

PAPER

Students' Attitudes towards AI in Teaching and Learning

Dana Dobrovská¹, David Vaněček¹ (✉), Yilmaz Ilker Yorulmaz^{1,2}

¹MIAS, Czech Technical University, Prague, Czechia

²Mugla Sitki Kocman University, Mugla, Turkey

david.vanecek@cvut.cz

ABSTRACT

The use of AI technology in education has generated an increasing interest in teachers, academicians, researchers, and students. This study synthesizes the responses from a survey conducted among 2230 students at a technical university in Czechia, aiming to capture their attitudes towards integrating AI technology in academic settings. We analyzed students' perceptions on familiarity with the topic, perceived benefits and challenges of AI in education, ethical aspects, and perspectives for their teachers on this technology. A questionnaire was designed and administered within the frame of this study. Results reveal that the majority of respondents are familiar with and use AI technology, most of whom use it 'sometimes' or 'commonly.' Information processing and understanding is the most common purpose for using AI. Time efficiency and accessibility are the most reported advantages of AI, while the potential disadvantages involve credibility, overreliance, misuse, and scope-level concerns. Half of participants suggest students rarely or never consider ethical issues in their AI use. Most students believe that universities should clarify the gray areas regarding how and in which areas AI is allowed by establishing relevant ethical guidelines. Nearly half of student participants report that their teachers are moderately or more open to improving their understanding of AI use, while only a minority report that their teachers use it in practice.

KEYWORDS

AI, teaching, learning, technical university, student attitudes

1 INTRODUCTION

It is important to emphasize the impact of students' perceptions of their learning environment, their own abilities, and the teaching strategies used. In a learning environment, students' perceptions of an innovation can affect their willingness to use it, which in turn influences how fully it becomes integrated into the learning process. Technical innovations are hardly acceptable unless accepted by their users [1], [2].

Recent advancements in machine learning have paved the way for more sophisticated technologies, such as artificial intelligence. Generative AI (GenAI) models

Dobrovská, D., Vaněček, D., Yorulmaz, Y.I. (2024). Students' Attitudes towards AI in Teaching and Learning. *International Journal of Engineering Pedagogy (ijEP)*, 14(8), pp. 88–106. <https://doi.org/10.3991/ijep.v14i8.52731>

Article submitted 2024-07-07. Revision uploaded 2024-09-28. Final acceptance 2024-10-07.

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employ advanced algorithms to identify patterns and create new content, such as texts, visuals, and audios etc. [2], [3]. The capability of AI systems to process complex prompts and generate human-like responses has spurred research into integrating GenAI across various fields. Since its release, this has also driven a surge of interest in applying GenAI within higher education [2]. There has been considerable discussion about its potential to improve and transform teaching and learning in higher education [2], [4], [5]. The extraordinary abilities of AI in processing complicated works have become a contentious topic among teachers, although their perspectives on the future of education become diverse. Some educators consider AI as the future of teaching and learning, prompting new innovations in higher education, while others view it as a sign of the decline of educational activities, making learners more dependent and less autonomous in the learning process [6]. But a significant number of teachers lean towards the opinion that AI is a groundbreaking tool for fostering new paradigms in teaching and instructional design, and that the evolution of education would be hindered by traditional teaching methods [7]. It is believed to have potential to improve learning and teaching. Some studies discuss how AI affects motivation and academic achievement in teaching various subjects such as physics [8] or mathematics [9]. Other authors emphasize the need for harmony with pedagogical and psychological theories, as pedagogical and psychological approaches are often interconnected, achieving harmony between them in AIED could optimize the quality of learning [5]. Addressing these challenges, this study is an initiative to holistically reveal the use of AI in academic settings from the perspective of its users—the students.

2 LITERATURE REVIEW

In our literature review, we begin by focusing on the role of attitudes in the use of AI for learning and teaching. One approach in the literature defines attitude as a psychological construct that represents a person's emotional state focused on goal-oriented conduct, characterized by a desire to accomplish a particular result [10]. Numerous researches on educational psychology and technology have demonstrated that attitude is a key factor influencing the willingness to integrate technology into the educational process [11]. Other studies complement this by adding cognitive components (e.g., knowledge, thinking, memory) and behavioral components.

