

The potential of developing and creating online applications for teacher training

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Abstract. In the modern society, technology is everywhere. From birth, children learn about technology and develop computer competence. Whether a baby, preschooler, or adult – it doesn't matter, everyone has basic skills in manipulating devices and interacting with the Internet (according to age, body functionality, etc.). However, this is not what can satisfy the growing need to change approaches to professional activities in various fields of science and life. In particular, to education at all levels, which should ensure qualitative and quantitative changes for further professional activity.

For example, we conducted a review of the latest theoretical and practical publications on the development and creation of online applications, which formed the basis for our own reflections on their implementation and use. It is not the first year that we have been addressing the issue of application development, collecting and analysing information on the involvement of future teachers in content development. After all, observing the development of technological solutions in developed countries of Europe and the USA, we analysed the development and demand for new technological solutions in education. And as a result of this introduction, based on the analysis, we were able to consider: fundamental differences in understanding and approaches to working with applications in the Ukrainian scientific community and in international practice; analyse the potential of developing and creating applications by students majoring in primary education and preschool education; to make a snapshot of

data through feedback on their e-portfolios of relevant developments of their own production and lists of applications available online.

This approach allowed us to draw conclusions about the potential risks of implementing online applications in practice. We also identified critical points in preparing teachers to use existing, create and develop their own online applications for working with children.

Keywords: app development, apps, e-portfolio, m-learning, teacher training.

I. INTRODUCTION

Technological solutions that will reduce the time spent on self-education, mastering basic knowledge, and acquiring the necessary digital competence and computer literacy. These issues require intervention not only in the process of training specialists, but most importantly in the work of teachers of the first two levels of education. After all, according to the 2015 reports of the American education system, "7,000 students drop out of school every day. That is one student every 26 seconds. 1.2 million a year, and most of them say that the key reason for this decision is that they are bored" [1]. In Ukrainian society, for example, there is no such statistical information [2], although such cases are recorded by the Ministry of Social Policy. However, it is the thesis of "boredom" that should

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be of primary concern, as most young people of primary and secondary school age not only have access to gadgets and the Internet, but also easily manipulate information, find what they are interested in, and study subjects on their own ahead of the school curriculum. This often leads to conflict situations between adults and children, but for us, the main thing is to emphasise the need to change approaches to the implementation of educational programmes through technological solutions.

Yes, of course, in countries with high economic performance, high levels of prosperity and happiness, the quality of education changes faster. This is because innovations are more quickly adapted and implemented in preschool and primary education. While countries with low development indicators do not have this opportunity. This can be traced even in the format of the entry of certain terms and technologies into the space of each country, their development through state or grant funding, and their geographical distribution. All this creates a generalised picture of possible changes in education.

While studying the implementation of technological solutions in Ukraine (which the team has done before), the review focused on the use of applications in the work of educators and teachers in preschool and primary schools. In the process of analysing the materials, it was also found out to what extent students are able to develop and store developed materials on various platforms in their electronic portfolios and to what extent they are familiar with applications that can be used when working with children on various subjects or those that can be offered to parents for home use. Of course, this research cannot describe the situation in the whole of Ukraine, but this snapshot allows us to understand the potential risks in preparing teachers to develop and create online applications.

II. MATERIALS AND METHODS

That is why the aim of this paper was to explore the potential of developing and creating online applications in teacher training as one of the steps in the digitalisation of education through affordable and widespread gadgets. Based on the defined aim, the research was launched with the hope of solving the following tasks:

- to analyse research on the development and creation of online applications and consider the fundamental differences in understanding and approaches to working with applications in the Ukrainian scientific community and in international practice;
- to explore the potential of developing and creating applications by students of primary education and preschool education, to make a snapshot of data through feedback on their e-portfolios of relevant in-house developments and lists of applications available online.

In addition to the main research method of data collection and analysis, observations and surveys were used to interact with students, which allowed us to present the results of a small sample of 46 participants.

III. RESULTS

Referring to research and scientific and practical studies on the use of various applications in the work of teachers, it was found that since 2012 [3], the international

community has begun to consider mobile devices as one of the most likely devices for organising education. After all, the modern age is characterised by personal and technical mobility, when mobile devices, including phones, MP3 players and PDAs, are carried everywhere, and the education paradigm is shifting towards distance learning [4]. This is since billions of people today use mobile devices for communication and other tasks, but only a minority of them regularly use them for learning [3], confirming that the entertainment capabilities of mobile devices distract or even conflict with learning needs beyond the educational capabilities [3].

Although, according to other studies, in our opinion, it is worth paying more attention to the trends in the use of portable and flexible learning tools such as smartphones and tablets, which are currently responsible for the m-learning phenomenon. It allows students to use mobile applications for their academic studies, to search for educational materials and exchange information, which leads them to improve their performance [5]. In addition, m-learning is considered as learning in different contexts, through social and content interaction, using personal electronic devices [5].

