with multiple choices of verb complement regarding the analysed structures.

Experiment and Research Results

The recorded spontaneous speech of Brazilian students was stimulated by questions about themselves:

Расскажите о себе. Кто Вы по профессии? Откуда Вы занимаетесь? 'Tell about yourself. What is your profession? Where are you from? What do you do?'

Что Вы делаете в свободное время? 'What do you do in the free time?'

Почему Вы решили учить русский язык? 'Why did you decide to study the Russian language?'

Каких русских авторов Вы предпочитаете? Какое у вас любимое произведение русской литературы? 'Which Russian authors do you prefer? What is your favourite piece of Russian literature?'

Вы уже были в России? Если да, то как прошла ваша поездка? Если нет, Вы собираетесь туда? Какие у Вас ожидания от этого путешествия? 'Have you been in Russia? If you did, how was your trip? If you did not, are you planning to go there? What do you expect from this trip?'

From the diverse types of divergence from the discourse in Russian of a native we chose to analyse, for now, the verb-object relations when not

intermediated by a preposition. To confirm the identified divergences, we elaborated a questionnaire in Google Form containing 24 sentences with the missing compliment to be chosen from 4 options, of which only one was correct. An option containing the alternative "Я не знаю." – "I don´t know." was included to stimulate the students not to choose an option when they had no idea of the answer.

We added two questions of each meaning analysed. From the Dative, ten questions were given to the students concerning five different meanings:

1) speech act and addressee

Студент дал яблоко преподавателю. 'The student gave an apple to the teacher.'

Мама сказала сыну спокойной ночи. 'The mother told to the son good night.'

2) cooperation

Саша всегда помогает друзьям. 'Sacha always helps the friends.'

Я попросил, но Ваня не помог мне. 'I asked, but Vanya didn't help me.'

3) betrayal

Муж изменил жене. Поэтому, они развелись. 'The husband has cheated on the wife. For this reason, they separated.'

Старик не изменил идеалам своей юности, но остался верным самому себе. 'The old man has not betrayed the ideals from his youth, but has remained true to himself.'

4) emotional relation

Дети обычно радуются Рождеству. 'The kids usually rejoice at Christmas.'

Мама удивилась мальчику, когда она узнала насколько он способен. 'The mother was surprised with the kid when she found out how much he could do.'

5) jealousy

Мы с коллегами завидуем начальнику, потому что у него шикарная машина. 'My colleagues and I envy the boss because he has a fancy car.'

Никто не завидовал Рите, когда она работала в новогодние праздники. 'Nobody has envied Rita, when she worked in the New Year holiday.'

Since the last meaning may be similar to the fourth one in Russian, but not in Portuguese, we added two questions separately.

From the Genitive were given to the students 6 questions regarding 3 meanings:

1) concern

Школьник боится экзамена по математике. 'The schoolboy is afraid of the math test.'

Девочка очень смелая, она не боится темноты. 'The girl is very brave, she is not afraid of darkness.'

2) embarrassment

Мальчик стеснялся того, что мама поцеловала его на глазах у друзей. 'The boy was embarrassed that his mother kissed him in front of his friends.'

Друзья всегда стесняются поведения Саши, когда она хвастается. 'The friends are always embarrassed of Sasha's behaviour, when she shows off.'

3) request

Преподаватель просит учеников не шуметь во время занятий. 'The teacher asked the students not to make noise during the lessons.'

Саша попросила незнакомого о помощи. 'Sasha asked a stranger for help.'

The Instrumental was represented in the questionnaire with 8 questions for 4 different meanings:

1) possession, distraction

Мальчик уже владеет русским языком, благодаря его русской маме. 'The boy already masters the Russian language, thanks to his Russian mother.'

Команда отличается тем, что ещё не проигрывала в этом году. 'The team differs in that has not lost this year.'

2) emotional relation

Турист хотел наслаждаться путешествием, но всё пошло не так. 'The tourist wanted to enjoy the travel, but everything went sideways.'

Пара всегда гуляет по парку, они могут весь день любоваться природой. 'The couple always walk the park, they could admire the nature all day.'

3) utilization

Хороший игрок знает, как пользоваться своими сильными сторонами. 'A good player knows how to use his strengths.'

Во время экзамена запрещено пользоваться телефоном. 'During the exam it is forbidden to use the telephone.'

4) management, administration

Директор руководит сектором. 'The director manages the sector.'

Иван Сергеевич управляет корпорацией. 'Ivan Serguéevitch administers the corporation.'

The errors may be of two different natures: from an ending misplacement, either from a meaning ignorance. The first option can be excluded in our research because of the accuracy when choosing objects in other meanings of the three analysed cases.

We analysed the meanings in which were found most recurrent object errors in sentences answers. The chosen alternatives indicate conclusive results only in three of the twelve analysed meanings, which makes possible to conclude that the Brazilian student can learn the primary meanings of Genitive, Dative and Instrumental, but finds difficulties to extend such meanings endings to specific groups of verbs of the correspondent cases.

We found few errors in the meanings of speech act and addressee and the Dative's cooperation, which allows concluding that these meanings are well assimilated. We found a medium number of errors in the meanings of jealousy in the Dative, concern and request of possession/distinction in the Genitive, and emotional relation and utilisation in the Instrumental. In these situations, the errors are not enough to be considered as interference from the Portuguese.

On the other hand, the high incidence of errors shows that there is confusion regarding some meanings:

7. Муж изменил _____, поэтому они развелись.
29 responses

- жене
- жена
- жены
- жену
- Я не знаю.
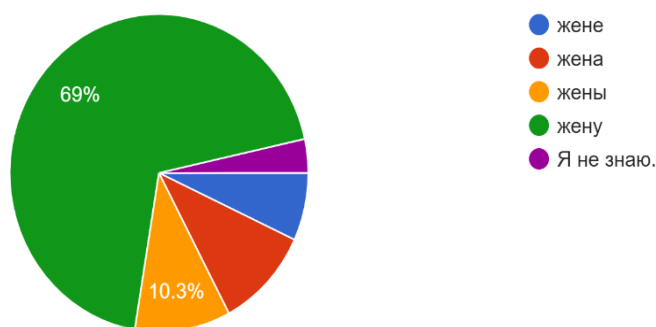
*Figure 1 **"The husband has cheated <u>on the wife</u>. For this reason they separated."***

27. Старик не изменил _____ своей юности, а остался верным самому себе.
29 responses

- идеалы
- идеалам
- иделов
- идеалами
- Я не знаю.
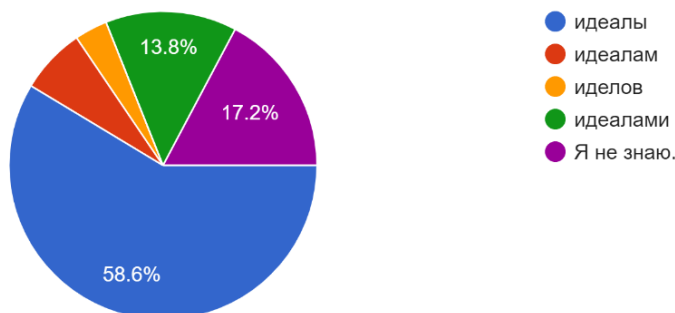
*Figure 2 **"The old man has not betrayed <u>the ideals</u> from his youth, but has remained true to himself."***

26. Директор руководит _____.

29 responses

сектор
сектором
сектора
сектору
Я не знаю.

13.8%
20.7%
6.9%
48.3%
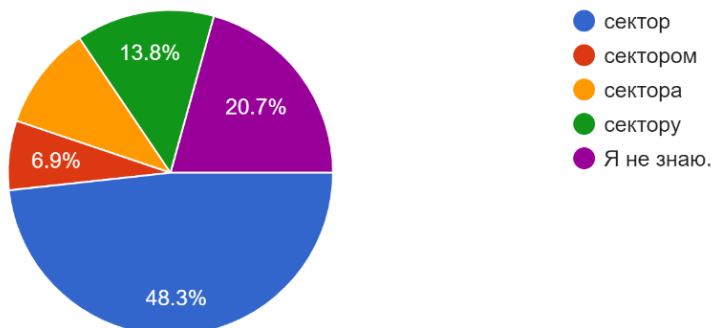
*Figure 3 "**The director manages <u>the sector</u>."***

31. Иван Сергеевич управляет _____.

29 responses

корпорацию
корпорация
корпорацией
корпорации
Я не знаю.

10.3%
20.7%
55.2%
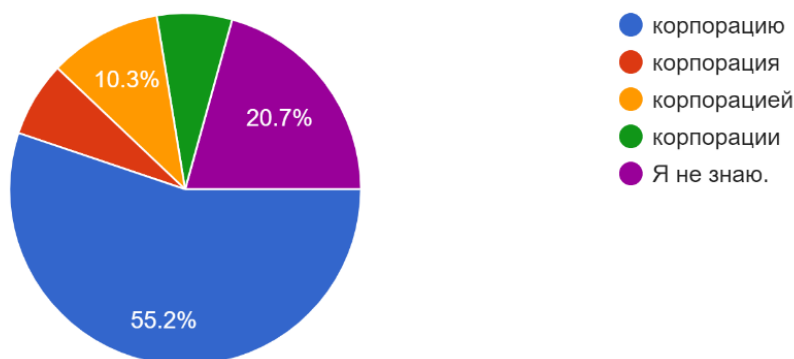
*Figure 4 "**Ivan Serguéevitch administers the corporation."***

The equivocated objects *жену* 'wife' and *идеалы* 'ideals' to the verb *изменить* 'to betray' mark an option of the Accusative instead of the Dative, what also happens in the objects *сектор* 'sector' and *корпорацию* 'corporation' to the verbs *руководить* 'to rule' and *управлять* 'to manage' in the Accusative instead of the Instrumental. The correspondent verbs in Portuguese *trair*, *comandar* e *gerir* establish direct relations with the object, what explains the option for Accusative forms in Russian.

On the other hand, the next graphics show another kind of case misplacement:

9. Дети обычно радуются _____.
29 responses

Legend:
- Рождеству
- с Рождеством
- Рождество
- Рождества
- Я не знаю.

31%
55.2%
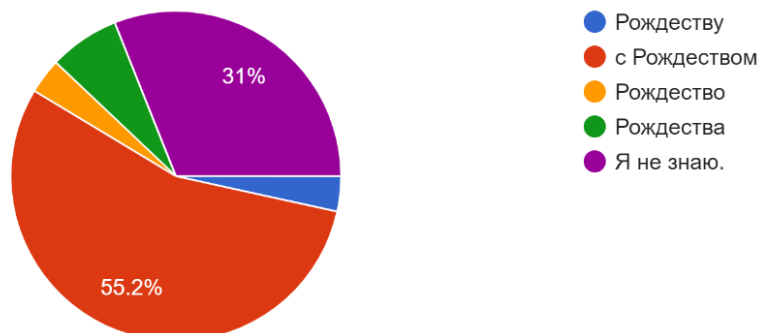
*Figure 5 "**The kids usually rejoice <u>at Christmas</u>.**"*

10. Мама удивилась _____, когда она узнала насколько он способен.
29 responses

Legend:
- мальчиком
- мальчику
- мальчика
- с мальчиком
- Я не знаю.

27.6%
20.7%
6.9%
24.1%
20.7%
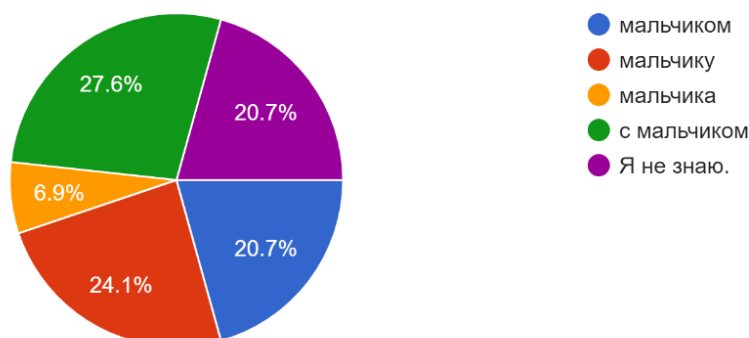
*Figure 6 "**The mother was surprised <u>with the kid</u>, when she found out how much he could do.**"*

The option of the students *с Рождеством* 'with Christmas' and *с мальчиком* 'with the boy' as objects to the verbs *радоваться* 'to get happy' and *удивляться* 'to get surprised' indicates the apprehension of the meaning of emotional relation as Instrumental instead of Dative. The correspondent verbs in Portuguese *alegrar-se* and *surpreender-se* have object intermediated by the preposition *com* 'with', correspondent to the Russian *с*.

Such a pattern of errors proves the influence of the native language in the acquisition of the learned one.

Conclusions

The questionnaire results point out to a pattern of errors when using the Dative and the Instrumental among Brazilian students. When you learn Russian cases, you need to pay attention on the form (endings and prepositions) and on the meaning of each case. However, it is not sufficient to attribute such errors exclusively to this nationality, because it would be necessary to apply the same questions to students of other nationalities. Therefore, it consists in a step to explore the native language interference in the acquisition of Russian cases.

Based on the difficulties showed by the students to assimilate the Dative and the Instrumental, at first, we propose to teach the structures that contain preposition and at a second stage present the ones without preposition. This way the student can understand better the case meaning, as well as the corresponding endings, and then assimilate the more difficult structures, the ones in which there is no preposition to indicate the object case.

