Transforming Higher Education in the Era of Artificial Intelligence Chat Tools: Case Study

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Abstract. **These days it's hard to find someone who hasn't heard of Artificial Intelligence (AI). It is a reality of today's life. Although there are many questions – how to use it effectively, especially in higher education and research. Therefore, the question of AI Literacy becomes relevant, where the key aspects relate to knowledge, skills and psychosocial factors, including a positive attitude towards AI technology and tools. In order to conduct the corresponding transformation of teaching, learning and assessment from the perspective of higher education, the readiness to use AI tools on the example of AI Chat Tools by staff must first be determined. So, within the scope of ERASMUS+ project "DialogEduShift: Transforming Higher Education Teaching and Evaluation Approaches in the Era of AI Chat Tools" the survey was created for cross-country research, including the respondents from the following countries: Poland, Germany, Turkey, Ukraine, Latvia. A comparative analysis of the survey results was then conducted regarding the perspective of three respondent groups: experts in IT field, academician, and university administration. While some questions were specified and intended only for academician.**
This article reviews the insights and suggestions gathered during the survey by creating the list of guidelines for effective transformation of teaching and assessment in higher education institutions in the Era of AI Chat Tools. The aim of the article is to determine the AI Literacy of three groups of respondents: IT experts, academician, and university administration who use AI Chat Tools to increase the effectiveness of their work and to summarize the guidelines for updating and renewing teaching and evaluation approaches in higher education institutions by implementing AI Chat Tools. This research is valuable for improving AI Literacy of higher education staff.

Keywords: artificial intelligence, AI Chat Tools, transformation, teaching, evaluation, higher education.

I.INTRODUCTION

When did the first thoughts about artificial intelligence (AI) actually arise? As early as 1641, Thomas Hobbes published Leviathan and presented a mechanical theory of cognition based on combinatorics, emphasizing the role of calculation. At the same time, Blaise Pascal invented a mechanical calculating machine. Subsequently, many other inventions were introduced and used extensively [6].

While the development of AI accelerated significantly in the 1990s, largely due to increases in computing power. One notable event was the victory in 1997 of Deep Blue computer program over world chess champion Garry Kasparov [11]. The history of AI is one of ups and downs, both in terms of interest and funding. Despite a challenging journey, AI is now gaining ever-increasing popularity and is entering a new phase of development.

At the current time, the development of AI represents a turning point that influences various areas of our lives. One area where modern technology plays a key role is education, including higher education (HE). While it raises may questions and discussions regarding its effective use in teaching and evaluation in HE. Despite the increasing prevalence of AI in today's world, many professions still require unique human competence that AI cannot replace. Therefore, the presence of teachers and mentors in educational processes remains, but their traditional roles change to supportive and developing specific skills like critical thinking, interpersonal skills, problem-solving, etc [8].

The effective transformation of teaching and assessment in higher education institutions in the Era of AI Chat Tools is required, focusing on the primary tenets and its implementation. So, the aim of the article is to determine the AI Literacy of three groups of respondents: IT experts, academician, and university administration who use AI Chat Tools to increase the effectiveness of their work and to summarize the guidelines for updating and renewing teaching and evaluation approaches in higher education institutions by implementing AI Chat Tools.

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II.LITERATURE REVIEW

By conducting the systematic literature review from 2016 to 2022 Helen Crompton and Diane Burke found that interest in research on AI aspect in HE is increasing, and in particular identified five areas of its effective application – from assessment and evaluation to prediction, assistance and student management. While there is a need to empirical research for the appliance of new tools like ChatGPT [5].

According to "The AI Index 2023 Annual Report" presented by Stanford University, AI has entered its age of use. New large-scale AI models were released every month throughout 2022 and early 2023, such as ChatGPT, Bing Chat, etc. with wide range of tasks, from text manipulation and analysis to image generation and unparalleled speech recognition. These systems demonstrate capabilities in answering questions and generating text, images and code that would have been unimaginable a decade ago. AI will continue to improve and as such will become a larger and larger part of our lives. While the effective use and implementation requires additional knowledge and competence [8].