For example, as part of research on different approaches to e-learning, scientists have developed and analysed the results of such programmes as:

- the introduction of tablet computers in schools in Thailand and Turkey; projects on the use of mobile phones that can provide access to distance education for teachers in remote areas of Mozambique, promote literacy among girls in Pakistan, motivate young people in South Africa to read and improve their maths skills, promote literacy among adult women in Niger [3];
- AMULETS project (Advanced Mobile and Ubiquitous Learning Environments for Teachers and Students) to develop, implement and evaluate innovative educational scenarios for collaborative learning in a context supported by mobile and ubiquitous technologies in an authentic environment; Mobile Digital Narrative (mobileDN) project, which involves the creation of a collective multimedia digital narrative filmed entirely on mobile phones by a group of distributed students, from idea generation to final product [4];
- a simulation laboratory and software for students in the study of polymers and metals; a model of online computer courses on the impact of the cooperative method on group work; pilot e-learning programmes in areas such as computer mathematics education or computer programming courses; teaching methods in the structure of online learning, which investigated the limited knowledge transferred during learning in the online environment and the exhaustion of learning in a short period of time; a method of distance learning through interactive [6]
- the creation of the aprendo platform for school principals, which serves more than 12,000 teachers in primary, secondary and vocational schools, offering a wide range of learning opportunities [7], etc.

Although a number of countries use mobile learning only in specific projects and programmes, the prevalence of mobile devices is a good reason to consider smartphones

as a mainstream medium for education. That is why all countries, and their governments recognise the crucial role of technology in ensuring access to and improving the quality of education, as well as in lifelong learning [8]. But at the same time, it is noted that state education policy "focuses on technology - hardware, software, networking, content - rather than its connection to pedagogy, curriculum or assessment [3], which leads to a delay in transformations and slows down the processes of education renewal. And as a result, the loss of interest in learning, the loss of the educational system's position in front of the entertainment market. And, given the cause-and-effect relationship, the gradual loss of human capital with a high potential for innovation and productivity; demographic, social, cultural and other crisis phenomena that lead to economic downturns, among other things. In continuation of this idea, it is worth noting that before a school purchases tablets for students, it is necessary to make important organisational, ethical and usage guidelines decisions, as the introduction of 1:1 device triggers systemic changes [9]. Which means changes in the entire school system.

That is why, in the context of m-learning, special attention should be paid to the presence of a number of professionally significant functions (the ability to reflect, create, self-organise, self-develop, selectivity, manifestation of content creation, innovative solutions) in combination with professional skills that will allow teachers to act as reflective agents of industrial and socio-cultural innovations, which ensures their personal and professional success [10] in practice. And all this should take place in parallel with the development of competence and the implementation of skills within the framework of computer-oriented communication, which will allow to perform new functions to which the educational system is moving - cooperation, consulting, tutoring, monitoring, which allow to implement alternative forms of personal training, interactive classes and group teaching [10].

In addition, if necessary and possible, teachers should consider developing mobile learning activities that fulfil specific learning objectives and become rather a means of enabling activities that would otherwise be impossible or increase the benefits for learners [4]. Such a development strategy can only meet a part of the needs of teachers to implement the subject matter objectives. In addition, after the development of various elements of the game, attention should be paid to self-awareness, self-regulation and motivation [11], which will be formed by the developer's intention and as part of the processing of the proposal, team members should predict different levels of problematic issues that may arise as a result of the student's interaction with the proposed educational application.

In addition, at all stages, the team should follow a clear algorithm for testing the application, including the ethical framework or strategy for making ethical decisions in the context of which the scenario in the proposed application will be considered; the scenario itself and a set of questions to stimulate ethical discussion of the scenario [12].

Such a set should also be used when considering the use of third-party applications that are freely available either on gaming educational platforms or in the Google, Microsoft or Apple markets. After all, mobile technologies for teaching and learning in school and beyond using

multimedia content created or captured using mobile devices, teachers contribute to the possibility of students to learn for life outside of formal educational contexts, and the process of using them can expand the possibilities of

Although it is primarily a matter of developing their own software, they should understand that this creates a few problematic issues. In particular:

- the so-called "Acceptance of the Unexpected", which is related to teachers' fear that something can go wrong and can be solved by establishing "golden rules" of what is acceptable and unacceptable in a school or educational institution" [9].
- a policy of "support for open technical standards", which should be based on encouraging the use of open, standards-based platforms for mobile learning applications to increase access and simplify the development process [3]. In our opinion, we should partially agree with the approach here, since the use of data, platforms and applications on a particular device depends on the policy of the gadget manufacturer. For example, some gadgets have Android, while others have Microsoft or iPhone OS. In addition to the difference in the underlying software, there is the issue of outdated technology that cannot withstand new applications due to their requirements for screen resolution, video card, and even battery life. In addition, we no longer address the issues of programming languages, game engines, and other development nuances that directly affect the operation of applications on different devices. Even a simple website 4 years ago had to be manually adjusted for high-quality visualisation on devices with different screen sizes, resolutions, and colour spectrums. Therefore, the issue of accessibility and universality of the proposed content for education through mobile devices is quite interesting, but currently a difficult topic to implement.

