Research article

ARTIFICIAL INTELLIGENCE FOR EDUCATION AND RESEARCH: PILOT STUDY ON PERCEPTION OF ACADEMIC STAFF

Jelena Titko, Kaspars Steinbergs, Mourine Achieng, and Kristine Uzule

Abstract. Artificial Intelligence (AI) tools have been used across various sectors of the global economy. The use of AI has been associated with both benefits and drawbacks, which is why the goal of this research was to identify the attitudes of academic staff of higher education institutions (HEIs) towards using AI for both academic and research purposes. To attain the goal, there was designed a questionnaire, which was distributed to members of academic staff of different biological genders and ages from 10 European countries. Irrespective of biological gender, age, or country, responses were similar. First, academic staff emphasized the importance of having AI-related regulations at HEIs. Second, academic staff were positive about using AI for information searchers and preparation of teaching materials. Third, academic staff were concerned about AI-related plagiarism issues, which is why they were reluctant to approve the AI use for research and thesis writing. Fourth, slightly more than 40% of the respondents indicated the use of AI. This points to the lack of AI skills among academic staff, which was further supported by a set of basic purposes for which AI was claimed to have been used. One implication of this research relates to the organization of the study process. Managers of HEIs should introduce institutionalized training in AI for academic and research purposes for academic staff to promote digital equality. Another implication of the study relates to the areas of AI training for academic staff. It should cover the topics of AI for the design of teaching materials, formative and summative assessment, and plagiarism check.

Keywords*: artificial intelligence; research; education; perception; academic staff.

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1. Introduction

Artificial Intelligence (henceforth – AI) has rapidly been entering various aspects of human life, ranging from economic to social activities, including education [1], so much so that there has emerged a new field – AI in Education [2], in which AI is seen as a tool that can improve the quality and accessibility of education [3,4]. The range of areas of application of AI technologies in education is wide, and it includes management of education processes, learning, teaching, assessment, and lifelong learning [3]; in other words, AI has been incorporated into administration processes, teaching and learning [5].

Due to the massive expansion of AI tools and their extreme popularity among students, higher education institutions (HEIs) are compelled to think about the AI integration in curricula, regulation of usage of AI tools and revision of the study process, e.g., evaluation of students' results. To help HEIs, UNESCO prepared recommendations [6,7]; however, many issues regarding ethics, academic integrity, and study quality are yet to be solved on the path toward the full understanding of AI capacity and potential usage in study and research processes.

The global goal of the large-scale research project "Artificial Intelligence for Education and Research" was to identify a general attitude of HEIs' staff and students towards AI integration in curricula and research activities. The current paper aims at reflecting the pilot research results among 42 academic staff members representing 10 European countries.

The paper structure is organized as follows: 1st part is an Introduction; 2nd part is a Literature review on challenges and opportunities to use AI in the study and research process; 2^{3rd} part describes the research methodology, including a description of the research instrument and methods applied to data processing; 4th and 5th parts are devoted to the description of main findings, discussion, and conclusive remarks.

2. Literature Review

Technology advancement in recent years has resulted in a paradigm shift that has changed how societies function. One sector that has seen a significant shift is the education sector where teaching and learning as well as research activities are experiencing transformative changes. The application of advanced technologies such as AI has gained momentum over the last five years [8,9]. Examples of AI technologies that are used in education include but are not limited to intelligent tutoring systems, adaptive learning systems, teaching robots or chatbots, scheduling systems, and adaptive skill-building systems [8-10]. Such AI technologies have great potential roles in education and academic research. AI technologies have the potential to assist in developing new ways of improving instructional teaching and learning in classrooms [9,11]. In addition, AI technologies such as ChatGPT can be used to adapt instructional methods to the needs of different types of learners in a classroom [12]. Furthermore, such AI tools can be used to provide individualised feedback to learners [13], develop assessments [14] and predict and monitor student performance [15]. In addition, AI tools can provide learners with basic reading materials on the discussion topic; classroom teacher-learner interactions can be used for high-level analytical and behavioural learning [16].