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THE POTENTIAL OF DIALECT PHONETIC MISTAKES IN TEACHING RUSSIAN AS A FOREIGN LANGUAGE

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Abstract. *This article examines the problem of presenting phonetic material in texts when teaching Russian as a foreign language (RFL) to Brazilian students. Based on the methodological principles of teaching Russian phonetics, the authors discuss the importance of taking into account students' phonetic needs in selecting text in the educational process. The structure of educational materials and educational texts are analysed as an example of this approach. The authors offer to consider the national specifics of students to increase the efficiency of work on phonetics. To analyse the phonetic material present in texts and expose the specific difficulties Brazilian students experience when learning the Russian language, the authors experimented using a text from the textbook "Poekhali! 1 level". From different regions, fifty-four students were interviewed, and we presented different phonetic problems according to their dialectal characteristics. The most exciting and complex phonetic error is related to the pronunciation of the sounds [r]-[rʲ] and [X]-[Xʲ]; based on this type of error it is possible to determinate the provenience of the interviewed students.*
Keywords: *Russian as a foreign language, Russian phonetics, comparative linguistics, typological comparison, dialects of Brazilian Portuguese, linguo-ethno-oriented approach.*

Introduction

A linguo-ethno-oriented approach to teaching Russian as a foreign language is based on the indispensable consideration of the peculiarities of the studied language through the prism of the native language (or the intermediary language) and conscious reliance on him in the course of a specially organized and controlled educational process for different ethnic groups.

The communicative orientation of modern teaching RFL, determining the interconnected and parallel formation of the language, speech and communicative competences of students, determines the corresponding presentation the development of language material in textbooks addressed to native speakers of specific languages.

The text is introduced into the educational process not separately, but in close connection with the presentation of phonetic material (Cunha & Cintra, 2008). Since the text gives students examples of the living use of those language units to be mastered, its use in the educational process provides students with an understanding of phonetic units not as separate sounds, but as an inseparable side of the language. Providing a phonetic minimum for each stage of development, the teacher must select texts as efficiently as possible in accordance with the needs of his audience.

In the conditions of teaching RFL to a certain nationality, it is necessary to consider their characteristics, including phonetic aspects. The phonetic minimum is not determined by native language of a student, but the difficulties in achieving it at each stage of education depend on national specifics.

The characteristics of students' native language should determine the differences like educational comments, the measure of attention to a particular linguistic fact, the choice of methods for staging Russian sounds and methods of semantization lexical units, the sequence of studying linguistic phenomena and the nature of their presentation. Furthermore, with the help of special methodological techniques, a teacher can limit the phenomenon of interference. However, the stimulation and inhibition of the transference should be carried out mainly through specially selected exercises and partially instructions, but not by a comparative analysis of the two languages

Literature Review

The accessibility of the text is closely related to the national specifics of the student, because it is on the structures and concepts offered by his native language that his perception of the linguistic specifics in a foreign language depends. Therefore, it becomes necessary to consider methodological principles when selecting a suitable text; the principle of gradualness is especially important. Since the student's difficulties are determined in accordance to the peculiarities of his/her native language, especially in teaching phonetics, the mastering of phonetic material through texts will be realized precisely according to the similarities and differences of the native language in comparison with the foreign language. To teach RFL to Brazilian students, therefore, they have to consider their national phonetic difficulties when studying a foreign language, which has initially been described by Budnik (2007) and posteriorly explored by Medina (2020):

    a)   violation of the softness feature can lead to a phonetic error based on substitution and, consequently, to the phonological replacement of soft consonants with hard ones due to the underdifferentiation of these phonemes;

b) vowel rate in an attempt to reproduce soft consonants due to the fact that softness in Russian AB leads to the development of places of formation that differ from Brazilian AB (middle palate [к'] - [г'] and [х']) and ways of formation (soft [t '] - [d']).

These indications of phonetic discrepancies must be count on the selection of Russian text for the Brazilian audience.

To identify the regional specifics of the speech of the speaker in Russian N. S. Smirnova and M. V. Khitrov developed a phonetically representative text, which content reflects the general linguistic distribution of phonetic units (phonemes, allophones and syllables); their frequency was statistically determined by the authors (Smirnova & Khitrov, 2013). The texts developed by N. S. Smirnova and M. V. Khitrov, on the one hand, are an excellent test material for students of the advanced stage, but on the other hand, they cannot be used in our work, since they do not imply the stages of mastering RFL, but reflect the entire phonetic complexity of the Russian language.

At the initial stage of learning, the limited number of words, according to Shchukin (2017), is 750 words at A1 and 1500 words at A2, which does not allow flexible supply of new words. However, the process of expanding vocabulary at the initial stage should be carried out respecting the possibilities of its mastery by students, which presents many options in terms of phonetics. Therefore, it is highly recommended not to overload the texts with words and phrases, the phonetic properties of which coincide with the above-mentioned difficulties, but the text should fulfill the function of making the student's development considering its complexity. It is in the articulation of these two principles that the balance of the text is determined: not too complex while not too light.

Methodology

Since the methodology of teaching RFL is not sufficiently developed in Brazil, a teaching material of textbook does not reflect the peculiarities of native language. The analyzed text is *Пешком ходить – долго жить* "Walking on foot – to live a long time" was introduced into the textbook *Poekhali! 1 level* in lesson 20, page 165, when work on phonetics is no longer in the very structure of the material (Chernyshov, 2009).

Fifty-four Brazilian students from different regions had their reading of the following text recorded. The resulting material was then compared to the expected patterns of pronunciation errors.

Пешком ходить – долго жить
Было время, когда люди только ходили пешком, потом - долго ездили на лошадях. Лошади очень красивые и не едят дорогой бензин. Лошадь - очень

экологичный транспорт. На лощади вы можете ехать, куда хотите, даже в лес. И в наше время люди на далёком севере ездят на собаках, и в северных странах, например, в Канаде, это новый популярный спорт. Собаки - хорошие друзья и дешёвый транспорт, только не очень быстрый. Во многих странах модно ездить на велосипеде. Это хорошо в городах, где есть специальные велосипедные дороги. В Америке индейцы, в принципе, знали колесо, играли в «футбол», но никогда не ездили. В последнее время люди, особенно в богатых странах, больше и больше ездят на машинах: на работу, на отдых, в гости и даже в соседний магазин. Во многих странах хорошая машина - это престиж. Сколько же ходит пешком современный человек? Вот что говорят об этом английские специалисты: средний европеец за свою жизни ходит пешком 80 500 километров. Кажется, немало. Но, если он живёт 70 лет, то ходит 3 километра в день. А в России говорят: «Пешком ходить - долго жить!»

Walking on foot - living long
There was a time when people only walked, then they rode horses for a long time. The horses are very pretty and do not eat expensive gasoline. The horse is a very environmentally friendly transport. On a horse, you can go wherever you want, even into the forest. And nowadays people in the far north ride dogs, and in northern countries, for example, in Canada, this is a new popular sport. Dogs are good friends and cheap transport, but not very fast. Cycling is fashionable in many countries. This is good in cities where there are special bike paths. In America, the Indians, in principle, knew the wheel, played football, but never drove. Recently, people, especially in rich countries, drive more and more: to work, to rest, to visit, and even to a nearby store. In many countries, a good car is prestige. How long does a modern man walk? Here's what British experts say about it: the average European walks 80,500 kilometers in his lifetime. It seems a lot. But if he lives for 70 years, then he walks 3 kilometers a day. And in Russia they say: "To walk on foot to live a long time!"

In this text, there are examples of sounds which pronunciation allows to check the difficulty of reproducing such soft sounds as consonants without a vowel after them. The first group of errors is divided into two subgroups: when there is a soft vowel after a soft consonant: *люди*, *ездили*; the second one is composed by soft consonants with soft sign: *только*, *очень*, *лошадь*, *ходить*, *жизнь*. In the first subgroup there is a potential error in the pronunciation as hard sound: *лю*[dʒ]*и*, *ез*[dʒ]*или*, while in the second one it is expected the pronunciation of hard sound instead of soft: *то*[l]*ко*, *оче*[n] или даже с гласной ставкой: *лоша*[dʒi], *ходи*[tʃi], *жиз*[ni]. The last three errors are included in the second group, marked by the vowel addition: *когда – ко*[gi]*да*, *едят – едя*[tʃi], *транспорт – транспор*[tʃi], *в гости –* [vi] *гости*, *средний –* [si]*редний*.

It is noted that the error of the vowel addition can lead to a grammatical one in cases of pronouncing nouns with a soft sign or a consonant at the end, as can be noted in the nouns *транспорт* and *лошадь*, which pronunciation with [i] in the end changes the number of the noun to the plural.

It is also important to note that when pronouncing words with a soft sign at the end, the student must overcome difficulties related to both groups of errors. These soft sounds are therefore particularly difficult for Brazilian students.

Another important dialectal mark of the students' discourse is the pronunciation of [x]-[xʲ] and [r]-[rʲ] after vowel. In Portuguese language there is an alternance of [x] and [r] corresponding to the same letter pronunciation, that is the word mar 'sea' may be spoken as ma[x], ma[r] or even [ɹ] depending on the students' provenience, as described by Silva (2003, p. 51). Such pattern leads to the potential misinterpretation of the sounds [x] and [r] after vowel in Russian, which may result in the following errors: *лошадях* 'horses' – *лошадя*[r] or *лошадя*[ɹ] and *собаках* 'dogs' – *собака*[r] or *собака*[ɹ], as well as *популярный* 'popular' – *популя*[x]*ный* or *популя*[ɹ]*ный* and *транспорт* 'transport' – *транспо*[x]*т* or *транспо*[ɹ]*т*.

Research Results

The experiment was conducted with qualitative analysis of data. We compared the phonological systems of Brazilian and Russian languages. The students read the texts in Russian, we described their mistakes considering the phonetical interference. The students from nine Brazilian states. The majority of them presented problems with the soft pronunciation, as expected. The vowel addition was observed in the students in the initial level, but less frequently in the ones in the intermediate.

The variety of levels of the analyzed students allows to identify which errors persist after some progress in learning. As said before, the majority of the students presented the same error when pronouncing soft sounds: *ходить* – *хо*[ˈdʒi.tʃɪ], *ездили* – *ез*[dʒi]*ли*, *хотите* – *хо*[ˈtʃi.tʃe], *жить* – *жи*[tʃɪ], *лошади* – *лоша*[dʒɪ], *можете* – *може*[tʃɪ]. The vowel addition is also observed independent of the student's provenience: *специалисты* – [is]*пециалисты*, *страна* – [is]*страна*, *спорт* – [is]*порт*, *только* – *то*[l]*ко*, *транспорт* – *транспор*[tʃɪ].

We identified very interesting possibilities regarding the pronounciation of the sound [r] after vowel. As predicted, the alternance occured according to the pronunciation in the student's dialect: the mispellings *спорт* – *спо*[x]*т*, *транспорт* – *транспо*[x]*т*, *например* – *наприме*[x] were commited by the ones from the states Ceará and Rio de Janeiro, while *северных* – *севе*[ɹ]*ных*, *спорт* - *спо*[ɹ]*т*, *транспорт* – *транспо*[ɹ]*т*, *например* – *наприме*[ɹ] were pronounced by the ones from the country sides of different south and southeast states. It is also relevant to consider the supression of this sound in the end of the word: *собаках* – *собака*[-], *странах* – *страна*[-] happened with one student from the state Ceará, which does not permit yet to consider it a pattern, but it opens possibilities for

further investigation. Such supression may happen in different places in Brazil (Cardoso, 2009).

Conclusions

Thus, a linguo-ethno-oriented approach to the production of Russian sounds necessarily requires an RFL teacher to know which moments of articulation are new for students of a certain nationality (in our case - Brazilian), and which are only similar to the sounds of his native language; violation of which moments of articulation lead to mixing of sounds (phonological error), and which ones lead to a slight accent (phonetic error).

To optimize the teaching of Russian pronunciation, the volume and sequence presentation of phonetic material should be determined by comparing the phonological systems of the native and studied languages and considering phonological features of the native language of students.

When setting sounds, a student should rely not only on imitation but also on controlled and tangible articulation in Russian. Since the pronunciation skills formed by imitation are unstable, it leads to a mixing of similar sounds in contacting languages.

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MEDIJPRATĪBAS IZGLĪTĪBA PAMATIZGLĪTĪBAS UN VIDĒJĀS IZGLĪTĪBAS SATURĀ LATVIEŠU VALODAS MĀCĪBU PRIEKŠMETĀ

Topics of Media Literacy in the Content of Primary and Secondary Education in the Subject of the Latvian Language

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Abstract. *People are facing the growth and access of information, as well as the various forms of communication. While some part of society experience a lack of information, others are flooded with printed, broadcast and digital content. UNESCO argues that media and information literacy can provide answers to questions related to our culture of information and critical thinking. Media literacy must be discussed through education, because teachers are the key person to literacy of the society. An important way to update media literacy among teachers and students is to introduce it in the curriculum. The topic of media literacy is currently included in the curriculum based on the new competency approach in Latvia. When evaluating the curriculum of the subject of the Latvian language, the aim of the paper is to determine which topics and aspects of media literacy are included in the curriculum of the Latvian language and what pupils' skills and knowledge they promote.*
Keywords: *media literacy, school curricula, Latvian language, education content.*

Ievads
Introduction

Šī pētījuma objekta – medijpratības – nozīmi visprecīzāk izteic Apvienoto Nāciju Izglītības, zinātnes un kultūras organizācijas (UNESCO) mājaslapā publicētais ievads par medijpratību: informācijas kvalitāte, ar kuru mēs darbojamies, būtiski ietekmē mūsu uztveri, uzskatus un attieksmi. Tā var būt informācija no citām personām, plašsaziņas līdzekļiem, bibliotēkām, arhīviem, muzejiem, izdevējiem vai citiem informācijas sniedzējiem, ieskaitot tos, kas atrodas internetā (UNESCO, a). Tas nozīmē, ka nav runa tikai par medijiem vai informāciju globālajā tīmeklī, bet par informācijas uztveršanas, lietošanas un izplatīšanas paradumiem kopumā. Tādēļ arī UNESCO, minot tēmu

medijpratība, vienmēr to saista un apskata līdztekus ar jēdzienu *informācijas
pratība*.