Students' attitudes toward using AI in learning and teaching can vary widely depending on factors such as the context of use, individual preferences, learning styles, and the specific goals of the educational experience. The success of integrating AI into learning and teaching depends on how well it complements existing educational practices, addresses student needs, and aligns with educational goals. The future of AI in education will be influenced in large part by student feedback and continuous evaluation of its effects on learning outcomes.

2.1 Role of attitudes in the use of AI for learning and teaching

In cognition:

- developing individualized learning paths (students are motivated to engage more with the subject, leading to a more tailored educational experience) [12]

- brainstorm of ideas [13]
- work analysis through instant feedback [14]
- encouraged self-reflection, self-directed learning [15]
- self-regulation by allowing learners to identify and learn from their own mistakes [5].

In motivation and emotions:

- strengthened motivation and weakened demotivation [16]
- positive emotional arousal [17]

In behavior, achievement needs, and social needs:

- increased engagement and effort [18]
- improved collaboration [19]

Secondly, our literature review focuses on recent publications regarding the potential benefits for students and teachers, followed by ethical aspects associated with the use of AI.

2.2 Potential benefits and limitations for students and teachers

The benefits for students involve fostering independent learning, as well as providing continuous feedback to enhance the quality of teaching and learning. On the other hand, there are potential drawbacks, including the risk of producing incorrect information, biases in data training, and the ethical concerns arising from possible misuse [4], [20], [21].

AI also offers significant advantages for teachers, primarily by automating administrative tasks, such as grading and attendance tracking, thereby freeing up more time for instructional activities. AI-driven tools can help in creating dynamic teaching materials and designing assessments that are more aligned with students' needs. Additionally, AI can support professional development by providing teachers with real-time data on student performance, enabling them to adjust their teaching strategies promptly. This can lead to more informed pedagogical decisions and enhanced educational outcomes [22], [23].

2.3 Ethical aspects connected with the use of AI

The ethical considerations of AI in teaching and learning are multifaceted. There are concerns about data privacy, especially regarding how students' data is collected, stored, and used. Bias in AI algorithms is another critical issue, as it can lead to unfair treatment or reinforcement of existing stereotypes. To address these ethical challenges, educational institutions are encouraged to implement AI with a human-centric approach, ensuring transparency, fairness, and accountability in AI-driven decisions. Furthermore, there is a growing emphasis on training both educators and students to understand the ethical implications of AI, endowing them with the necessary competences to employ and critique AI tools responsibly [24], [25], [26], [27].

3 RESEARCH OBJECTIVE AND RESEARCH TOPICS

Our research delves into the varying attitudes of technical students towards AI, providing a holistic view of its perceived impact and reception in the educational landscape. By doing so, it aims to contribute to the expanding body of knowledge on AIEd and support the development of policies and practices that enhance learning experiences worldwide.

Undergraduate and graduate students at a technical university shared their responses on the below topics:

Topic 1. Familiarity and usage

- To assess the current level of AI use in the academic activities of technical university students and to evaluate the frequency and extent of AI technology usage among them.

Topic 2. Pros and cons

- To identify the students' general perspectives related to AI use in education, including perceived advantages and concerns in their learning processes.

Topic 3. Ethical considerations

- To identify ethical barriers and considerations to AI adoption in education if/as seen by students.

Topic 4. Teacher perspectives as seen by students

- To explore how the participants view their teachers' attitudes towards AI integration in higher education.

4 RESEARCH METHODOLOGY

Our study employed a survey design to comprehensively define the current state of AI use among students across different technical faculties. A structured questionnaire was used to collect data, enabling both quantitative and qualitative approaches.

4.1 Questionnaire design and administration

A questionnaire was designed and administered within the frame of this study. Before designing the questionnaire, we defined the aim and scope of the study by revisiting relevant literature first. Then, we held interviews with several students to get more insight into their general perspectives about the AI use in university studies. During the design, we drafted the questionnaire, including instructions for potential participants, their characteristics, and the questionnaire items themselves. The introductory part informed potential participants about the researchers and the purpose of the study. The part related to characteristics of participants enabled us to define the sample in terms of gender, grade level, age, and faculty. The body of the questionnaire included 18 questions for participant students to reveal their opinions. Then, we asked the opinions of two experts from each faculty, a total of 16,

who had experience and expertise either in AIED or in questionnaire development. Considering experts' opinions, we deleted six items and modified the remaining 12 items. Also, we conducted a pilot implementation phase with students to check its intelligibility, and some items were remodified based on their feedback. The final form consisted of 12 items, including close-ended and open-ended questions.