But what exactly is artificial intelligence? The term AI was coined by McCarthy in 1956 during the Dartmouth Conference, where he proposed it as the name for the field of research devoted to the development of machines that can perform tasks that would normally require human intelligence [9]. He is widely regarded as one of the founding fathers of artificial intelligence. The background of early AI was the idea of developing new techniques in data processing. Subsequently, different solutions were sought for various reasons, such as simulating human abilities through machines, applying them in efficient engineering and management applications, providing empirical facts and theoretical hypotheses about the brain or behaviour, and embodying knowledge in computers, in relation to real-life situations, how to relate decision-making, etc. [3].

According to the UNESCO World Commission on the Ethics of Scientific Knowledge and Technology, there is no single or fixed definition of AI, but there is general agreement that AI-based machines are potentially capable of imitating or even exceeding human cognitive abilities, including perception, language interaction, reasoning and analysis, problem solving, creativity, etc. [15].

AI is widely used in our daily lives and also includes education. There are currently many unmet priorities for improving teaching and learning. As a result, educators are looking for technology-driven solutions that are secure, effective, and scalable. They acknowledge the rapid advances in technology in their everyday lives and wonder how these might be applied to teaching and learning. Some are already using AI-powered tools, but there is still a need to understand the full potential of different AI tools, while considering possible risks such as privacy and security risks. Despite the risks, educators are excited to explore how AI can improve the teaching and learning experience for themselves and their students [2].

One of the most popular AI tools is ChatGPT. It is a language model developed by OpenAI that has shown potential in the education industry. ChatGPT generates human-like responses and conducts conversations with users using natural language processing and machine learning techniques. While ChatGPT and AI-based solutions can provide valuable support and resources in higher education courses, such tools should not be viewed as a replacement for instructors/ educators or traditional teaching instruction. It can be used in various aspects ranging from assessment, teaching/learning to research [13].

According to UNESCO, ChatGPT is a language model that allows people to interact with a computer in a more natural and conversational way. GPT stands for “Generative Pre-trained Transformer” and is the name for a family of natural language models developed by open AI. This is also known as a form of generative AI due to its ability to deliver original results. ChatGPT uses natural language processing to learn from Internet data and provide with artificial intelligence-based written answers to questions or prompts. These models are trained on large text datasets to learn to predict the next word in a sentence and then generate coherent and convincing human-like output in response to a question or statement [14].

It is important to emphasize, that the free version of ChatGPT is based on GPT-3.5, which has limited access to external data or the internet. Additionally, there is a premium option called ChatGPT Plus that uses GPT-4 (Rospigliosi, 2023). Research by Crawford, Cowling, and Allen (2023) demonstrates that ChatGPT outperforms students, suggesting it has the potential to improve higher education courses and potentially revolutionize conventional learning methods [4].

While, Gemini (formerly named Bard) is a generative artificial intelligence chatbot developed by Google (March 21, 2023). Gemini operates on the Language Model for Dialogue Applications (LaMDA) model. It represents Google’s family of large conversation models [7].

Additionally, Microsoft Copilot (formerly named Bing Chat), uses large language model technology such as GPT-4 and DALL-E 3 to provide answers [12]. DALL-E 3 is an AI system developed by OpenAI that takes a text prompt as input and generates a new image as output. It builds on its predecessor DALL-E 2, by enhancing caption fidelity and image quality [1].

Summing up, advances in AI such as ChatGPT, Gemini and Microsoft Copilot offer promising potential for transforming various sectors including higher education, conversational interactions and imaging through their representative innovative technologies and capabilities.

After thoroughly reviewing the existing literature on AI, it is essential to outline the methodology employed in this study to address the research questions and objectives identified.

III.MATERIALS AND METHODS

The survey was created within the scope of ERASMUS+ project “DialogEduShift: Transforming Higher Education Teaching and Evaluation Approaches in the Era of AI Chat Tools” for cross-country research,

including the respondents from the following countries: Poland, Germany, Turkey, Ukraine, Latvia.