Ikvienam ir nepieciešamas zināšanas par masu medijiem un informācijas
sistēmām, lai izteiktos un kritiski izvērtētu masu mediju un dažāda veida
informācijas saturu. Mediju un informācijas pratība, iespējams, ir vissvarīgākais
un nozīmīgākais līdzeklis šāda veida zināšanu un spēju attīstīšanai (Wadbring &
Pekkala, 2017).

Par medijpratību ir jārunā ar izglītības starpniecību, jo skolotāji ir *vārti* uz
sabiedrības pratību (UNESCO, b). Nozīmīgs veids, kā aktualizēt medijpratību
skolotāju un skolēnu vidū, ir ieviest to izglītības saturā. Medijpratības tematika
Latvijā šobrīd ir iekļauta jaunajā kompetenču pieejā balstītajā mācību saturā.
Tādējādi raksta mērķis ir, izvērtējot mācību programmas latviešu valodas
mācību priekšmetā, noteikt, kuri medijpratības temati ir iekļauti izglītības saturā
latviešu valodā un kādas skolēnam nepieciešamās prasmes un zināšanas tie
veicina.

Lai to paveiktu, pētījuma praktiskajā daļā ir veikta latviešu valodas mācību
priekšmeta no 4. līdz 12. klasei mācību programmu kvalitatīvā satura analīze.

Teorētiskie aspekti
Theoretical Aspects

Nereti teorētiskajā literatūrā jēdziens *medijpratība* tiek lietots kopā ar
jēdzienu *informācijpratība*. Jēdziena *medijpratība* skaidrojumi ir daudzpusīgi,
tādēļ medijpratības eksperti apgalvo, ka nav nepieciešams izvirzīt vienu
definīciju. Drīzāk būtu jāapspriež vairākas mediju lietotprasmes, kas, iespējams,
palīdzētu kontekstualizēt dažādas mediju lietotprasmes definīcijas (Wadbring &
Pekkala, 2017).

Viens no skaidrojumiem, ko pauž mediju un izglītības eksperts profesors
Deivids Bekingems (*David Buckingham*) no Lielbritānijas, ir saistīts ar prasmēm
un kompetencēm: mediju pratība ir spēja piekļūt, saprast un veidot
komunikāciju dažādos kontekstos (Buckingham, 2007). Šī definīcija tiek
izmantota gan Lielbritānijā, gan ASV, kur medijpratības jautājums jau tiek
aktualizēts kopš 2000. gadu sākuma.

Latvijas mediju politikas dokumentos galvenokārt tiek akcentēta prasme
darboties ar informācijas avotiem: mediju pratība – arī mediju lietotprasme,
mediju lietotpratība. Tā ir zināšanu un prasmju kopums, kas nepieciešams
darbam ar informācijas avotiem – informācijas atrašanai un analīzei,
informācijas sniedzēju funkciju izpratnei, informācijas satura kritiskam
izvērtējumam, objektīvas informācijas atšķiršanai no tendenciozas, dažādos
avotos pieejamo ziņu salīdzinājumam, lai veidotu savu pamatotu viedokli.

Mediju pratība ietver arī prasmi praktiski lietot medijus (Ministru Kabinets, 2016).

Kā redzams, informācijas pratības jēdziens ir integrēts definīcijā, nenosaucot konkrēti masu medijus, taču tie tiek uzlūkoti kā informācijas avoti. Šajā pētījumā par pamatu tiek izmantots UNESCO apstiprinātais medijpratības un informācijpratības skaidrojums. Mediju un informācijas pratības ietvarā ir iekļautas: digitālā pratība, ziņu pratība, datoru pratība, interneta pratība, spēļu pratība, kino pratība, televīzijas pratība, reklāmas pratība, informācijas pratība, mediju pratība, vārda un informācijas pratība, bibliotēku pratība (Grizzle & Wilson, 2011).

Lai gan lielākajā daļā sabiedrības tiek lietots jēdziens *medijpratība*, D. Bakingems skaidro, ka medijpratība ir mediju izglītības rezultāts. Ar mediju izglītību šajā gadījumā tiek saprasts mācīšanas un mācīšanās par medijiem process (Buckingham, 2003). Eksperts mediju izglītībā saskata arī jēdziena *pratība* iedevumu (Buckingham, 2003): pratība nepārprotami ir kas vairāk nekā tikai funkcionāla pratība, proti, prasme izmantot tehniski kādu lietu, piemēram, kameru.

Kā atzīst mediju politikas veidotāji, mediju pratības neesamība ilgtermiņā sabiedrībā var radīt dažādas problēmas: nespēju adekvāti novērtēt dažādus medijus un to saturu, neprasmi kritiski uztvert mediju darbību un saturu, kā arī izpratnes trūkumu par audiovizuālā kultūras mantojuma un mediju lietošanas daudzveidību. Latvijas mediju politikas veidotāji uzsver 21. gadsimta mediju vides multimedialitāti, kas no mediju lietotāja pieprasa jaunas prasmes un kompetences. Sabiedrībai, kurā ir augsta mediju pratība, ir daudz kritiskāka attieksme pret mediju saturu un tā ietekmi. Vienlaikus šāda sabiedrība spēj arī radošāk un daudzpusīgāk izmantot informācijas un komunikācijas tehnoloģijas. Mediju pratība nozīmē spēju orientēties daudzveidīgajā mediju vidē, kas ir svarīgs priekšnosacījums komunikatīvi integrētas sabiedrības pastāvēšanai un sociālā kapitāla vairošanai. Tādēļ mediju pratības veicināšana ir būtiska Latvijas mediju politikas prioritāte, kas tiek skaidrota kā auditorijas prasme lietot medijus, meklēt un analizēt informāciju, kritiski izvērtēt mediju vēstījumus, kas savukārt veicina sabiedrības komunikatīvo integrāciju. Šādas prasmes sekmē indivīda radošo darbību, kā arī mazina mediju komunikācijas vienvirziena ietekmi, ļaujot atpazīt un novērst tendenciozas informācijas izplatīšanu. Zinoša auditorija spēj atšķirt medijus, kas atbalsta un pārstāv kvalitatīvas un uzticamas žurnālistikas principus (Ministru Kabinets, 2016).

Būtiska loma šajā procesā ir abām nozarēm – gan izglītības, gan mediju jomai, kuras mijiedarbojoties spēj uzlabot sabiedrības medijpratību.

Medijpratība izglītībā
Media Literacy in Education

Latvijas Mediju politikas nostādnēs galvenās darbības ir saistītas ar masu mediju vides aktivitāti, proti, mediju saturā tiek aktualizēti medijpratības jautājumi. Līdztekus ir paredzēta sabiedrības izglītošana, taču nav pateikts, kādā veidā. Pārējās darbības saistītas ar izglītības satura pilnveidi medijpratībā. Šajā gadījumā nozīmīga loma ir piešķirta pedagogiem, pirmkārt, viņiem ir jāizglītojas pašiem, lai varētu zināšanas nodot tālāk, otrkārt, ir paredzēts radīt mācību līdzekļus jeb materiālus, lai sniegtu atbalstu pedagogiem skolēnu medijpratības izglītošanā.

Daudzas Eiropas Savienības (ES) valstis medijpratību ir izvirzījušas kā svarīgu politikas prioritāti, uzsverot, ka medijpratības veicināšana nozīmē atbalstu ne tikai formālai izglītībai, bet arī dažādām kultūras institūciju, nevalstisko organizāciju un brīvprātīgo iniciatīvām (Ministru Kabinets, 2016). Tā kā mediji mainās un to tehnoloģijas attīstās ļoti ātri, nozīmīga kļūst medijpratības vieta mūžizglītības kontekstā.

Medijpratības izglītības ainava Eiropas izglītības sistēmā ir sadrumstalota. Tās izpausmes ir atšķirīgas – medijpratība ir iekļauta kā temats mācību programmās vai kā atsevišķs priekšmets (McDougall, Zezulkova, van Driel, & Sternadel, 2018). Taču būtiski apzināties, ka medijpratība ir nozīmīgs temats visos mācību priekšmetos un mediju izglītība kā daļa no satura var tikt iekļauta šādos mācību priekšmetos: dzimtā valoda, vēsture, ģeogrāfija, pilsoniskā izglītība, dabaszinātnes vai kā mediju studiju priekšmets (McDougall et al., 2018). Piemēram, dabaszinībās medijpratības tematika var tikt iekļauta kā prasme izprast un analizēt, lai spētu kritiski izvērtēt masu medijos publicētos rakstus par zinātni.

Atšķirībā no citām ES valstīm obligātās izglītības iestādēs Latvijā mediju pratībai līdz šim ir nepietiekami pievērsta uzmanība. Pamata un vidējās izglītības posmos atsevišķos mācību priekšmetos ir paredzēts runāt par mediju ietekmi, taču medijpratības apguvei būtu jānotiek integrēti teju visos mācību priekšmetos. Lai gan tiek veidoti arī dažādi metodiskie materiāli, tomēr tajos iekļautā informācija ietver atsevišķus medijpratības elementus, nevis piedāvā vispārēju medijpratības sistēmiskas apguves paraugu.

Citviet pasaulē būtisku devumu medijpratības pilnveidē sniedz bibliotēkas. Ir izstrādātas programmas, lai veicinātu dažādu vecumu un sociālās piederības pārstāvju medijpratību. Piemēram, Amerikā ir izveidots tēmu saraksts, kuras tiek aicināts aplūkot kā nozīmīgu mūsdienu realitātes daļu neformālās izglītības kontekstā, piemēram, bibliotēkās (American Library Association, 2020). Tās ir interneta arhitektūra, pilsoniskā aktivitāte, mediju vide un ekonomika, neprecīza

informācija (kas nav radīta kaitnieciskiem nolūkiem) un dezinformācija (radīta, lai kaitētu), kā arī mediju veidošana un dalīšanās ar mediju saturu.

Medijpratības saturs latviešu valodas mācību priekšmetā
Content of Media Literacy in the Subject of the Latvian Language

Lai varētu vērtēt medijpratības tematikas klātbūtni izglītības saturā latviešu valodas mācību priekšmetā, tika veikta tā kvalitatīvā satura jeb kontentanalīze latviešu valodas mācību stundas programmām no 4. līdz 12. klasei, kuri ir izstrādāti Valsts izglītības satura centra (VISC) projektā "Kompetenču pieeja mācību saturā" (Skola2030). Tie ir pieejami vietnēs *skola2030.lv* un *mape.skola2030.lv*. Vietnēs atrodamie materiāli ir pētījuma avots.

Kontentanalīze šajā gadījumā ļauj veikt sistemātisku satura, skaitlisku apstrādi, novērojumu un interpretāciju (Mārtinsone, 2011). Izmantojot kvalitatīvo kontentanalīzi, tika atklāti būtiskākie medijpratības aspekti un temati mācību programmās.

Programmā ietvertie medijpratības un informācijpratības temati tika kategorizēti, balstoties uz UNESCO izstrādātajiem mediju un informācijas pratības sasniedzamajiem rezultātiem, kuri precīzi atklāj šīs prasmes būtību, proti, piekļuve; analīze un izpratne; kritisks izvērtējums; izmantošana; radīšana un iesaistīšanās (Grizzle & Wilson, 2011).

Skolotājs savu darbu galvenokārt organizē, balstoties uz mācību standartu un programmu, kurā noteikts, kas skolēniem ir jāapgūst pamata un vidējās izglītības posmā. 2018. gadā LR Ministru kabinetā tika apstiprināts pilnveidotais pamatizglītības standarts, savukārt vispārējais vidējās izglītības standarts ir apstiprināts 2019. gadā. Izglītības dokumentos ir atvēlēta vieta medijpratības aspektiem, taču termins *medijpratība* neparādās. Šī tematika galvenokārt tiek ieviesta, izmantojot informācijas atlases, apkopošanas un izvērtēšanas prasmi. Savukārt digitālā pratība ir spēja droši un atbilstoši definēt, piekļūt, pārvaldīt, integrēt, sazināties, novērtēt un radīt informāciju, izmantojot digitālās tehnoloģijas un tīkla ierīces, lai piedalītos ekonomiskajā un sociālajā dzīvē (Teng, 2018). Tas nozīmē, ka arī augstāk minētā definīcija demonstrē galvenokārt informācijpratības aspektus, taču *informācija* ir ļoti plašs jēdziens.