What is emerging in literature is that the use of AI technologies in education, particularly in teaching and learning activities is commonly seen in three areas. These areas include personalized learning and teaching methods, communication between teachers and learners, and monitoring and evaluation [8,9,12]. In personalized learning, AI technologies can be used to tailor educational content to the needs of each learner. AI tools can also be used to assist teachers in designing educational content that is tailored to each learner's needs, learning pace, and knowledge level [17]. Since most AI technologies such as chatbots are interactive in nature, they can be used to improve teacher-learner communication [8]. Intelligent tutoring systems are used to provide learners with personalised feedback and mentoring that can provide learners with valuable opportunities to improve their argumentation skills. Furthermore, AI applications are used in predicting a learner's status, performance, or satisfaction, resource recommendations, and automatic assessment. All these functions are aimed at improving the learning experiences for learners [18]. Another application of AI tools and technology is in improving educational assessment and evaluation procedures. AI technologies improve assessment efficiency and consistency by using the same criteria across learners [19]. To support assessment and evaluation activities, AI technologies can also be used to automate grading assessments.

Ultimately, the use of AI tools and technologies in teaching and learning has enormous potential. However, it is not without challenges that must be addressed to effectively benefit from the opportunities that AI technologies can offer in the education environment. AI technologies can be used to handle plagiarism and cheating that can negatively impact academic integrity, but they could also enable academic dishonesty. Although AI tools such as ChatGPT can be used to personalize learning, they have limitations when interpreting a context [20]. For example, AI technologies may not have a deep understanding of the cultural contexts, curricula, and learning styles of each learner [20]. Literature also suggests that overreliance on AI technologies by learners and teachers has consequences. For example, when learners over-rely on AI technology, they might experience a decline in cognitive skills such as creativity, critical thinking, reasoning, and problem-solving [20]. This could be attributed to the fact that AI tools like ChatGPT simplify the process of sourcing information, and as a result, learners' cognitive skills decline [21].

Perhaps one of the biggest challenges of AI technology in education is the provision of equal access to AI-powered education for all learners. It is critical to ensure that all learners have access to necessary resources, regardless of their socio-economic status or location. In the academic research field, while there are numerous benefits generated by AI technologies, there are also concerns about their impact on academic research integrity. There are concerns around issues such as differentiating human versus AI authorship that have created a lot of debate within the academic community [22,16]. Ethical issues around the use of AI in research are also a concern as AI technologies have the potential to perpetuate existing biases and discrimination. Furthermore, issues around privacy and data security are a concern that must be addressed [23].

In the future AI technologies should help to fundamentally reshape educational practices by continuously engaging in assessment and the provision of feedback, by boosting creativity [3], and by preparing students for professional life with AI [24]. Educational establishments should transform their curricula to introduce the concept of the AI-across-the-curriculum, thus, extending the use of AI beyond STEM programs [24] and learning how to productively use

Generative AI solutions [25]. Other AI solutions will be expected to support lifelong learning not merely in the form of tutorial provision but rather as an AI companion, offering support in learning, engaging in conversations, and nourishing learners' interests [3]. AI solutions should include solutions to the current AI problems mentioned above, ranging from providing explanations for the solutions to acknowledging sources of information, even when creating new content.

From a research perspective, despite its early stages, AI technologies such as the ChatGPT are already demonstrating great promise in revolutionising how research is conducted in the academic environment [26,23]. Some emerging trends in AI technology used in academic research include data collection, analysis, and classification. AI technologies are used to analyse large sets of data more rapidly and more accurately compared to traditional analysis methods [23,16]. AI technologies are also capable of analysing unstructured textual data and identifying sentiments, emotions, and other information that human analysts may overlook [27]. Another area in research where AI technologies can effectively be used is in the systematic review of literature, where AI can assist researchers in quickly identifying relevant articles related to their research. There is a growing interest in using powerful statistical techniques to improve the accuracy and generalizability of research findings [23]. Given all these, the use of AI technology in academic research has the potential to enhance transparency, reproducibility, and collaboration [26].