The theoretical framework of the survey was developed together with the partners, initiated through a comprehensive literature review focused on the integration of AI Chat tools into HE teaching and assessment methods in their respective countries. This included identifying prevailing issues, established practices and existing policies in each partner country. Based on the collective results of all partners, were then evaluated, leading to the formulation of survey questions that covered aspects common to all regions.

The semi-structed survey included ten questions, some of which provided Liker-scale ratings and others of which were open-ended questions, the presented areas are shown in Figure 1.

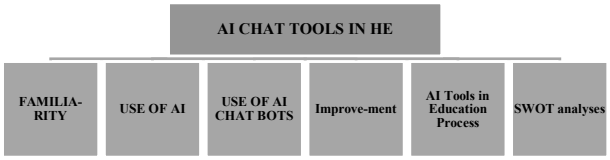

Fig. 1. AI CHAT TOOLS in HE.

Where **Area 1** covered familiarity with concepts such as Artificial Intelligence (AI), Generative AI, data science, machine learning and AI chatbot and required the detailed information on what you know about AI and how you understand it. **Area 2,** on the other hand, dealt with the use or encounter of AI tools in daily life such as AI chatbots, Image generator, Image/ video editor, Video generator, Sound and music generator and Computer vision and required details on the situations and ways of use. In addition, **Area 3** covered the use of AI chatbots such as ChatGPT, Google Bard and Bing Chat. **Area 4** reflected the improvement of the study process in HE thanks to AI technologies, asked how AI technologies can contribute to its improvement, and provided examples/ share experiences when AI tools were helpful or necessary in the study process. It is important to emphasize that this was intended for academicians only. In **Area 5,** six statements on AI in the education process were offered using 5-Likert scale, covering: AI tools in the assessment process; AI tools to create personalized learning approaches; sufficient knowledge and skills for the use of AI technologies in the study process; the need to enhance your knowledge and skills in using AI technologies in the study process; AI creates opportunities for the improvement of the education/study process; AI poses challenges to the education/study process. Area 5 was also only addressed to academicians. Finally, **Area 6** presented SWOT analysis in order to analyse the strengths, weaknesses, opportunities, and threats that the participants believe AI can create in the higher education studying process. A comprehensive survey was conducted across five educational institutions: Rezekne Academy of technologies (Latvia), European House Esthal GmbH (Germany), Sumy State University (Ukraine), Muğla Sıtkı Koçman University (Turkey), Eastern Institute of Business Education (Poland), engaging experts from the IT field, esteemed academicians, and administrative staff.

IV.RESULTS AND DISCUSSION

The primary focus was to gauge familiarity with AI among respondents and understand its integration into daily life in higher education institutions. Total 107 experts participated in the survey. Distribution of participants by country is shown in Figure 2.

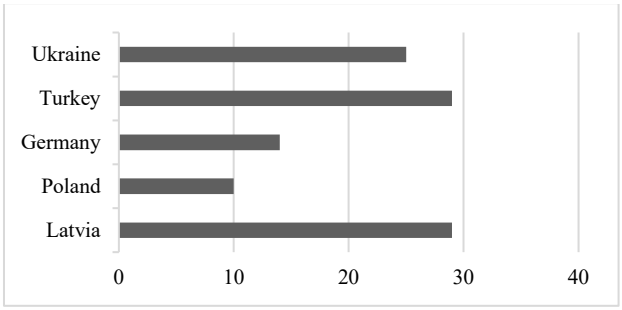

Fig. 2. Distribution by Country.

So, the biggest number of participants were from Latvia and Turkey, while the age of participants varied from 19 to 70.

Aside from the differences between participants, the majority of everyone is familiar with AI and its chatbots (Area1) and uses it in daily life (Area 2). While the percentage is higher among IT professionals (100%) and academics (80 to 100%) than among administrative staff (around 50%), emphasizing the use of AI chatbots and image generators more than other tools. Notably, the survey highlighted ChatGPT as one of the most popular AI tools (Area 3).