Mācību priekšmeta programmas latviešu valodā palīdz skolotājiem īstenot Ministru kabineta 2018. gada 27. novembra noteikumi Nr. 747 "Noteikumi par valsts pamatizglītības standartu un pamatizglītības programmu paraugiem" un 2019. gada 3. septembra noteikumi Nr.416. "Noteikumi par valsts vispārējās vidējās izglītības standartu un vispārējās vidējās izglītības programmu paraugiem", nosakot plānotos skolēnam sasniedzamos rezultātus valodu mācību jomā. Izvērtējot latviešu valodas mācību priekšmeta programmu pamatskolā no 4. līdz 9. klasei (Andrejeva, 2020), ir redzamas būtiskākās tendences, kā

medijpratības tematika izpaužas izglītības saturā latviešu valodas mācību stundās

Par informācijas ieguvi saruna tiek uzsākta jau 4. klasē, apgūstot tematu "Maizes valoda". Temata apguve notiek, meklējot un atlasot informāciju no dažādiem avotiem (tīmeklī un drukātos izdevumos) par maizi un tās izplatību. Tas nozīmē, ka šajā vecuma posmā skolēni tiek iepazīstināti ar dažādiem informācijas avotiem – kā primārais ir nosaukts tīmeklis, taču skolotāja ziņā ir informēt skolēnus par citiem informācijas avotiem. Tādā veidā notiktu arī pirmā iepazīšanās ar masu mediju daudzveidīgo vidi, ja skolotājs kā citus avotus izmantotu arī laikrakstus vai žurnālus. Būtu vērtīgi, ja 4. klasē skolēni tekstu sāk arī novērtēt, pievēršot uzmanību, vai informācijai ir norādīts avots un autors, piemēram, meklējot un atlasot informāciju, kā svētkus svin citās zemēs. Līdztekus tiek mudināts domāt par procesu, kā atrast šo informāciju, piemēram, izmantojot precīzus atslēgvārdus. Būtiski papildinājumi saturā notiek 5. klasē, kad skolēni apgūst tematu "Manas ielas/pagasta vēstījums". Izmantojot informāciju apkārtējā vidē, skolēni apgūst sintaktiskās konstrukcijas, līdztekus domājot par informācijas daudzveidību, taču netiek pārrunāts par to, kāda ir informācijas ietekme noteiktā vidē. Šajā gadījumā būtu noderīgi runāt par ietekmi uz skolēnu, ģimeni, radiniekiem, respektīvi, precizēt tās jomas vai cilvēkus, kurus konkrētais vēstījums var ietekmēt vai mainīt ierasto lietu kārtību.

Daudzveidīgi un apjomīgi medijpratības tematika tiek atklāta 6. klasē un 7. klasē. 6. klasē medijpratības tematika parādās saistībā ar informācijas ieguvi, apstrādi un prasmi ar to dalīties. Šajā posmā tiek nosaukts viens no medijpratībā būtiskiem jēdzieniem – *dezinformācija*, skolēniem pašiem ir jānoskaidro tā definīcija.

Līdztekus 6. klasē tiek skarta arī mediju joma. Skolēni tiek iesaistīti darbībās, kuru sasniedzamie rezultāti ir – kritiski izvērtē mediju saturu, balstoties uz mediju funkcijām, kā arī mijiedarbojas ar masu medijiem pašizpausmē. Piemēram, skolēniem ir jāīsteno projekts: jāveido papīra formāta izdevums, ziņas interneta mājaslapā (piemēram, skolas vai novada mājaslapā) vai jāfilmē TV ziņas, kuru runātie teksti iepriekš jāizveido arī rakstveidā. Līdztekus satura veidošanas prasmēm skolēni gūst informāciju arī par profesiju jomu, jo atbilstoši projekta darba izvēlei atlasa profesiju sarakstu un, izmantojot profesiju datubāzēs iekļauto informāciju, izveido pienākumu sarakstu žurnālistam, redaktoram, korektoram, multimediju dizaina speciālistam. Tādējādi tiek veidota izpratne par žurnālista darba specifiku, kas sniedz priekšstatu arī par mediju vides īpatnībām un pazīmēm.

7. klasē skolēni pievēršas arī mediju žanriem, piemēram, intervijām. Tādējādi skolēni izprot medijpratības sasniedzamo rezultātu – izprot mediju lomu un funkcijas demokrātiskā sabiedrībā. Izpratnes veidošanu par mediju vidi demonstrē arī temats "Avīžu un žurnālu valoda. Kas raksturīgs preses izdevumu

valodai?”. To apgūstot, skolēni vēro preses izdevuma virsrakstus un teksta uzbūvi. Savukārt zināšanas par drukātajiem masu medijiem pilnveido uzdevums – veido kopsavilkumu, kādus periodiskos izdevumus zina, kā tos var dalīt, kā atšķiras dažādu periodisko izdevumu saturs. Tādējādi tiek noteikta mediju loma un funkcijas sabiedrībā.

8. un 9. klases būtiskākā atšķirība no iepriekšējā posma ir sociālo mediju akcentēšanu. Šajās klasēs galvenokārt tiek pilnveidots sasniedzamais rezultāts – salīdzina vairākus informācijas avotus, izvēlas ticamākos, pamato savu izvēli. Integrē un interpretē informāciju no dažādiem avotiem. Izvēlas mērķim atbilstošu informācijas apstrādes un strukturēšanas veidu. Sociālie mediji tiek atklāti tematā “Sociālo mediju lietošana profesionālos nolūkos. Kā kritiski lasīt vēstījumu sociālajos medijos un radīt savu vēstījumu” un demonstrē to divējādo dabu – sociālie mediji ir gan informācijas avots izklaidei, informācijas iegūšanai izglītībai, gan pašizpausmes līdzeklis. Aplūkojot pašizpausmi, tiek skarti arī komunikācijas ētikas jautājumi. Savukārt skolēnu masu mediju pārzināšanas loks tiek papildināts ar konkrētu tīmekļa vietni – lsm.lv, kurā skolēniem ir jālasa sadaļā “Dezinformācija” ievietotie materiāli un ziņa un jāatpazīst manipulācijas tehnikas.

Jāsecina, ka izglītības posmā no 4. līdz 9. klasei tiek skarti vairāki medijpratības un informācijpratības elementi. Sākotnēji dominē informācijpratība, vēlākajos posmos tiek akcentēti atsevišķi mediju vides jautājumi.

Vidējās izglītības posmā skolēni turpina apgūt medijpratības jautājumus, Jāpiebilst, ka mācību saturs vidusskolā ir organizēts moduļu veidā – “Valoda un sabiedrība”, “Stilistika”, “Valodas struktūra”. Medijpratībai mācību programmā ir paredzēts arī konkrēts modulis – “Mediji, valoda un ietekme”. Modulī medijpratības tematika galvenokārt tiek atainota kā valodas līdzekļu nozīme vēlamā satura un ietekmes veidošanā kā tradicionālajos, tā arī jaunajos medijos.

Vidusskolas posmā arvien vairāk kā mācību avots tiek izmantoti masu mediji. Piemēram, apgūstot tematu “Latviešu valodas daudzveidība”, skolēniem tik piedāvātas vairākas aktivitātes, kas mudina lasīt/pētīt mediju saturu: *pēta apvidvārdu lietojumu ikdienas valodā, plašsaziņas līdzekļos un daiļliteratūrā, izmantojot latviešu valodas korpusu; pēta latviešu valodas daudzveidību tuvākajā apkārtnē: uzrakstos publiskajā telpā (lingvistiskajā ainavā), plašsaziņas līdzekļos, tūristiem piedāvātajos informatīvajos izdevumos u.c.* (Lazdiņa, Murinska, Šalme, & Urbanoviča, 2020). Savukārt šo aktivitāšu sasniedzamais rezultāts saistīts ar valodas līdzekļu, sintakses un interpunkcijas pārzināšanu, nevis medijpratības pilnveidi. Līdzīgas aktivitātes, kur masu mediji galvenokārt tiek izmantoti kā avoti, ir redzamas arī citos moduļos, piemēram, “Stilistika” (*veido oriģinālu darba sludinājumu vai uzņēmuma vizītkarti sociālo tīklu vietnē; savstarpēji vērtē izveidotā teksta iedarbību uz adresātu*), “Valodas

struktūra" (*vēro, raksturo un analizē verbālos un neverbālos izteiksmes līdzekļus, kā arī zīmes, simbolus dažādās TV pārraidēs, videolekcijās, publiskajās runās*) (Lazdiņa et al., 2020). Tiesa, minētās aktivitātes tiešā veidā neveido priekšstatu par mediju vidi, taču parāda tekstu daudzveidību un mediju tekstu (precīzāk – publicistikas) atšķirību no citiem. Medijpratībai ir cieša saikne arī ar tekstu un tā lietojumu, kas definīcijās, piemēram UNESCO definīcijā, netiek akcentēts. Šīs ir metavalodas zināšanas, kuras attīsta mediju satura kritisku patērēšanu un analīzi.

Visplašāk medijpratības saturs ir integrēts modulī "Mediji. Valoda. Ietekme". Modulis ir veidots secīgi, aptverot galvenos masu mediju aspektus, jo komunikāciju starp sabiedrības grupām un indivīdiem nodrošina masu mediji. Savukārt komunikācija nozīmē informācijas, ideju, emociju nodošanu – pārsūtīšanu, pārraidīšanu, izplatīšanu. Komunikāciju ilustrē pamata komunikācijas modelis, kas ietver sūtītāju, informāciju vai vēstījumu un saņēmēju. Komunikācijas zinātne nodarbojas ar cilvēku komunikācijas modeļu, komunikācijas procesu un komunikācijas problēmu izzināšanu un izpēti (Rožukalne, 2020).

Temats "Mediju veidi un to funkcijas" ļauj pārdomāt un izvērtēt savus un savas ģimenes mediju lietošanas paradumus, jo līdztekus mediju apkopošanai, skolēni cenšas noteikt, kādas emocijas viņos raisa konkrētie mediji, tādējādi definēt mediju funkcijas un to daudzveidību, kā arī ietekmi sabiedrībā. Ētiska informācijas nodošanas prasme tiek aktualizēta tematā "Lingvistiskās uzvedības ētika medijos".

Tematā tiek konkretizēti piemēri, kurus ir iespējams izmantot, lai apgūtu tematu – skolēni tiek aicināti iepazīt reklāmas drukātajos un digitālajos medijos un identificēt un salīdzināt valodas un vizuālos līdzekļus, it īpaši mākslinieciskās izteiksmes līdzekļus (piemēram, metaforas un hiperbolas), kuri lietoti reklāmu veidošanā. Būtiski, ka pēc tam klasē tiek pārrunāts par reklāmas tekstu specifiku, to iedarbīgumu uz adresātu. Komunikācijas ētika tiek pilnveidota, izvērtējot arī publisko komunikāciju, piemēram, politiķu uzstāšanos vai uzņēmumu komunikāciju. Līdztekus medijpratības tematiem saturā latviešu valodas mācību priekšmetā ir iekļauti arī informācijpratības jautājumi, piemēram, *lasa populārzinātniskus rakstus; tekstā nosaka, kuri informācijas avoti ir izmantoti, kā ir veidotas atsauces, vai ir ievērotas autortiesības* (Lazdiņa, Murinska, Šalme, Urbanoviča, 2020). Tādējādi skolēns novērtē informācijas ticamību – aplūko publicēšanas laiku un vietu, iekļautos faktus un viedokļus, kā arī, kas ir informācijas adresāts.

Būtiskākā atšķirība no pamatskolas ir daudzveidīgu medijpratības tematu iekļaušana izglītības saturā vidusskolā – kritiski izvērtē mediju saturu, ētiski izmanto informāciju, nosaka mediju funkcijas, nodod informāciju, atrod un novērtē informāciju, mijiedarbojas ar medijiem. Var secināt, ka līdztekus

informācijpratībai tiek veidota izpratne par masu medijiem, piemēram, analizējot savus mediju lietošanas paradumus, tādējādi tiek noskaidrota arī motivācija, kāpēc skolēni izvēlas konkrētos medijus.

Secinājumi
Conclusions

1. Latvijā termins *medijpratība* tiek lietots mediju vides ekspertu diskursā, savukārt izglītībā no šī termina izvairās, īpaši dokumentos un vadlīnijās. To demonstrē arī pētījuma praktiskā daļa, piemēram, mācību programmās tiek runāts par informāciju, par informācijas avotiem, par informācijas atlasi, taču netiek nosaukts, ka šīs tēmas apvieno medijpratība un informācijpratība. Respektīvi, medijpratība netiek nosaukta kā joma.
2. Izglītības saturā latviešu valodā galvenokārt dominē informācijpratība, piemēram, prasme novērtēt informācijas ticamību. Šis sasniedzamais rezultāts ir aktualizēts pamatskolas posmā. Vidusskolā līdztekus informācijas pratībai tiek iekļauti medijpratības teorētiskie aspekti, piemēram, mediju funkciju un žanru pārzināšana. Būtiski, ka šajā posmā masu medijs jeb kanāls nav tikai informācijas avots, bet tas tiek aplūkots kā objekts – tiek izvērtēta mediju vide, mediju lietošanas paradumi, tiek skarts auditorijas jēdziens.
3. Mācību programmā no 4. līdz 9. klasei dominē jēdziens *informācija* – tiek salīdzināti vairāki informācijas avoti, tiek domāts par to ticamību. Skolēni paši izveido kritērijus, kas nosaka, ka informācija ir ticama. Tādā veidā skolēni novērtē informācijas daudzveidību, piemēram, masu medijos, kā arī atšķir apmaksātu informāciju no žurnālista neatkarīgi veidota raksta/sižeta un publiskas uzstāšanās. Skolēni mācās izmantot informāciju no dažādiem avotiem un atbilstoši to interpretēt. Šajā posmā ir nozīmīgi arī informāciju attiecīgi strukturēt un atainot.
4. Mācību programmā vidusskolā arvien vairāk kā mācību avots tiek izmantoti masu mediji un arī tiek mācīts par masu medijiem, proti, tiek pārrunāta mediju vides daudzveidība, struktūra, žurnālista loma satura veidošanā. Skolēni, izvērtējot žurnālistu valodu, uzzina, ka žurnālists ir profesija. Var secināt, ka vidusskolas posmā izglītības saturā ir iekļauti visi pētījuma metodoloģijas daļā iekļautie medijpratības un informācijpratības aspekti.