4.2 Participants

Our research was conducted by using an online questionnaire. Participating students were invited to an online platform and asked to confirm their consent by reviewing an informed consent form before providing their responses. They were notified that participation in the research was voluntary and that their responses would be recorded anonymously. Participants were allowed to skip questions they were not comfortable answering.

Participants in the study are undergraduate and graduate students at a technical university. The university has a total population of 12,945 students enrolled across eight faculties. A disproportionate cluster sampling technique was used in the identification of the sample. The minimum sample size that was a valid representative of the university student population was 374. However, it was aimed to maximize the sample to ensure participation across different demographics, such as age, gender, and educational background. In this regard, participants are a total of 2230 students from eight technical faculties in the technical university. The data was collected during the winter semester of the 2023-2024 academic year by distributing the online questionnaire to students through their registered e-mail addresses.

4.3 Data analysis

Both quantitative and qualitative approaches were employed in the analysis of the attained data. Descriptive analysis (frequency and percentage) was used to analyze the responses from yes/no questions and multiple-choice questions, while a thematic analysis approach was used to analyze the responses to the open-ended questions in the survey. Iterative readings of the responses were the first step in the qualitative analysis process. Next, text passages were coded, and themes were derived from the codes. The coding procedures and choices about groupings and themes were discussed in several correspondences between the three authors. In terms of the reliability of the data, we employed the formula "Reliability = Agreement / (Agreement + Disagreement) × 100" [28] for the compatibility of student responses with codes and then suggested themes, reaching the reliability rate of 91% between authors. We held another consensus meeting to maximize this compatibility. For the validity of the data, the study group was identified in detail, and the procedures of questionnaire development, data collection, and its analysis processes were reported in detail.

5 RESEARCH RESULTS

5.1 Sample characteristics

The participants' gender, faculty, study program, and age were collected in the demographic section of the questionnaire, as shown in Table 1.

Table 1. Sample characteristics

| Characteristics (n = 2230) | | n | % |
|----------------------------|---|------|------|
| Gender | Male | 1546 | 69.3 |
| | Female | 618 | 27.7 |
| | Non-Defined | 66 | 3.0 |
| Faculty | Architecture | 194 | 8.7 |
| | Biomedical Engineering | 174 | 7.8 |
| | Civil Engineering | 446 | 20.0 |
| | Electrical Engineering | 463 | 20.8 |
| | Information Technology | 400 | 17.9 |
| | Mechanical Engineering | 218 | 9.8 |
| | Nuclear Sciences and Physical Engineering | 174 | 7.8 |
| | Transportation | 116 | 5.2 |
| | Non-Defined | 45 | 2.0 |
| Study Programme | Bachelor | 1486 | 66.6 |
| | Master | 583 | 26.1 |
| | Doctoral | 158 | 7.1 |
| | Non-Defined | 3 | 0.1 |
| Age | 18–20 | 634 | 28.4 |
| | 21–23 | 950 | 42.6 |
| | 24–26 | 423 | 19.0 |
| | 27–29 | 96 | 4.3 |
| | 30–39 | 75 | 3.4 |
| | 40+ | 28 | 1.3 |
| | Non-Defined | 24 | 1.1 |

Male students outnumbered female students in our sample (69.3% vs. 27.7%). Most respondents were students from the faculties of civil engineering, electrical engineering, and information technology. Two-thirds of them were bachelor's students; 90% fell into the 18–26 age category.

5.2 Students' familiarity with and usage of AI

We sought to determine how knowledgeable students are about the use of AI in teaching and learning, as well as how often and in what ways they use AI in their academic lives. The results are presented in Table 2.