In addition, continuing to address the topic of studying the development and evolution of interactive games and applications, the study will reveal a number of specific characteristics and recommendations for the evolution of these modelled microcosms based on real environments and societies, which can offer educators and educators excellent opportunities to understand how the dynamics generated on the Internet stimulate and generate the development of community learning environments [13]. This process is quite interesting, but needs further explanation for the creators of modern educational products, who present the entertainment element of educational content as a reward that can only be obtained by being willing to suffer a little from the pedagogical process itself, which from the very beginning creates an ambivalent dichotomy between entertainment and education, as if the learning process itself is an unpleasant experience that needs to be supported by a number of techniques and tools external to pedagogy [13]. This is another disadvantage that hinders the implementation of applications in practice, even if there are opportunities.

Indeed, the research outlines quite a few negative aspects of using mobile learning, including applications in the educational process, but this does not mean that it is a failed option for the traditional educational space. Developers and researchers should understand that society

and teachers of all levels of education need to be prepared to use not only ICT, distance learning, online courses, but also to shift the emphasis in the role of the teacher, in the presentation of course materials, which should primarily motivate the search for information and the formation of appropriate competencies for the professional development of the individual.

That is why, in order to address the main objectives of this paper, questions related to the results of the technical awareness of 46 students who were to participate in the educational hackathon and the interview based on the survey results were considered.

Thus, it turned out that all students in the previous year had created educational game applications on various platforms, but they could not specify which topic or subject they had developed. Except for 5 people who added descriptions and links to the exercises they created. In addition, the question of creating their own e-portfolio was not raised at all, because as students noted in the interviews: "If I need to, I will create it again", "I'd rather use ready-made exercises by teachers that I found on the Internet", "At school, I probably won't have time and need to play with children", "I will work with the Intellect programme, so I don't need to develop anything. The whole course is ready", etc. Of course, this short description does not reflect the experience and general picture among students preparing to become teachers, but it gives us an opportunity to think about why the education system is so slow to adopt innovations. And also to answer a dozen more questions about why, which are voiced by teachers, parents and children involved in the educational process.

In addition, a follow-up a year later with the same group of respondents showed that students did not remember the applications and exercises that were offered to them during the meetings a year ago. In particular, they found it difficult to find their own presentations created as part of the educational hackathon.

Thus, we can confirm the lack of motivation to create their own e-portfolio for further professional activities, which can save time when preparing for a lesson or class. Of course, such a description can be called subjective, but it is also indicative of the situation in the education sector and the gap between the offer of technological solutions and innovations and reality. In particular, the presence of a green board instead of an interactive one in schools and other educational institutions.

IV. DISCUSSION

In continuation of the topic of the use or lack of such practice in educational institutions, we must mention an important aspect - no matter how many adults try to create an artificial classroom filled with educational content, children, as true explorers and seekers of adventure or freedom, find dozens of holes and go beyond the proposed space. Therefore, it is virtually impossible to calculate and outline all the variants of interaction and cause-and-effect relationships of youth participation in learning through mobile applications as in a traditional classroom.

We also believe that the issue of longevity, i.e. the life cycle of the proposed application, its self-sufficiency and consumer interest, is among the issues under discussion. After all, in our practice, we often come across developments for individual subjects and game content, the

life cycle of which, for various reasons, does not go beyond 1 month or 1 year. Then, even if dozens of teachers want it, this app goes out of business and disappears. Therefore, there is no way to find quality content offered by businesses or indie developers that could be a permanent platform for a subject teacher, educator, or speech therapist. Apps, like any product, only become viable players in the market if they are developed and supported by the public sector, corporations, or donations.

The third issue is the attitude of the educators themselves towards the proposed applications. According to our observations, as long as the project proposal is in place and there is a constant need to report on the use of a particular application within the pilot schools or across the country, the process is ongoing. Since the end of the reporting period, only a few teachers who have "taken a liking" to the app have been included in the process, or the children themselves continue to use the app without appropriate adult supervision. This also has a significant impact on personal development, on children's attitudes to their own activities and to suggestions from others. Children see, children hear and, of course, imitate the behaviour of the adults they interact with during the 12 years of their school life. Therefore, innovations should not be introduced vertically or horizontally in accordance with state or school policy, but in accordance with the technical capacity of the school, students (today in Ukrainian reality, not all families can afford to buy a smartphone, let alone provide a separate gadget for a child) and the computer skills of the teacher.

Of course, these are not all the issues that can trigger a discussion on this topic, but not all of them are critical for scientific and practical searches for the introduction of mobile learning technologies into the educational process, along with the training of teachers who could independently or in a team create the necessary content – applications for the development and education of children, the formation of age-appropriate competencies.

V. CONCLUSIONS

Therefore, in this paper, we have dived into the issue of mobile learning, including the use of apps, their potential and controversial issues that require careful planning on the part of the teacher. In particular, what to use and how to use it; what purpose and task should the task performed in the application have; what to pay attention to when developing your own application or using a third-party application. Of course, this review does not cover all the issues related to the potential of developing and creating online applications in teacher education, but we have outlined the main positions that have been and are important components for our pedagogical activities.

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