Summary

There is a need to talk about media literacy through education, because teachers are the gates to public literacy. An important way to raise awareness of media literacy among teachers and pupils is to include it into the curriculum. The topic of media literacy in Latvia is currently included in the new curriculum based on competencies. Therefore, the purpose of the paper is to determine which topics of media literacy are included in the curriculum of the subject of the Latvian language and how they contribute to the level of pupils' media literacy.

The evaluation of the content of the curriculum shows the tasks that are set to activate and implement the tasks of media literacy and information literacy. Mainly those are access of information and selection, namely, skills based on search and memory. Media literacy is also fostered by awareness raising activities – summarizing and explaining specific issues to others and analysis by which pupils compare, for example, what language tools are used by social network users to achieve their goals. Development and creation of the media content are included in curriculum, for example, pupils select the most interesting and thoughtful idea and create a periodical mass media in a classroom.

The concept of information prevails in the curriculum from classes 4 to 9: a number of sources of information are compared, and their credibility is considered. In this way, students assess the diversity of information, such as in the mass media, and distinguish between paid information from a journalist's independently developed article. The secondary school curriculum increasingly uses mass media as a source and also teaches about mass media, namely the diversity of the media environment, the structure, the role of the journalist in content formation. Students also learn about this profession when assessing the language of journalists. It can be concluded that, at the secondary stage, the educational content includes all aspects of media and information literacy.

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PECULIARITIES OF HEALTHCARE SPECIALISTS' COMMUNICATIVE COMPETENCE IN ENGLISH AS A FOREIGN LANGUAGE

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Abstract. *Healthcare specialists are expected to possess competences essential for a successful fulfilment of their duties. Although specialists' practical competences enabling them to deal with a wide range of health conditions are the key ones, communicative competence, implying an ability to use a target language "accurately, appropriately, and flexibly" (Yule, 2010, p.194), has also had an immense impact on the accomplishment of professional duties (World Health Organisation, 2005). It follows that apart from giving opportunities to acquire knowledge about medicine and practical skills, medical education institutions are expected to teach 21st century students to communicate effectively using various linguistic tools applicable in their professional context (Zethsen and Askehave, 2006). The present article aims to elucidate the peculiarities of communicative competence that practising or future healthcare providers should possess in order to demonstrate how it enables them to accomplish their responsibilities by communicating with patients and, thus, provide them with qualitative care or treatment in a foreign language, specifically English as a foreign language. With the aim to reach the goal, a scientific literature review was conducted. The theoretical implications were supported by the examples of medical encounters; in the given encounters, the use of the selected language aspects and participants' non-verbal cues were interpreted.*
Keywords: *communicative competence, healthcare specialist, EFL.*

Introduction

The description of medical language, more specifically, its application in professional discourse, is one of the oldest and most prominent topics in applied linguistics (Barton, 2005). The exploration of the peculiarities of medical language, the nature of health communication as well as related language competences has both theoretical and practical values. Its doctrinal value lies in the development of the theoretical basis that would provide an insight into "the institutional interaction, relationships as created and reflected by discourse, and specialized sequences within the interaction of medical encounters" (ibid.). The practical value, in its turn, manifests itself in the provision of data on the basis of which the methodologies and teaching materials aimed at the enhancement of medical specialists' communication skills could be developed (ibid.).

Despite the fact that medical language and its peculiarities in communication are widely explored (e.g. Roter & McNeilis, 2003; Heritage & Maynard, 2006; Miller et al., 2016), there are few studies that focus on the language user, specifically language competences a practising or future professional should possess in order to communicate with patients in healthcare institutions.

Therefore, the goal of this article is to provide an account of the peculiarities of communicative competence, including the related competences, a caregiver is expected to have, supporting them by the examples of medical encounters. The focus of the paper is not only one's native language, but also English as a foreign language which has gradually become an international language in the field of public healthcare due to worldwide globalisation. In order to reach the goal, the following research questions have been formulated: 1) how has the notion of communicative competence evolved? 2) how are communicative competence and its related competences manifested in the interaction between a healthcare provider and a patient? 3) what is the role of a healthcare provider as a possessor of a communicative competence in communication with a patient? 4) what are the factors that influence the realisation of communication?

Methodology

This study is a part of a larger research project which is concerned with the elaboration of teaching materials aimed at medical students' communication skill enhancement in English as a foreign language. In order to develop qualitative materials that pursue the above-stated aim as well as guidelines for their effective application, first, it is essential to explore the nature of communicative competence and its importance for healthcare providers. This served as an impetus for the present research.

The goal set at the beginning of the research determined the methodology, that is, a literature review and interpretation of linguistic and paralinguistic sources in medical encounters. A scientific literature review enabled me to conduct "a critical examination of existing research" (Bryman, 2012, p.14) devoted to communicative competence and other competences related to it. A pedagogical framework of communicative competence developed by Celce-Murcia, M., Dornyei, Z. & Thurrell, S. (1995) was put in the main focus of the present research. First, the development of the term of communicative competence in the field of applied linguistics was traced; then, its peculiarities in the relation to the healthcare field were identified; after that, a communication participant's role in medical encounters was established; finally, factors influencing effective communication were viewed.

Both linguistic and paralinguistic sources were interpreted in the chosen examples of medical encounters to support theoretical findings. The use of the

selected linguistic sources was illustrated on the examples of the dialogues extracted from previous research and various English for Medical Purposes books. The use of non-verbal cues, which are an important source of information in terms of communication, were analysed in the film fragments that depict interaction between a healthcare provider and a patient or his/her relative.

Manifestation of the Peculiarities of Communicative Competences in Medical Encounters

This section includes a description of the evolution of communicative competence, characteristics of communicative competence as well as other competences that build up the communicative one. They are illuminated in the context of healthcare.

In the mid-1990s the role of communicative competence, which is defined as an ability to communicate and understand utterances across linguistic, situational, social and cultural boundaries, has been actively discussed in the context of applied linguistics (Celce-Murcia, 2007). Since then, the interest in the issue has not decreased. In 1995, Celce-Murcia, together with Dörnyei and Thurrell, offered a pedagogical framework for communicative competence (see figure 1) (1995, p.10). Their model is represented by a circle within a pyramid, in the centre of which there is discourse competence. The three points that surround the circle are linguistic, sociocultural and actional competences. The triangle, in its turn, is surrounded by another circle which denotes strategic competence. All the above-mentioned competences build up the communicative one.
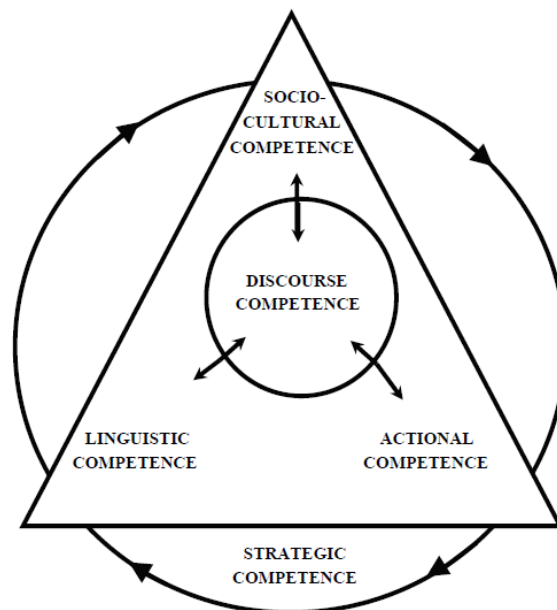

*Figure 1 **Representation of communicative competence**
(Celce-Murcia, Dörnyei and Thurrell, 1995, p.10)*

The evolution of communicative competence began with the linguistic one. The concept of linguistic competence is considered to be one of the most controversial concepts in the scientific field of applied linguistics. The notion was first defined by Noam Chomsky as "the speaker-hearer's knowledge of […] language" enabling him/her to produce grammatically correct sentences and utterances as well as recognize their different types (1965, p.4). The American linguist claims that linguistic knowledge is the unconscious mental knowledge the ideal native speaker has at his/her disposal, and it is not affected by any situational, social and cultural factors during a specific linguistic performance (Chomsky, 1965). In this way, linguistic competence implies that a speaker, including a medical practitioner, is expected to possess phonological, lexical, morphological and syntactic knowledge in order to lead a conversation successfully. A healthcare provider is expected to know the following syntactic knowledge to achieve his/her professional goals, for example, imperatives for giving instructions, modal verbs *can* and *may* for informing about side effects of drugs, different types of questions for eliciting specific information from a patient (McCarter, 2013, 2014).

Chomsky's notion of linguistic competence was challenged by the hypothesis of Dell Hymes (1972) and Sandra Savignon (1972) who argued that the knowledge of grammatical rules and an ability to apply it are not sufficient for effective communication, due to the fact that communicative practices are socially and culturally situated. Thus, Chomsky's perspective on the notion competence was not considered relevant to real-life communication (Hymes, 1972). It served as an impetus to introduce the notion of communication competence. Its idea was that "linguistic competence must adapt itself to the total informational input, both linguistic and paralinguistic" (Savignon, 1972, p.8). Thus, a communication participant should have not only the knowledge of a language as a code, but be aware of situational, social and cultural aspects of specific discourse. These aspects determine the language, namely, the choice of linguistic macro- and microstructures, lexemes and language strategies to which a speaker appeals to achieve his/her goals, including the professional ones. Three salient characteristics of medical communication in terms of language use, taking into account the above-mentioned aspects, is simplicity, provision of a large number of details and/or explanations, as well as extensive use of grammatical structures aiming at politeness.

The first peculiarity being discussed is simplicity. Simplicity means that a healthcare specialist should use the language that is maximally understandable for a patient, excluding professional terminology (Travaline et al., 2005). If medical terms cannot be avoided, their explanations should be provided (ibid.). This may be illustrated on the examples of the cases in which a healthcare specialist (CCS – in all further dialogues) informs a patient (P – in all further dialogues) or patient's

relative about the 1) disease that his/her patient has, 2) investigation methods he/she requires and 3) treatment he/she will undergo:

1)   CCS: As I though, you are a little bit anaemic.

P: Is that bad?

CCS: No, not necessarily. It just means that your red blood cell count is a little on the low side (…). (Grice, 2011, p.129)

2)   CCS: Well, what we are going to do is have a look at your gullet and your stomach to see what's going on there.

 P: OK. (McCarter, 2013, p.134)

3)   CCS: (…) What we're going to need to do, with your consent, is to give your husband something to help get rid of any blood clots. […]

P: OK. (McCarter, 2014, p.134)

The first example demonstrates that when the professional mentions a medical term *anaemia*, an explanation of this term follows, because the patient is not familiar with it, since a question about it is raised. It is also noteworthy that when describing analysis results, that is, a red blood cell count, the professional uses such collocation as *to be on the low side*, instead of *to be decreased* or *to be diminished* that are the terms with which foreign patients, especially the ones who have low a level of English proficiency, might not be familiar.

As concerns the second excerpt, it should be noticed that the healthcare provider does not mention such professional term as *gastroscopy*; conversely, he/she explains the procedure in as simple language as possible, not forgetting to mention what the aim of this procedure is. As a result, there are no questions raised from a patient's side, which was the case in the first dialogue.

As concerns the third dialogue, the medical specialist uses the same explanation tactic as the professional in the second dialogue. Respectively, he/she omits the use of a professional term *thrombolysis* in order to explain the procedure his/her patient is going to undergo. Instead, he explains the procedure in the language understandable for the patient to make himself/herself explicit; it is done intentionally with the aim not to cause confusion.

The second peculiarity of oral communication in medical appointments is provision of the details about a patient's condition, medical examination and treatment (Travaline et al., 2005). For example, when discussing the course of medical examination or treatment, a healthcare specialist is to explain its each step as in the following examples:

1)   CCS: I think that a CT scan should be done. […] The CT scan is a high-tech kind of an X-ray. It shows important details of your brain. It does not hurt and it is not dangerous. During the study you will be lying on your back on a stretcher. The technician will advance your head into a narrow tunnel for about 8 minutes. There is nothing to be worried about. There will be enough breathing space around your head. You will be able to speak to the technician by a

microphone in the CT tunnel. The tunnel serves to bring electronic imaging machinery close to your head. Have you ever been afraid of tunnels in your life before? (Gross & Baumgart, 2006, p.156)

2) CCS: Acne's nothing to do with poor hygiene, but if you wash twice a day and then put on a moisturizer like aqueous cream, that will help.

P.: Aque...

CCS: Aqueous cream. It's this. It comes in tubs like this. And cream here. I'm going to give you some cream – benzoyl peroxide – to put on twice a day and this antibiotic cream. […] Now, I must point out that these can take weeks to work, so you need to be patient. (McCarter, 2014, p.132)

The excerpts from the dialogues above show that the caregivers provide a wide range of information about the medical examination and treatment their patients are going to experience, namely, gastroscopy and acne treatment. The aim of giving such detailed descriptions is to make patients fully aware of the forthcoming procedures and, consequently, prepare them for these experiences both physically and emotionally.

In the first conversation the professional informs which type of investigation is needed, what its essence is and the benefits of exactly this type of investigation. The physician also gives information about working principles of a computed tomography (CT) scanner. In addition, he/she mentions how safe CT is, since this is what patients usually enquire about any type of procedure. The specialist also describes what will be the actions of the patient throughout the session, which is significant, since adherence to doctor's instructions or their violation might influence the outcomes of investigation. It is also noteworthy that the specialist asks about patient's fear of closed tunnels. This may be required either to understand which else type of information is needed to be provided to the patient, or warning that uncomfortable feelings might appear due to enclosed space.