In research, AI use has been on the increase in solving complex tasks because AI capabilities are designed on data, which is why there has emerged a specific area of AI application – AI for Science [28]. Overall, AI solutions for science help to break down a scientific problem into components, define a problem, and design a new perspective on tackling it. At more specific levels, such AI products are used to solve mathematical problems, produce pattern matching, yield computationally based predictions and models, offer artifact improvement, deliver control, and provide hypotheses with confirmations. The degree of development of AI has reached such a level that AI can be considered an adjunct to human intelligence [29]. However, the problem of alignment of human needs and AI capabilities continues to be an issue [29].

3. Methods

The authors designed a questionnaire, the structure of which is provided in Table 1. Data was collected during the International Scientific Conference "Emerging Trends in Economics, Culture and Humanities (etECH2023)" that took place in Riga, on April 19-20, 2023. Forty-two respondents participated in the survey, representing HEIs of 10 European countries: Poland, the Czech Republic, Germany, Ukraine, Latvia, Bulgaria, Lithuania, Slovenia, Spain, and Romania. The sample involved 31% of men and 69% of women. The age distribution was the following:
- 1st group – 18-26 years old – 0%;
- 2nd group – 27-42 years old – 38%;
- 3rd group – 43-58 years old – 40%;
- 4th group – 59-68 years old – 22%.

Most of the respondents represented "Social Sciences" (67%) and "Humanities and Art" (19%).

Table 1. The structure of the questionnaire

Part of the questionnaire	Description		
	Type of the questions	**Evaluation scale**	**Codes**
A: General questions	Closed	Multiple-choice questions	A_1 – A_3
B: Attitude (9 statements about the use of AI tools in different research or study processes)	Closed	1 – strongly oppose; 5 – strongly favour	B_1 – B_9
C: Perception (7 statements about integration AI in research and study process and related issues)	Closed	1 – strongly disagree; 5 – strongly agree	C_1 – C_7
D: Respondent profile	Closed	Multiple-choice questions	Gender; Age; Field of science; Country

Source: developed by the authors.

Data was processed using the analysis of frequencies and ranking. The internal consistency of the measurement scales (question B and question C) was checked using the calculation of Cronbach's alpha (Table 2).

Table 2. Internal consistency of the measurement scales

Labels of the statements (question B)	Cronbach alpha if the item deleted	Labels of the statements (question C)	Cronbach alpha if the item deleted
Study process and research in general	0.834	Ethical risk	0.735
Assignments and exams	0.857	Co-authorship	0.793
Bachelor's and Master's theses	0.840	Regulations for study	0.749
Preparation of teaching materials	0.833	Regulations for research	0.739
Preparation of literature review	0.857	Revision of study requirements	0.768
Research methodology	0.839	Threat to quality	0.742
Text generation	0.844	Plagiarism	0.835
Generation of ideas	0.847		
Data processing	0.846		

Source: developed by the authors.

A total alpha value for the B and C scales indicates an acceptable internal consistency (0.859 and 0.795 respectively). The analysis of the measure "alpha if item deleted" pointed to adequate relevance of all statements in both scales. The difference between respondents' answers (only B question) depending on their socio-demographic characteristics was also checked. Considering the distribution within the respondents' profile, only gender and age categories were used for analysis. To select the appropriate method, the authors applied the Kolmogorov-Smirnov test. It indicated that five out of nine variables do not follow a normal distribution. Thus, the authors applied a non-parametric method – the Mann-Whitney U test – for the gender

category. In turn, for the age category (more than 2 groups), the authors applied the Kruskal-Wallis test which is an extended version of the Mann-Whitney U test.