Table 2. Familiarity and AI usage

| | n | % |
|--|------|------|
| Use of AI Technology (n = 2230) | | |
| Yes | 1981 | 88.8 |
| No | 249 | 11.2 |
| Frequency of Use (n = 1981) | | |
| Nearly Not at All | 204 | 10.3 |
| Rarely | 481 | 24.3 |
| Sometimes | 662 | 33.4 |
| Commonly | 559 | 28.2 |
| Always | 75 | 3.8 |
| Purpose of Using AI (n = 1981) | | |
| <i>Purpose 1. Information Processing and Understanding</i> | | |
| Getting a general overview of the topic | 1427 | 72.0 |
| Processing information | 1191 | 60.1 |
| Seeking answers hardly available at search engines | 43 | 2.2 |
| Problem-solving | 26 | 1.3 |
| Verifying the accuracy of information | 19 | 1.0 |
| Simplifying complex concepts | 4 | 0.2 |
| <i>Purpose 2. Language and Textual Enhancement</i> | | |
| Translating texts | 769 | 38.8 |
| Language editing and proofreading | 81 | 4.1 |
| Describing tables and graphs | 2 | 0.1 |
| <i>Purpose 3. Writing and Content Development</i> | | |
| <i>Purpose 3.1. Creative and Analytical Writing</i> | | |
| Writing an assignment | 457 | 23.1 |
| Preparing a research paper | 192 | 9.7 |
| <i>Purpose 3.2. Mechanical Writing and Presentation Tasks</i> | | |
| Writing email | 19 | 1.0 |
| Outlining a structure for a topic | 15 | 0.8 |
| Summarizing a text or article | 10 | 0.5 |
| Creating a presentation | 6 | 0.3 |
| Writing a cover letter | 2 | 0.1 |
| Formatting the style of text | 2 | 0.1 |

(Continued)

Table 2. Familiarity and AI usage (Continued)

| | n | % |
|--|-----|-----|
| Purpose 4. Technical and Creative Works | | |
| Coding and programming | 154 | 7.8 |
| Generating visualizations or audio | 78 | 3.9 |
| Generating sample data for term papers | 4 | 0.2 |
| Creating tests and quiz questions | 2 | 0.1 |
| Converting file formats | 2 | 0.1 |
| Purpose 5. Resource and Perspective Seeking | | |
| Brainstorming and inspiration | 55 | 2.8 |
| Asking for different perspectives | 18 | 0.9 |
| Finding relevant specific resources | 13 | 0.7 |

88.8% of students use AI, with most using it “commonly” or “occasionally,” primarily for *information processing and understanding*. A big majority of participants use AI for the purpose of getting a general overview of the topic and of processing information for their university studies. *Language and textual enhancement* is the second common purpose of using AI among participants. *Writing and content development* is the third ranking purpose suggested by students. Additionally, *technical and creative works*, as well as *resource and perspective seeking*, are among the least common purposes reported by students.

5.3 Potential pros and cons of using AI

The following questionnaire items focused on students' opinions regarding the potential pros and cons of using AI in academic activities (refer to Tables 3 and 4).

Table 3. Potential pros of AI in teaching and learning

| Potential Pros of AI (n = 2230) | n | % |
|---|------|------|
| Theme 1. Efficiency and Accessibility | | |
| Timesaving | 1776 | 79.6 |
| Available at any time, 24/7 | 1618 | 72.6 |
| Delegation of simple and repetitive activities | 12 | 0.5 |
| Ease of use | 2 | 0.1 |
| Theme 2. Research and Information Management | | |
| Help with data analysis | 1063 | 47.7 |
| Help with preparing assignments or papers | 896 | 40.2 |
| Simplification of seeking specific information | 67 | 3.0 |
| Suggesting sources for further studies | 13 | 0.6 |
| Reformulating large texts, data, or sources | 5 | 0.2 |

(Continued)

Table 3. Potential pros of AI in teaching and learning (Continued)

| Potential Pros of AI (n = 2230) | n | % |
|---|-----|------|
| Theme 3: Support for Creativity and Development | | |
| Development of creative works (visuals, audios, etc.) | 697 | 31.3 |
| Brainstorming ideas and more stimulus | 18 | 0.8 |
| Outlining topics | 2 | 0.1 |
| Proposal for sentences or topics for a particular work | 2 | 0.1 |
| Theme 4: Problem Solving and Decision Making | | |
| Help with decision making | 460 | 20.6 |
| Help with solving complex problems | 4 | 0.2 |
| Theme 5: Personalized Learning and Understanding | | |
| Ensuring personal learning experience at own speed | 242 | 10.9 |
| Quick orientation to topic, enabling simple understanding | 12 | 0.5 |
| Verification of understanding or attained information | 8 | 0.4 |
| Subsequent questioning for a better understanding | 3 | 0.1 |
| Theme 6: Language Support | | |
| Translation and language editing | 25 | 1.1 |
| Helps with programming | 6 | 0.3 |