In the second interaction the physician provides the following details. He/she gives the reason why this type of treatment is needed and names the specific title of medication that is required, including its form. The specialist also tells the patient how to use it and how often to use it. Moreover he/she does not ignore mentioning treatment duration and an anticipated outcome.

The third peculiarity of health communication in terms of language use is active exploitation of specific grammatical structures to achieve polite utterances (Wodak, 2006). When a healthcare provider gives his/her patient instructions, the use of directives, for example, "Open your mouth", should be avoided, because it may often sound harsh and impolite (McCarter, 2013, p.25). For this reason, it is recommended to refer to such structures as "…for me, please", "Can/could you (just) + infinitive (without 'to')", "…if you can/could" and 'I'd like you + infinitive', indirect questions to make requests and instructions sound polite

(ibid.). The following examples from medical encounters demonstrate the use of the above-mentioned and similar structures:

1)   CCS: Could you just bend your head forward for me, please? (McCarter, 2013, p.25)

2)   CCS: [...] your oncologist thought it would be good to come and see me and I just wondered why you were coming to see me.

P: uhm (.) well basically it's because my hip's still giving me pain […]. (Finlay & Sanargi, 2006, p.670)

As demonstrated in the first example, during a physical examination of the patient the healthcare provider uses an interrogative with *could* to form a request, instead of using an imperative form, namely, "bend your head forward" which would sound harsh at some extent. The phrase at the end of the sentence, "for me, please", in its turn, is used to soften the request.

As concerns the second example, an indirect question, namely, "I just wondered why…" was chosen as a form for the same purpose – formation of a polite request. It was done intentionally, since the direct question, specifically, "Why are you coming to see me?" would sound unprofessional in the medical settings; it is possible that the patient could perceive it as specialist's irritation or unwillingness to admit him/her as a patient.

The next competence under consideration in this section is the discourse one; it implies "the selection, sequencing, and arrangement of words, structures, sentences and utterances to achieve a unified spoken […] text" (Celce-Murcia et al., 1995, p.13). Celce-Murcia puts emphasis on the significance of this competence as a central element of communicative competence, since it unites other competences in order to create an integral text fitting specific social and socio-cultural settings (2007, p.44, 46). This aim can be achieved with the help of cohesion, including such elements as conjunctions and lexical chains; coherence which deals with textual macrostructural elements; deixis that includes deictic pronouns, spatial, temporal and textual references; generic structures that consist of ordering structural elements; and conversational structures that focus on a turn-taking system in oral conversations (ibid., p.14-15). According to Hatch's discourse theory (1992), following scripts enables interactants to communicate in certain situations flawlessly (Hatch, 1992, p.107). It implies that the scripts of conversations related to the medical field should be acquired by practising or future professionals during their studies. The scholar enumerates script components, including goals, actors, props and actions (1992, p.85-86). In the medical discourse script components depend on the medical subfield, functions, conversation participants and interlocutor's goals. In communication between a physician and a patient, the healthcare provider's goals might be as follows: to reformulate pain description, give instructions, summarise a health situation, describe interventions, apologise to a patient, show empathy, inform a patient of

bad news, manage patient's anger and other actions related to his/her profession (Isaacs, Laurier, Turner, & Segalowitz, 2011, p.565). As concerns the roles, the roles of a specific healthcare provider, for example, a nurse, and a patient can be identified in the field of healthcare. Props, depending on the situation, may vary from simple medical equipment, for example, a thermometer and sphygmomanometer, to sophisticated machines, for example, haemodialysis and MRI machines. The last component, that is, an action, implies the activities that accompany a conversation, for example, a nurse taking notes onto a patient medical history form while interviewing him/her and a general practitioner taking a stethoscope and placing it on the patient's chest while asking about the pain in the chest.

Describing their framework of communicative competence, Celce-Murcia et al. emphasize the role of sociocultural competence, which denotes 'the speaker's knowledge of how to express messages appropriately within the overall social and cultural context of communication (1995, p.23). In health communication, the possession of this competence is especially significant when either a caregiver, or a patient does not speak his/her native language. The significance of this competence was also confirmed by a recent study in which its author claimed that the questions of professional communication should be more thoroughly investigated from sociological and cultural angles (Ponomarenko et al., 2020, p.4). A healthcare provider is expected to possess an ability to use a language "at an appropriate level of formality for the situation, observing social as well as cultural norms in respect of conventions", adapting also his/her body language (Coelho, 2004, p.109). Celce-Murcia et al. describe several sociocultural variables that a communication participant is supposed to bear in mind when interacting. They include:

–   social contextual factors: the participants' age, gender, status, social distance and their relations to each other: power and affect;
–   stylistic appropriateness: politeness strategies, a sense of genres and registers;
–   cultural factors: background knowledge of the target language group, major dialects/regional differences, and cross-cultural awareness. (1995, p.23-24)

The style of communication may vary depending on socio-contextual factors, for example, patient's gender and social distance. In this way, a physician's style of communication differs when talking to children, adults or the elderly. A conversation with a child is typically started referring to his/her emotions, for instance, by asking about fears (Levetown, 2008, p.e1441), specifically fear of pain. Then a medical professional is expected to relieve child's anxiety and eradicate his/her fear, and only then move to examination (ibid.).

Stylistic appropriateness, in its turn, manifests itself in physician's formulation of utterances. For example, a physician is meant to use some introductory sentences when informing negative news to a patient to sound empathetic, for example, "I realise this probably comes as a shock to you" or "It is not easy saying that, but there is a chance that your wife may not get any better" (Lloyd & Bor, 2009, p.67, 72).

Culture of interactant participants is another factor that defines the nature of communication. When communicating with a foreign patient, a healthcare provider should be aware of the cultural norms of his/her patient (Mutha, Allen, & Welch, 2002). For example, a woman of Islamic religion will expect to be given a physical examination by a female physician, since a male's touch is highly undesirable in her religion (Chamsi-Pasha & Ali Albar, 2016, p.123).

The next competence under consideration is strategic competence, which denotes "knowledge of communication strategies and how to use them" (Celce-Murcia et al., 2007, p.26). According to Celce-Murcia et al., communication strategies include avoidance strategies which involve "tailoring one's message" by replacing it or avoiding some specific topics, and abandoning it (1995, p.27); the achievement strategies which imply "manipulating available language to reach a communicative goal" (ibid.); stalling or time gaining strategies which denote the use of "filters, hesitation devices, gambits as well as repetitions" (ibid.); self-monitoring strategies that consist of self-repair and rephrasing (ibid.); and interactional strategies that are regarded to be the ones that are used to appeal for help from an interlocutor's side, for example, confirmation check (ibid.). The following examples are given to demonstrate the application of several strategies:

1) CCS: Mustapha, isn't it?
P: Yes, that's right.
CCS: So what happened to you? (…) (Grice, 2011, p.126)
2) CCS (intern): And he shouldn't eat sugar, right?
CCS: Well, no, it's not true that diabetic shouldn't eat sweet things. Actually, what's important is balance. (ibid., p.128)

The first example demonstrates the application of an interactional strategy, the goal of which is confirmation check. This is highly important in the clinical settings, since checking patient's identity is one of the medical staff studies. In this specific case, the use of the word "right" at the end of a closed-ended question would imply an affirmative or negative response.

The second example, in its turn, shows the use of time-gaining devices, such as "well" and "actually". They are typically used to save time that might be needed for formulation of a sentence or recalling what other information is needed to be introduced to a patient or colleague. In addition, the use time-gaining words and phrases in physician's speech might be beneficial for patients, since it gives them more time to process information which is new for them.

The last but not the least important competence in the focus of the present study is actional competence, which was firstly introduced by Celce-Murcia et al. in 1995. Actional competence is defined as "competence in conveying and understanding a communicative intent, that is, matching actional intent with linguistic form" (ibid., p.17). Special attention should be devoted to the development of non-native speaker's actional competence, since non-native speaker's actional behaviours might not be always contextually appropriate, since their knowledge of linguistic sources are distinct from their knowledge of sociocultural norms (Celce-Murcia et al., 1995, p.19). For this reason, they might often be unaware actional intents of specific linguistic sources. As a result, it may cause misunderstanding between interlocutors. As to the types of actional intentions, they include the ones that refer to interpersonal exchange, information exchange, opinion and feeling exchange, suasion and discussion of future plans (ibid., p.22). The following examples demonstrate some of the actional intents of healthcare specialists and linguistic sources they used to achieve their intents:

1) CCS: As I though, you are a little bit anaemic.

P: Is that bad?

CCS: No, not necessarily. It just means that your red blood cell count is a little on the low side. A normal count is about 4.2 to 5.4 million red blood cells per microlitre of blood, and yours was 3.9.

P: Oh dear – what does that mean? (…). (Grice, 2011, p.128)

2) CCS: Acne's nothing to do with poor hygiene, but if you wash twice a day and then put on a moisturizer like aqueous cream, that will help.

P: Aque…? (McCarter, 2014, p.132)

The first conversation shows that the actional intent of the physician is to inform the patient about the test results and describe them. In order to inform the patient about the results, such statement as "You are…+ adjective" is used. In order to describe the results, an introductory phrase as "It just means" and an evaluative phrase as "is a little on the low side" are used.

The second dialogue demonstrates such physician's intention as prediction. In order to achieve this, first conditional is used. It is noteworthy that before giving his/own prediction, the specialist denies patient's suspicion about the cause of the disease, namely, poor hygiene.

Role of a Healthcare Provider in a Communicative Event and its Realisation

This section offers an insight into the abilities of an interlocutor, that is, a healthcare provider, to communicate and his/her role in a communicative act. It also includes an assessment framework which helps to evaluate adequacy of a communicative act, taking into account various factors.

When it comes to communicative competence, the role of communication participants should be discussed, as the underlying ability of interlocutors to use a target foreign language is one of the most important factors in communication (Rickheit & Strohner, 2008). According to Savignon (1976), native and non-native language users have different abilities of exploiting a language. A native speaker "knows not only how to say something but what to say and when to say it", due to the reason that "the linguistic features of an exchange are embedded in a cultural context" (Savignon, 1976, p.4). A non-native speaker has to acquire a set of specific linguistic macro- and microstructures as well as get acquainted with the cultural background of the country and peculiarities of the society where a foreign language is spoken in order to be able to interact fluently (ibid.).

Moving to the discussion of the capabilities of a non-native speaker to communicate in a foreign language, it should be admitted that poor foreign language knowledge is an obstacle to physician-patient communication that may result in hindering effective interaction (Isaacs et al., 2011, Travaline et al., 2005). If a specialist has a low level of foreign language proficiency as well as is unaware of the situational, social and cultural settings of a working place, the flow of conversation can get distorted (Isaac et al., 2011). Consequently, poor communication may be the cause of patient's anxiety (Finlay & Sarangi, 2006). Moreover, it may become a source of complaints and litigation from patient's side (ibid.). As a result, it makes it hardly possible for a healthcare specialist to provide good quality medical care or treatment.

In the medical settings, conversation participants take different roles. It was established that, regardless of the medical practitioner's language proficiency level, he/she is more empowered in terms of influencing conversation flow in comparison with a patient; it implies that this is the healthcare provider who "controls the topics and their development, deflects or ignores patient topics or contributions that he or she deems irrelevant, provides the amount of medical information that he or she deems appropriate" (Barton, 2005, p.172). This may be achieved with the help of various techniques such as explicit categorisation, for example, "There are three important things that I would like to discuss […] (Kurtz, Silverman, & Draper, 2016, p. 47). Thus, a healthcare provider is in charge of the effectiveness of communication, and, consequently, its outcomes.

Interlocutor's knowledge and skills, an ability to use them, psychoemotional factors that surround him/her, interlocutor's environment, as well as his/her actions define if communication is possible at various levels. According to Hymes, the evaluation of the above-stated issues is significant for prediction of the success of communication. This way, it is essential to determine:
1. whether (and to what degree) something is formally possible;
2. whether (and to what degree) something is feasible in virtue of the means of implementation available;

3. whether (and to what degree) something is appropriate (adequate, happy, successful) in relation to a context in which it is used and evaluated;

4. whether (and to which degree) something is in fact done, actually performed, and what its doing entails. (Hymes, 1972)

The formal possibility refers to the interactant's possession of knowledge of a language system which allows him/her to communicate. In medical settings, successful communication between a healthcare provider and a patient is possible if both of them share a target language and can clearly express themselves in it. For this reason, when a medical student graduates, he/she is expected to have not only the knowledge of the medical field, but also the language of the medical discourse community, which enables him to fulfil his/her duties (Zethsen & Askehave, 2006). For example, in the context of Latvia, nurses are expected to communicate in at least one foreign language (The Ministry of Education and Science, 2020).

The feasibility in terms of means of implementation, in its turn, is concerned with the "psycholinguistic factors such as memory limitation, perceptual device, effects of properties such as nesting, embedding, branching" caused by the "features of the body and features of material environment as well" (Hymes, 1972, p.285). For example, an interaction between a physician and a patient is possible if a physician is able to interpret patient's body language and comprehend the physiological and psychological factors that caused it. In addition, communication between a healthcare provider and a patient is feasible when it takes place in a medical institution, where the necessary medical equipment can be found and patient's data – accessed.