4. Results and Discussion

The response analysis of the first three questions revealed three main trends:
- Everybody knew about the AI (95% of respondents have heard about it).
- It was not massively used by academic staff (43% of respondents have used AI tools in teaching or research).
- Users mostly applied AI tools to search for information about a topic of interest (83% of users). Other categories of usage included "use in research methodology" (39%), "text creation" (39%), "reference finding" (33%), and "quote finding" (28%).

Apart from pre-determined answers, the users mentioned such AI application fields, as "review of language", "preparation of a study plan", "search of case studies", and "verification of whether a thesis is written by a student". The results of the analysis of respondents' self-evaluated attitude towards the AI application for study and research purposes are provided in Table 3. The analysed data includes only the responses indicating a positive ("4") or very positive ("5") attitude.

Table 3. Attitude toward AI application for study and research purposes

Statement	Respondents who evaluated the statement with "4" and "5"
Research methodology	66.67%
Preparation of teaching materials	64.29%
Generation of ideas	64.29%
Study process and research in general	61.90%
Preparation of literature review	57.14%
Text generation	54.76%
Data processing	52.38%
Assignments and exams	35.71%
Bachelor's and Master's theses	33.33%

Source: developed by the authors.

The most positive attitude among respondents was towards AI application in the research methodology (e.g., in the preparation of survey or interview questions), preparation of teaching materials, and generation of ideas. The least positive attitude was towards AI application in the study process, specifically in assignments, exams, and final study assignments (e.g., Bachelor's and Master's theses).

These results are consistent with earlier research. In areas of research methodology, the use of AI has been useful because such systems can extract information from big data and can analyse big data [30]. AI can also create a new research method, for example, aiming at the identification of potential causal relationships in a literature review [30]. Regarding the study process, AI has been found to improve the academic process, for example, by identifying and bridging gaps in curricula [24]. AI systems are claimed to boost students' motivation, engagement, and information acquisition, for example, in music education at colleges and

universities [31]. The use of AI has also been supported for preparing teaching materials. For example, one paper on nursing and midwifery education claims that AI tools can help create personalized teaching materials, which can boost the quality of materials and reduce the time spent by educators searching for specific information or case studies [32].

A lower degree of preparedness to utilise AI in creating research or academic text (e.g., assignments, graduation theses) among the respondents could be attributed to some AI-deployment issues. For example, the cautious use of Generative AI, ChatGPT, has been suggested for creating assessment assignments [32], or any other academic text due to possible "hallucinations", lower accuracy, and possibly plagiarism issues, enabled by the systems [33]. For the same reasons, the cautious use of AI is also important when conducting assessments and tracing students' progress [32].

The results of the analysis of respondents' self-evaluated attitudes towards the AI application for study and research purposes are reflected in Table 4. The analysed data includes only the responses indicating an agreement with the offered statements ("4" and "5").

Table 4. Perception of AI in the study and research process

Statement	Respondents who evaluated the statement with "4" and "5"
Regulations for research	83.33%
Regulations for study	80.95%
Revision of study requirements	73.81%
Ethical risk	69.05%
Threat to quality	47.62%
Plagiarism	40.48%
Co-authorship	33.33%

Source: developed by the authors.

The statements that most respondents agreed with are the following: 1) "Universities and publishers must regulate the use of artificial intelligence tools in research", 2) "Universities must introduce regulations on the use of artificial intelligence tools in the study process", 3) "Universities must revise the use of artificial intelligence tools in study requirements". The statement with the least number of agreements was "Artificial intelligence tools can be a co-author of research".

These findings are also consistent with previous research. In one paper on the transformation of higher education, authors argue for regulating the use of AI to mitigate AI-induced risks, for example, in reliability and accuracy of produced solutions, and recency of information, all of which negatively impact the quality of resources [33]. They also argue that the drawbacks of AI bring ethical concerns because false information produced by AI changes the essence of the learner experience. Some authors draw attention to various ethical issues of AI systems used in education, for example, the lack of transparency in data protection issues and bias- and fairness-related risks in the design and application of AI systems [34]. As for the plagiarism and co-authorship issues, the respondents' relatively low confidence level could be attributed to academic integrity values. For example, humans have been found unable to reliably identify if a text was created by a human or AI, which might result in false accusations [35].