Experts widely concur that AI has the potential to significantly enhance the study process within higher education as well as provide other challenges for improvements (Area 4). Through its advanced algorithms and machine learning capabilities, AI can revolutionize traditional teaching methods by offering personalized learning experiences tailored to individual students' needs and preferences. By analysing vast amounts of data, AI can identify patterns in students' learning behaviours and provide timely feedback, thereby facilitating a deeper understanding of complex concepts. Moreover, AI-powered tools can streamline administrative tasks for educators, allowing them to allocate more time to interactive and engaging teaching activities. As AI continues to evolve, its integration into higher education promises to foster a more efficient, effective, and inclusive learning environment for students across diverse disciplines (Area 4).

Finally, Area 5 was addressed mainly for academicians, the responses shed light on various perspectives. Firstly, participants generally acknowledged the effectiveness of AI tools in the assessment process, with a majority expressing positive opinions. Secondly, there was a notable consensus on the potential of AI tools to create personalized learning approaches, indicating a growing interest in tailored educational experiences. Thirdly, while many respondents felt they possessed sufficient knowledge and skills for using AI technologies in the study process, there were also significant numbers indicating a need for further enhancement in this area, highlighting the

ongoing learning curve associated with AI integration. Fourthly, participants overwhelmingly recognized the opportunities AI creates for improving the education and study process, demonstrating optimism about its transformative potential. Lastly, while a substantial portion recognized the challenges AI poses to the education/study process, particularly in terms of adapting to new technologies and addressing ethical considerations, the overall sentiment remained cautiously optimistic about AI's role in shaping the future of education. Notably, in the academician-specific area, responses indicated a slightly higher level of confidence in utilizing AI technologies, possibly due to their familiarity with research and technological advancements.

In the second part of the questionnaire, SWOT analyses were carried out on the use of AI in higher education to show its advantages and disadvantages. The general responses were analysed without grouping the respondents in accordance to the above-mentioned approach, ensuring a comprehensive assessment of diverse perspectives within the surveyed population.

The data covering the key strengths is presented in Table 1.

TABLE 1 SWOT ANALYSES OF STRENGTHS

Germany	Latvia	Poland	Turkey	Ukraine
STRENGHTS				
- individualized learning; - streamlined administration; - enhanced educational processes; - data-driven insights; - facilitated learning; - support for educators; - innovative study approaches	- personalized learning; - individualized student support; - enhanced learning efficacy; - 24/7 virtual assistance; - research assistance; - research skills development; - improved problem-solving; - process automation - Big data; - enhanced information retrieval;	- personalized learning; - automat-ed administration; - process optimization; - data insights; - facilitated learning; - innova-tive study approaches - enhanced efficiency;	- personalized learning; - instant feedback; - enhanced accessibility; - curriculum optimization; - career development; - lifelong learning; - AI-driven learning; - inclusivity; - Data-Driven Insights; - efficiency - innovation teaching; - support; - improved engagement;	- economic transformation; - personalized learning; - automated feedback/ administration; - improved accessibility; - Big data; - process optimization; - innovative education; - enhanced student engagement; - emotional independence;

Thus, the responses from all participants regarding the strengths of using AI in education highlight a collective recognition of its transformative potential in enhancing various aspects of the learning process. Across all countries, there is consensus on AI's ability to personalize learning experiences, streamline administrative tasks, optimize processes, provide valuable data insights, and facilitate easier learning. While specific focuses, tools, and contextual factors may vary, but the overarching themes underscore the importance of AI in advancing education towards more personalized, efficient, and effective learning environments. As AI continues to evolve and integrate into educational settings, it holds the promise of reshaping the future of education by addressing diverse needs and challenges in a rapidly changing world.

Despite the numerous strengths identified in the use of AI in education, it's important to acknowledge that there are also inherent weaknesses and challenges associated with its implementation. The core weaknesses highlighted within the survey are presented in Table 2.