The question of appropriateness deals with the employment of verbal and body language culturally and socially adequately (ibid.). Since body language differs in various cultures, a healthcare specialist is expected to be aware of basic intercultural differences, which makes him/her prepared for communication with a patient. For example, in American culture, on such formal occasions as communication with healthcare providers, eye contact signals "attentiveness", "respect" and "truthfulness" (Martin & Chaney, 2012, p.52). From image 1, that is, a screenshot from the American film "The choice" it may be seen that eye contact between a physician and a patient's relative is supported throughout the whole conversation.

*Image 1 **Screenshot from the film "The choice"***

In the culture of Japan, in its turn, it is not recommended keeping eye contact with a patient, if to adhere to the rules of their culture. It may be interpreted as a rude behaviour. The Japanese try to avoid eye contact 90 % of their time finding it to be improper (Lewis, 2010). They also believe that 'not looking into other person's eyes during a conversation shows respect' to the person with whom they are contacting (Martin & Chaney, 2012). Image 2, a screenshot from the Japanese film "Our little sister", depicts that in the settings of a hospital the conversation participants avoid a direct eye contact.

*Image 2 **Screenshot from the film "Our Little Sister"***

The last question of actual performance deals with the accomplishment of a certain communicative task and its effect (Hymes, 1972). In the medical field, the result of a conversation might be the obtainment of consent from a patient or his/her relative to perform a procedure after a detailed explanation of this procedure and its consequences. Another example is a filled in registration form which includes all necessary information for patient's further examination and treatment.

Conclusions

This study has aimed at outlining the peculiarities of communicative competence, including its related competences, more specifically, their manifestation in the medical field, that is, medical encounters in English between a healthcare specialist and a patient. The results of the research presented here have revealed that communicative and other competences that refer to the communicative one are essential for medical practitioner's qualification, due to the reason that communication with patients, which often happens in intercultural settings in English, is an indispensable part of medical practitioner's professional life.

It has been discovered that communication never happens in isolation from a situational context, society, culture, intentions and accompanying actions, which implies that communicative competence is interconnected with linguistic, discourse, sociocultural, actional and strategic competences. Thus, communicating in the medical settings, a healthcare provider is expected to take into account situational and sociocultural factors, and adapt to them by choosing appropriate micro- and macrostructures of a target language and appealing to the register typical of the discourse. In addition, a specialist is expected to apply various linguistic strategies and strategic tactics for the achievement of the goals being set.

It has also been established that these are the interaction participant, namely, his/her native language, the level of foreign language proficiency, awareness of the situational and sociocultural aspects of communication that influence the course of a conversation, and determine its efficiency and results. When participating in an encounter, including the medical one, it is essential to evaluate if it is formally possible, feasible, appropriate, as well as to assess a likelihood of an oral task to be performed.

This research has a practical application: the awareness of the importance of communicative competence and related to it linguistic, discourse, sociocultural, actional and strategic competences for a healthcare provider's profession, as well as their peculiarities may serve as the basis for study programme actualisation and teaching material development aimed at specialists' communication skills enhancement.

Despite its exploratory nature, this study offers some insight into healthcare specialists' communicative competence, which is vital for the accomplishment of their professional duties. Therefore, the findings could be treated as useful for further exploration of the issue.

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КОМИКСЫ В ОБУЧЕНИИ ГРАММАТИКЕ, ЛЕКСИКЕ И КОММУНИКАТИВНЫМ НАВЫКАМ АНГЛИЙСКОГО ЯЗЫКА

Comics as Educational Tools in Teaching English Grammar, Lexis and Communication Skills

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Abstract. *The paper claims comics to be efficient multimodal tools in teaching students of English not only grammar and vocabulary but also some communication skills, social and language norms of conducting a conversation. Being entertaining and having the multimodal potential that results in a strong effect on the recipients' responsiveness, comics highly motivate students to integrate in education process and make learning fun for teachers and children alike.*
The authors aim at presenting an algorithm of teaching English and conversation skills by means of comics design teaching passing through the following stages: introducing the communicative situation, learning cultural data (linguistic and extralinguistic) and a conversation pattern (social rules for opening, developing and closing a conversation), imitating the conversation, working with grammar patterns and speech clichés, reproducing the conversation following the pictures, and, finally, acting it out. Comics vividly demonstrate facial expressions and gestures of the characters that are crucial in communicating certain ideas in a multisemiotic way either accompanying speech or performing on their own.
The authors present the results of the experimental teaching to nine/ ten-year old children in a secondary school in Russia which prove comics to be functional, well-structured tools for acquiring grammar, lexis and communication skills by young learners of English.
Keywords: *educational tools, comics, multimodal text, communication skills, grammar, lexis.*

Введение
Introduction

Причины зарождения комиксов как полимодальных текстов кроются в полимодальности или многоканальности восприятия окружающего мира человеком – его естественном свойстве психики, доказательством чего являются отраженные в его сознании фрагменты картины мира как

результат осмысления информации, полученной посредством различных каналов восприятия. Неизменным свидетельством такой работы человеческой когниции, как отражение информации с использованием нескольких модальностей, являются Египетские иероглифы, дополненные картинками батальных сцен, а также картинками, изображающими жизнь фараонов и представления о загробной жизни. В 20-м веке полимодальные тексты оформились в ряд жанров визуального искусства (плакат, карикатура, реклама, комикс, графический роман и т.д.). Бурно развивающиеся компьютерные технологии с начала 21-го века добавили новые возможности в создание полимодальных текстов и способствовали их распространению.

В современном мире комиксы как объект массовой культуры оказались в центре внимания не только культурологов, психологов, литературоведов, психолингвистов, но и педагогов, которые присваивают этому жанру визуального искусства также роль образовательного инструмента. Включение комиксов в образовательную среду не означает отказ от традиционного текста, содержащего лишь вербальную модальность, требующего больших усилий со стороны обучающихся в осмыслении материала, а предполагает поиск более органичных, естественных и привычных для современного школьника способа познания действительности.

Исследователи выделяют такую особенность восприятия современных детей и молодых людей, как «клиповость», достаточно широко обсуждаемую современной наукой, получившей довольно большой резонанс – от критики данного явления и поиска борьбы с ним до признания клипового мышления неизбежной данностью (Amirzhanova & Skripnikova, 2019), особенностью восприятия современного человека, порожденного новым информационным веком (Dokuka, 2013) и преобладающей в нем визуальной культурой.

Учитывая клиповое восприятия современного читателя, использование комикса в образовании представляется весьма своевременным, поскольку серия картинок в комиксах не позволяет перегружать внимание реципиента, разбивая поток информации на отдельные кадры, которые легко запоминаются и помогают сосредоточиться на важных деталях, создавая благоприятную атмосферу для общения в классе, поскольку комиксы легко имитируют коммуникационные процессы.

Таким образом, цель настоящего исследования заключается в определении методики работы с комиксами в образовательной среде средней школы для более эффективного обучения современных школьников как языковым, так и коммуникативным навыкам общения на английском языке.

Обзор литературы
Literature Review

Полимодальные тексты традиционно применялись и применяются в различных дисциплинах школьного образования, однако в современных условиях с высоко развитыми способами визуальной коммуникации, к использованию полимодальных текстов на образовательной платформе предъявляются новые требования. В исследовании современных ученых (Kress & Leeuwen, 2006) поднимается вопрос о необходимости обучения школьников навыкам работы с полимодальными текстами – от их корректной интерпретации до создания подобных текстов, что требует развития «визуальной грамотности» у обучающихся.

О. Дучак (Duchak, 2014) приводит весьма основательный обзор литературы, посвященный изучению проблемы визуальной грамотности в образовании, начатого еще в конце 60-х г. прошлого века (Debes, 1968), и приходит к следующим выводам: в 21 веке умения и навыки интерпретировать цифровые, визуальные и аудио средства коммуникации так же важны, как чтение и письмо. Автор призывает педагогов обратить внимание на визуальные средства как инструмент, повышающий эффективность обучения, а также использовать информационные технологии по включению визуальных средств на уроках, обучая школьников цифровой грамотности в их использовании (Duchak, 2014).

Одно из последних исследований в области визуальной грамотности (Matusiak, Heinbach, Harper, & Bovee, 2019) выявило, что активное использование цифровых технологий во всех сферах нашей жизни, в том числе в образовании, само по себе не решает проблему визуальной компетенции у студентов. Результаты исследования показали, что студентов высших учебных заведений все еще нужно учить корректному отбору визуальных средств в академической среде, оценке их культурного контекста и применению в собственной работе (Matusiak et al., 2019). Причинами такой неразборчивости студентов в использовании визуальных ресурсов может быть огромная масса картинок, заполняющая сеть, где теряется авторство и социальный контекст (ввиду высокой скорости производства зрительных продуктов, ослабевания критического мышления).

Перед учителями школ сегодня так же остро, как и перед преподавателями университетов, стоят задачи по развитию визуальной грамотности обучающихся, поскольку их решение предполагает значительные усилия по достижению визуальной, цифровой и прочих компетенций собственно работниками образования.

Комиксы – особый жанр визуальной культуры, и их применение в образовании широко обсуждается в научных исследованиях. Для многих исследователей очевидны преимущества использования комиксов в классе, независимо от учебной дисциплины. Наиболее важными считаются: повышение мотивации учащихся (Crawford, 2004), более высокая доступность к пониманию материала (Hosler & Boomer, 2011), развитие воображения учащихся (Rozkosz & Wiorogórska, 2016), активное вовлечение учащихся в учебный процесс (Dalacosta, Kamariotaki-Paparrigopoulou, Palyvos, & Spyrellis, 2009), игровой компонент (Assad, 2017), развитие навыков чтения, письма, говорения, аудирования (Ranker, 2008; Short& Reeves, 2009; Vassilikopoulou, Retalis, Nezi, & Boloudakis, 2011) и другие.

Благодаря доступности цифровых технологий – генераторов комиксов, педагоги самостоятельно могут создавать свои комиксы в качестве дидактического материала, не имея особых знаний и навыков в изобразительном искусстве и техническом дизайне этого жанра (Lazarinis, Mazaraki, Verykios, & Panagiotakopoulos, 2015).

Что касается использования уже готовых комиксов, а также создания собственных серий с применением цифровых технологий (comic strip creator tools) в обучении английскому языку, особое внимание заслуживают комиксы, разработанные Биллом Зиммерманом, и предложенные вместе с необходимыми инструментами по созданию новых комиксов на сайте makebeliefscomix.com. Например, в интерактивном журнале "Fraidy Cats' Book of Courage" читателю предлагается не только увлекательное чтение с психологическими советами о том, как преодолеть страхи и быть более храбрым, с использованием в тексте множества клишированных широкоупотребительных разговорных фраз английского языка, но и раздел, в котором он может описать свой опыт в письменной форме на английском языке – при этом практикуется употребление видо-временных форм глагола как реакция на задания "The bravest thing I have done in my life was …", "A time when I found courage: …", "Someone I admire because of the courage they have shown: …", "Whom I would protect: …" и т.д. Используя книги Б. Зиммермана, учащиеся приобретают языковые и коммуникативные навыки в увлекательной форме.

В российском образовании опыт использования комиксов пока не большой, и тем не менее, некоторые шаги по развитию визуальной грамотности уже предпринимаются. Например, начиная с 2012 г. отдельные школы обучают детей английскому языку по учебно-методическому комплексу «Английский язык», созданному Ю.А. Комаровой, И.В. Ларионовой, Ж. Перретт для начальных классов, который входит в систему учебников для средней школы «Инновационная школа» (Komarova, Larionova, & Perrett, 2015). В данном учебнике разработана серия комиксов,

на базе которых учащимся предложен лексический, грамматический, фонетический материал.

Методология
Methodology

Авторы данной статьи имеют опыт исследования в области развития визуальной грамотности обучающихся при работе с интернет-мемами как полимодальными текстами – от умения их интерпретировать, использовать в коммуникативном процессе до создания собственных сообщений в виде мема. В работах авторов (Sedliarova, Solovyeva, & Nenasheva, 2019; Sedliarova, Solovyeva, & Nenasheva, 2020a; Sedliarova, Solovyeva, & Nenasheva, 2020b) изложены идеи о ценности этих полимодальных текстов, применяемых в качестве дидактического материала для формирования социокультурной компетенции обучающихся, а также методика обучения с их использованием. В продолжение предпринятого исследования полимодальных текстов для повышения визуальной грамотности и эффективности обучения английскому языку авторы изучают потенциал комиксов как образовательного инструмента.

Настоящее исследование основывается на экспериментальной работе с учащимися третьего класса (второй год обучения) общеобразовательной школы село Фершампенуаз Челябинской области, Россия. Эксперимент проводился в течение двух недель (два урока в неделю по школьному расписанию, продолжительность одного урока – сорок пять минут). В эксперименте участвовали две группы – контрольная и экспериментальная, по 10 человек в каждой, с соблюдением как неварьируемых, так и варьируемых условий.

К неварьируемым условиям относились следующие: одинаковый уровень владения английским языком, диалогический текст, предъявляемый учащимся при нулевом срезе. Варьируемым условием стала методика работы с текстом. В контрольной группе работали только с вербальным текстом, в экспериментальной группе текст диалога был представлен в виде комикса, где вербальный текст взаимодействует с его визуализацией – изображением персонажей в коммуникативном действии. Главный критерий оценки успешного обучения – максимальная точность имитации и запоминания текста при его воспроизведении.

Экспериментальное обучение проходило в три этапа: 1) нулевой срез для определения уровня учащихся в экспериментальной группе и контрольной группе; 2) экспериментальное обучение для подтверждения гипотезы о том, что комиксы способствуют эффективному усвоению

информации; 3) итоговый срез – выявление результатов экспериментального обучения.