The analysis of differences in attitude towards AI between male and female respondents, as well as between respondents from different age groups, is summarized in Table 4.

Table 4. Results of the Mann-Whitney U test and the Kruskal-Wallis test for responses to B question

Labels of the statements (question B)	Mann Whitney U test, statistical significance (gender category)	Kruskal-Wallis test, statistical significance (age category)
Study process and research in general	0.421	0.862
Assignments and exams	0.018	0.479
Bachelor's and Master's theses	0.063	0.522
Preparation of teaching materials	0.372	0.778
Preparation of literature review	0.839	0.863
Research methodology	0.149	0.594
Text generation	1.000	0.946
Generation of ideas	0.715	0.355
Data processing	0.787	0.554

Source: developed by the authors.

Analysing the difference between the two gender groups, the p-value is lower than 0.05 only for the statement "Use of artificial intelligence tools in the study process, e.g., assignments and exams" (p = 0.018). It means that there is a statistically significant difference between the attitudes of men and women only in this case. The gender category Male has a higher mean rank (27.31) than the gender category Female (18.07). Thus, males tend to have a more positive attitude toward the application of AI for student assignments than females.

The statistical analysis revealed no difference between attitudes towards AI depending on age. However, the reliability of the received results is limited due to the pilot nature of the study. The authors will have more evidence while conducting large-scale research based on full sample data.

5. Conclusions

The goal of the research was to determine the general attitude of HEIs' staff and students towards AI integration in curricula and research activities. While research participants were both males and females of various age groups, no significant differences in opinion were obtained among them.

Most of the higher education academic staff from various countries of Europe are aware of AI tools, which is why more than 40% of them use AI in research and academic activities. This number, which is below 50%, indicates gaps in AI training among academic staff, which was further revealed in a relatively limited range of purposes for which AI has been used. Specifically, AI usage was found restricted to information search, text generation, plagiarism check, and language check. This finding is consistent with earlier research, which argued for the necessity to provide educators with AI training to facilitate teaching and knowledge acquisition among learners [33]. Thus, the first implication of the research is the necessity to ensure academic staff of HEIs with AI-related training for research and academic purposes at

the institutional level across Europe. Consistent with earlier research on digital inequality [33], this research further supported the point. Having almost 60% of academic staff detached from AI tools means digital inequality that translates not only to digital deprivation of academic staff but also to digital constraints of students, who lack sufficient immersion in the AI-generated environment.

The lack of deeper knowledge of AI tools was further supported by positive AI attitudes of academic staff in most basic areas of AI application – search and generation of information. Although information search via AI tools might be different from Google searches, the mechanisms of information search are similar at some point. The fact that academic staff was positive about using AI for teaching purposes suggests that educators are interested in reducing time preparing for lectures. The fact that educators were less enthusiastic about using AI tools for co-authorship and thesis writing taps into their awareness of issues of AI-induced plagiarism and accuracy. The finding is also consistent with earlier research [32-35] and suggests the areas of AI training for educators.

Finally, academic staff also suggested that AI-related regulation be introduced in HEIs. AI-related regulations would minimize academic and administrative risks and conflicts and would ensure the implementation of a fairer and more transparent study process for both the academic staff and students.

The main research limitation is the small sample size which limits the reliability of received results. The next step for research is conducting a cross-country survey. The research instrument for extended research is planned to be modified, including more specified questions about AI tools. The research sample will include not only academic staff but also students.

Author Contributions: Conceptualization, J.T. and K.S.; methodology, J.T. and K.S.; data processing and analysis, J.T.; writing-original draft preparation, K.U.; discussion, writing-review, and editing, K.U.; visualization, K.U.; supervision, J.T. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

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