TABLE 2 SWOT ANALYSES OF WEAKNESSES

Germany	Latvia	Poland	Turkey	Ukraine
WEAKNESSES				
- inequality risk; - critical thinking limitations; - privacy concerns; - ethical AI implementtation;	- human thought interference; - misinformation - subjectivity in AI systems; - data privacy; - skills/ knowledge demand; - ethical concerns; - lack of human involvement; - dependence on technology; - misuse risk; - importance of critical thinking; - less communication	- limitations on critical thinking skills; - privacy concerns; - error potential; - limitations in teaching creativity;	- tech dependence impacting critical thinking/ problem-solving; - ethical concerns (data privacy, bias, governance - plagiarism and academic integrity; - emotional intelligence gap;	- limited AI training; - security, ethics, and consequences; - de-humanization risk; - AI in critical infrastructures; - unfair outcomes; - privacy risk; - job displacement; - lack of human factor; - ethical and confidentiality concerns; - data unreliability; - new technology study requirements; - special skills need; -

In accordance to Table 2 various weaknesses and concerns associated with the use of AI in education were shed light as well. These include risks of reinforcing existing inequalities, limitations on critical thinking skills, privacy concerns, potential for misinformation and disinformation, subjective AI systems reflecting biased datasets, ethical considerations, dependence on technology leading to diminished human abilities, and the need for new skills and knowledge. Participants also highlighted concerns about the potential for mistakes, limitations in teaching creativity, plagiarism, lack of emotional intelligence, security and ethical aspects, loss of human touch, unfair outcomes, displacement of jobs, and the unreliability of received data. Overall, these responses underscore the importance of addressing these weaknesses and concerns through robust governance frameworks, transparency measures, ethical considerations, and ongoing training to ensure the responsible and effective use of AI in education.

The opportunities presented by the effective use of AI in higher education closely align with its strengths, one could highlight the overlapping benefits and potential advantages that both aspects offer to the learning process. By demonstrating the inherent connection between opportunities and strengths, it becomes evident that leveraging AI in education not only addresses current challenges but also opens up new avenues for improvement and innovation. This perspective underscores the comprehensive and multifaceted benefits of integrating AI into educational settings, ensuring a holistic understanding of its potential impact on learning outcomes and experiences. The analyses of opportunities are presented in Table 3.

TABLE 3 SWOT ANALYSES OF OPPORTUNITIES

Germany	Latvia	Poland	Turkey	Ukraine
OPPORTUNITIES				
- positive catalyst for change (accessibility, innovation, global collaboration, new possibilities); - enhance learning enjoyment; - provide extra support; - adapt and personalize learning;	- consultant; - collaborative science engagement; - knowledge creation/ expansion; - administrative robots implementation; - in-novative learning approaches - enhanced accessibility; - lifelong learning; -tasks optimization / ideas generation; - student efficiency tool; -self-improvement;	- accessibility; - fostering in-novation; - facilitating global collaboration; - enhancing learning enjoyment; - offer additional support; - innovation in teaching methods; - in-clusivity promotion; - diverse learning approaches	- higher education improvement; -personalized learning; - accessibi-lity enhancement; - lifelong learning; - process automation - data-driven insights; - global collaboration; - in-novative teaching tools; - efficient research; - administra-tive process optimization;	- enhanced assessment; -improved learning management; - in-novative teaching; - continuous improvements; - operational communication; -information processing; - data and business analytics; - alterna-tive information search; -ideas generation; - task automation - adaptive knowledge delivery;

All participants highlight a collective recognition of the diverse opportunities presented by the use of AI in education. These opportunities span various aspects of the learning process, including accessibility, innovation, global collaboration, personalized learning, and the optimization of administrative tasks. Participants envision AI as a catalyst for positive change, facilitating enjoyable and effective learning experiences while also offering additional support and promoting inclusivity. Moreover, AI is seen as a tool to foster lifelong learning, enhance student engagement and achievement through data-driven insights, and streamline administrative processes for increased institutional effectiveness. Overall, the responses underscore the multifaceted potential of AI to transform and enrich education by addressing a wide range of needs and challenges in the learning environment.

Finally, by identifying the threats associated with the use of AI in education, the same trajectory as in weaknesses is kept. These threats not only underscore the weaknesses previously mentioned but also represent potential risks and consequences that need to be addressed in the implementation of AI in educational settings (see Table 4).