На первом уроке при проведении нулевого среза учащиеся контрольной и экспериментальной групп прослушали следующий диалог со зрительной опорой на текст из учебника «Английский язык. Brilliant»:

Nora: "Ha. Ha! Look at Denzil!

Denzil: "Do you like my flippers?

Brill: "Yes, I do."

Alice: "Are we going to go on holiday, Brill?"

Brill: "Yes, we are. We're going to go to the beach."

Alice: "We are going to swim in the sea."

Bertie: "I'm going to catch lots of fish."

Eddie: "I've got my lilo."

Fred: "I've got my armbands."

Brill: "I've got a picnic basket. We're going to have a picnic."

Nora: "Where's my sun hat?"

Alice: "It's on your head, Nora!"

Brill: "Come on! Let's go! The stars are on Magic Mountain and we're going to have a brilliant holiday!" (Komarova, Larionova, & Perrett, 2015).

Прослушав весь текст один раз, затем, повторяя каждую реплику за диктором (используя аудиозапись), и еще раз прослушав текст целиком, со зрительной опорой, каждый учащийся самостоятельно прочитал текст. Оценивались следующие факторы: интонационный рисунок утвердительных, восклицательных и вопросительных предложений, а также правильность произнесения слов. Правильность выполнения задания определялась по количеству оцениваемых единиц (слов и предложений) в тексте. Далее, учащимся было предложено воспроизвести диалог по ролям по памяти, без визуальной опоры на текст.

На этапе экспериментального обучения контрольная группа продолжила работать с тем же текстом в том виде, в котором он был представлен на первом этапе, а экспериментальной группе был представлен данный текст в виде восьми кадров комикса (Рис. 1, Рис. 2):

При предъявлении текста в обеих группах были сняты лексические трудности текста. Новые слова – *flippers, beach, sea, lilo, armbands, sun hat, picnic basket* – в экспериментальной группе были прослушаны с демонстрацией картинок и переведены на русский язык. Повторив эти слова за учителем, учащиеся прочитали их самостоятельно. В контрольной группе семантизация данных слов происходила без опоры на их визуальные образы. Кроме того, в этом тексте впервые в учебнике встречается конструкция 'be going to', и учитель ввел ее, пояснив ее значение как способ рассказать о своих планах на будущее.

Рисунок 1. ***Диалог 1-4*** *(Komarova, Larionova, & Perrett, 2015)*
Figure 1 ***Conversation 1-4*** *(Komarova, Larionova, & Perrett, 2015)*

Рисунок 2. ***Диалог 5-8*** *(Komarova, Larionova, & Perrett, 2015)*
Figure 2 ***Conversation 5-8*** *(Komarova, Larionova, & Perrett, 2015)*

Затем учащимся были заданы следующие вопросы: *О чем разговаривают персонажи? Куда они собираются идти? Что есть у каждого из них?* После прослушивания аудиозаписи текста с опорой на кадры комикса в экспериментальной группе и с опорой только на вербальный текст в контрольной, учащиеся отвечали на предложенные вопросы.

Далее в обеих группах текст диалога был переведен на русский язык. Снова прослушав аудиотекст, учащиеся повторяли его, глядя на кадры комикса (в экспериментальной группе), и с опорой только на вербальный текст (в контрольной группе). Следующим заданием в обеих группах было чтение текста по ролям. Учащимся также было дано задание найти вопросительные предложения и соотнести их с ответами. На последних двух уроках экспериментального обучения учащиеся снова просмотрели и прослушали диалог, прочитали его по ролям. Перед контрольным воспроизведением диалога по памяти в экспериментальной группе из комиксов удалили реплики, и учащиеся заполняли пустые текстовые пузыри – speech bubbles (Рис. 3).

*Рисунок 3. **Текстовые пузыри** (Komarova, Larionova, & Perrett, 2015)*
*Figure 3 **Speech Bubbles** (Komarova, Larionova, & Perrett, 2015)*

В контрольной группе из текста были удалены новые слова, которые изучались на первом занятии.

Во время контрольного среза учащимся обеих групп предстояло разыграть диалог по ролям в мини-группах по три человека. Каждый учащийся исполнял по 2-3 роли в зависимости от количества реплик

персонажа (по 4-5 реплик): учащийся 1 – Brill, Eddie, учащийся 2 – Nora, Fred, Bertie, учащийся 3 – Denzil, Alice, Eddie. Затем учащиеся менялись ролями.

Результаты исследования
Research Results

На этапе нулевого среза оценивались два вида деятельности: 1) чтение диалога: интонационный рисунок утвердительных, восклицательных и вопросительных предложений, а также правильность произнесения слов; 2) воспроизведение диалога по ролям без зрительной опоры на текст.

Правильность выполнения первого задания по количеству оцениваемых единиц (слов и предложений) в обеих группах составила около 30%. Результат выполнения второго задания составил 0% в каждой группе (Рис. 4).
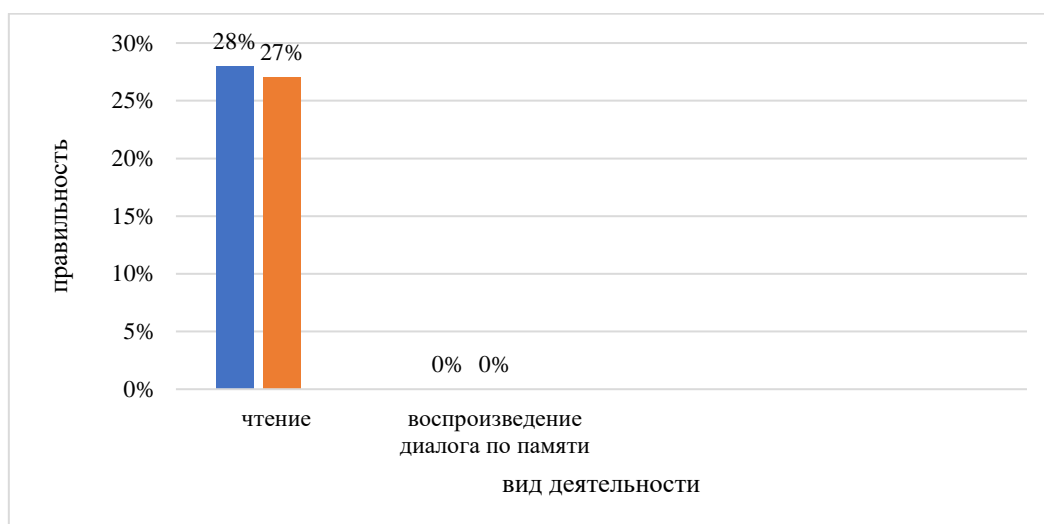

*Рисунок 4. **Нулевой срез – правильность чтения, воспроизведение диалога по памяти***
*Figure 4 **Initial Assessment – correct Reading, Dialogue Role-playing by Memory***

На этапе экспериментального обучения после прослушивания аудиозаписи текста с опорой на кадры комикса в экспериментальной группе и с опорой только на вербальный текст в контрольной, учащиеся отвечали на предложенные вопросы. В экспериментальной группе свыше 50% учащихся дали верные ответы без затруднений, а в контрольной – 30%.

Контрольный срез показал следующие результаты. В экспериментальной группе 7 из 10 учащихся запомнили диалог на 100%. Оставшиеся учащиеся запомнили его на 75%. В контрольной группе только

3 из 10 учащихся воспроизвели текст на 100%, 5 учеников запомнили текст на 60%, 2 учащихся запомнили текст менее, чем на 50% (Рис. 5). Правильность воспроизведения текста оценивалась по количеству правильно произнесенных слов, точной интонации предложений разного коммуникативного вида, верной последовательности реплик в соответствии с полученными ролями.
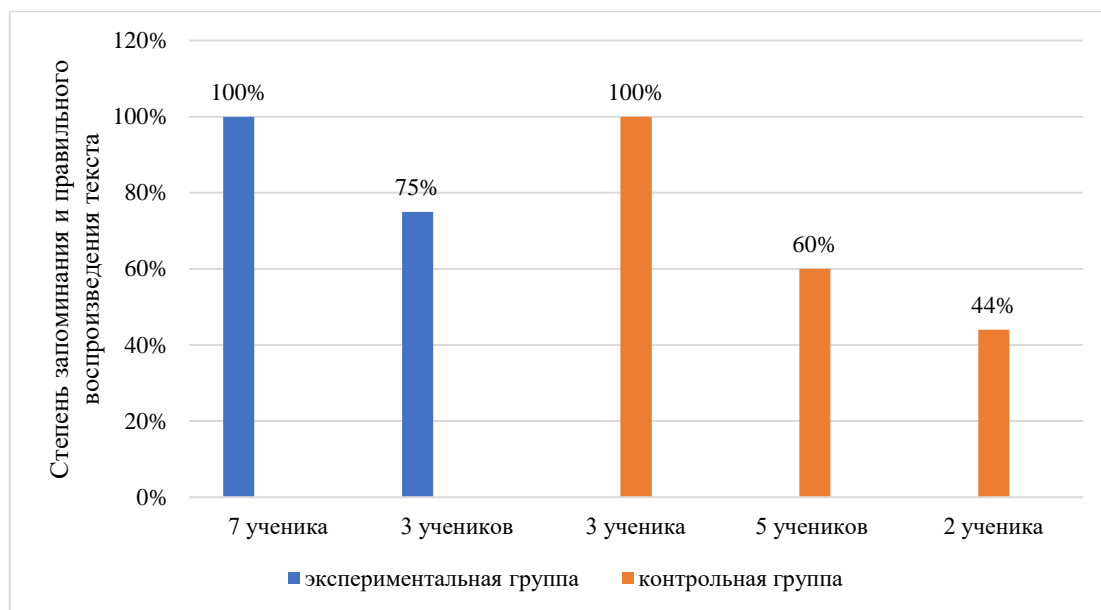

Рисунок 5. **Контрольный срез – правильность запоминания и воспроизведения**
диалога по памяти
Figure 5 **Final Assessment – correct Role-playing by Memory**

Согласно проведенному экспериментальному обучению, учащиеся экспериментальной группы смогли запомнить текст диалога лучше, опираясь на зрительные образы, чем учащиеся контрольной группы, работающие с текстом без картинок.

Выводы и дискуссия
Conclusions and Discussion

Результаты эксперимента показали эффективность использования комикса как полимодального текста в запоминании материала, как представляется, благодаря ряду факторов. Во-первых, яркие картинки мотивировали учащихся к обучению, воздействуя на зрительный канал восприятия визуальных образов, вызывая у них живой интерес к развивающемуся сюжету. Во-вторых, положительному восприятию информации также способствовали изображенные мимика и жесты

персонажей, которые, в свою очередь, являлись дополнением к передаче эмоционального настроя при фонологическом оформлении речи. Учащиеся экспериментальной группы более эмоционально произносили свои реплики. В-третьих, учащиеся экспериментальной группы сами легко догадались о значении новых слов, глядя на картинку, до того, как учитель семантизировал эти слова посредством перевода. У детей контрольной группы данный канал не был задействован, поэтому они узнали о значении новых слов, когда учитель перевел их на русский язык. В-четвертых, несмотря на многократное повторение одних и тех же грамматических конструкций – *be going to* для введения новой грамматической конструкции и *have got* для закрепления уже известной в обоих вариантах текста, в тексте комикса это повторение не воспринимаются так монотонно, как в тексте с одной вербальной модальностью. Поэтому обучение грамматическим конструкциям с помощью комиксов происходит тоже легче. Кроме того, дети в экспериментальной группе более точно воспроизводили очередность реплик, соблюдая вопросно-ответные реакции. Таким образом, можно заключить, что применение комиксов способствует более успешному усвоению лексического, грамматического материала, развитию фонологических и коммуникационных навыков (вопросно-ответные реакции, мимика, жесты).

Summary

Visual culture, the product of the information age we all belong to now, raises certain problems that are highly discussed by specialist and experts of various fields of human endeavor – art, psychology, sociology, literature, education, etc. Visual literacy, being one of the biggest problems resulted from visual culture, appears to be in the focus of educators' attention at present as more and more multimodal texts are being integrated in the education process, with comics among them. Visual literacy implies the ability of understanding, recognizing and interpreting the pieces of visual culture by the recipients. Only based on the right interpretation multimodal texts can make efficient tools in the classroom environment.

Comics as an alternative teaching resource can present complex material in an entertaining way due to its inherent humor aspect, telling a story by a series of static images. With text and image forming a whole, comics change perspectives on education processes (which used to have training practices based on verbal texts mostly) and encourage students' participation in all kinds of activities increasing efficiency in meaningful learning. Given information technology, teachers and students can use educational comic's resources to study English grammar, vocabulary, practice reading or produce their own comic strips as supplementary materials for teaching-learning purposes by means of comic strip creator tools that can be found on the internet.

This paper aimed at proving beneficial effects of comics in educational settings presents the empirical results of the use of comics in teaching English to 9/10-year-old learners of English. The results have revealed that the students affected by the visual appeal of the image, comparing to students who studied a verbal text only, show higher performance in memorizing

the verbal text, imitating the intonation patterns and accurate pronunciation of new words, conveying emotions of the fictional characters in role playing the conversation. They make fewer mistakes, avoid long pauses and hesitations in performing their roles. The bright colors, the body language of the characters and the visuals 'explaining' the meaning of new words have a positive effect on the students' perception of the material, and a series of images presenting a conversation pattern contributes to the development of conversation skills in students making the education process both more joyful and fruitful.

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