TABLE 4 SWOT ANALYSES OF WEAKNESSES

Germany	Latvia	Poland	Turkey	Ukraine
THREATS				
- job displace-ment (automa-tion); - ethical dilemmas (privacy); - the risk of widening educational disparities; -potential of AI making incorrect decisions; - proactive, vigilant approach needed;	- know-ledge loss; - lack of communica-tion skills; - comple-xity in controlling AI systems; - unclear future of AI develop-ment; - educatio-nal inequality; - job loss; - training/ preparation required; - no deep understand-ding; - no critical thinking; - no in-depth analyses; - no individual approaches - no new, unique solutions; - no thinking with fantasy; - the risk of over-reliance on AI - potential negative impacts on communicat ion and critical thinking;	- job displace-ment; - ethical dilemmas/ concerns; -educatio-nal disparities; - risk of wrong choices; - potential for cheating;	- privacy/ data security; - focus on quantitative objectives; - ethical concerns; - privacy risks; - job displace-ment (automa-tion); - digital divide; - mis-information/ bias; - regulation required;	-dis-information - impact of AI on the labour market; - Big Data - "robot soldiers"; - ethical concerns; -mindless information copying; - AI dependence - job displace-ment for educators; - resistance to AI-driven changes in teaching; - automa-ted weapons; - plagia-rism prevalence; - dis-honesty; - reduction of scientific abilities of students;

So, the core threats include job displacement due to automation, ethical dilemmas related to privacy and accountability, widening educational disparities, potential incorrect decision-making by AI systems, loss of knowledge and critical thinking skills, and the risk of misinformation and bias. Additionally, concerns about the future directions of AI development, privacy and data security risks, and the potential impact on the labour market were also raised. These threats underscore the importance of addressing ethical, regulatory, and educational challenges associated with the implementation of AI in education, ensuring that its integration is done in a responsible and sustainable manner to maximize its benefits while mitigating potential risks. Further discussion is needed to refine the SWOT analysis data of AI tools in HE, ensuring a comprehensive understanding of the strengths, weaknesses, opportunities, and threats they pose.

V.CONCLUSION

Despite the widespread familiarity and daily use of AI among survey respondents, including IT experts, academician, and university administration, especially ChatGPT tool, and a solid understanding of its potential application in higher education, it's essential to recognize that the SWOT analysis reveals a balanced perspective with both advantages and disadvantages.

In summary, the SWOT analysis of the use of AI in higher education reveals a complex landscape with both promising opportunities and significant challenges. The strengths identified include the potential for personalized learning experiences, streamlined administrative tasks, streamlined educational processes, valuable data insights, and facilitated learning. However, these strengths come with weaknesses such as privacy concerns, limitations in critical thinking skills, and ethical dilemmas. Additionally, while there are opportunities to foster innovation, promote inclusion, and improve lifelong learning through AI, there are also threats such as job displacement, increasing educational disparities, ethical concerns, and the risk of misinformation. Although integrating AI into higher education holds promise for transforming learning experiences, it is critical to proactively address these weaknesses and threats through ethical considerations, regulatory frameworks, and ongoing training to ensure responsible and effective implementation.

However, the limitation of the study lies in the different levels of AI use of the three respondent groups, which may have influenced the results obtained and the integration of AI into HE.

Going forward, building on the findings from the SWOT analysis and considering the identified research directions and limitations, further discussion should address the complexities and nuances of AI integration in HE. This discussion could explore the dynamic interplay between technological advancements, educational practices, and sociocultural contexts in shaping the impact of AI on teaching, learning, and institutional structures. Furthermore, there is a need to critically examine the underlying assumptions, values, and power dynamics embedded in AI systems and their impact on educational equity, diversity, and inclusion. Additionally, further discussion should involve stakeholders from diverse backgrounds, including educators, students, policymakers, and industry leaders, to promote interdisciplinary dialogues and collaborative efforts to address the multifaceted challenges and opportunities of AI in HE.

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