The students identified a wide variety of potential advantages of AI considering their university studies. For a clear understanding of potential pros of AI use, we have evaluated students’ responses under six themes. *Time efficiency and accessibility* ranks the highest among the advantages of AI, considering 79.6% of participants refer to the time-saving feature of AI and 72.6% highlight its availability. *Research and information management* ranks the second advantage, considering nearly half of participants suggest that it helps for data analysis and for preparing assignments. *Support for creativity and development* as well as *problem solving and decision-making* are revealed as another striking advantages of AI in teaching learning. *Personalized learning and understanding* as an advantage for students is notable. A minority of participants also stressed the *language support* as a potential advantage of AI in teaching and learning. The long list of perceived advantages mentioned by students reflects the diversity of their fields of study and their individual needs.

Table 4. Potential cons of AI in teaching and learning

| Potential Cons of AI (n = 2230) | n | % |
|--|------|------|
| Theme 1. Credibility Issues | | |
| It can't assess the credibility of data | 1733 | 77.7 |
| It makes up sub-optimal results needing verification | 126 | 5.7 |
| It works on trial-and-error principle | 111 | 5.0 |
| It is hard to obtain a true answer when topic is complex | 27 | 1.2 |

(Continued)

Table 4. Potential cons of AI in teaching and learning (*Continued*)

| Potential Cons of AI (n = 2230) | n | % |
|--|------|------|
| Theme 2. Overreliance Issues | | |
| There is a risk of relying too much on AI | 1229 | 55.1 |
| The student tries less to improve his own abilities | 972 | 43.6 |
| Theme 3. Misuse/Ethical Issues | | |
| There is a risk of misuse (plagiarism, homework fraud) | 1150 | 51.6 |
| It collects sensitive data, creating GDPR violations | 62 | 2,8 |
| There is a risk of being accused of plagiarism | 11 | 0,05 |
| Theme 4. Scope Level Issues | | |
| It is politically "biased" – data be adjusted to some ideology | 30 | 1,3 |
| Its database lacks some recent and paid -up to date- articles | 18 | 0,8 |

The respondents mentioned a wide range of potential disadvantages of using AI in learning and teaching. For a clearer analysis of the potential risks, we categorized the students' responses into four categories: 1) Credibility issues, 2) Overreliance issues, 3) Misuse or ethical issues, and 4) Scope-related issues. This categorization allowed us to identify the most common student reactions: Doubts about the credibility (e.g., credibility of the data, 77.7%), overreliance issues (e.g., risk of relying too much on AI, 55.1%), misuse/ethical issues (e.g., plagiarism or homework fraud, 51.6%), and scope level issues (e.g., political bias of AI, 1.3%).

5.4 Ethical considerations

Ethical values should be part of the responsible use of AI in learning and teaching by students, teachers, and universities. In our survey, the students expressed their opinions on the following two items: 1) To what extent are ethical principles considered by students while using AI tools in education? 2) Should universities establish guidelines for ethical and unethical behaviors when using AI tools in education? The results regarding the first item are shown in Table 5.

Table 5. Students' perspectives for considering ethical issues

| Students' Consideration of Ethical Issues (n = 2230) | n | % |
|--|-----|------|
| Never | 297 | 13.3 |
| Rarely | 826 | 37.0 |
| Sometimes | 702 | 31.5 |
| Often | 309 | 13.9 |
| Always | 68 | 3.0 |
| No Answer | 28 | 1.3 |

50.3% of the respondents reported that students "never" or "rarely" consider ethical issues in their university studies, while only 16.9% of them reported that university students consider ethical issues either "often" or "always" in university studies.

The results regarding the second item, which reflects respondents' opinions on if and why universities should (or not) set guidelines for ethical and unethical behaviors when using AI tools in education, are shown in Table 6.

Table 6. Students' perspectives for universities' setting ethical guidelines

| Universities Should Set Ethical/Unethical Guidelines (Yes) | n | % |
|--|------|------|
| | 1177 | 52.8 |
| Reason 1 = Clarification | | |
| Clarify gray areas on what areas and how AI is allowed | 453 | 20.3 |
| Learn university's stance on ethical and unethical use of AI | 25 | 1.1 |
| Eliminate false assumptions by students | 18 | 0.8 |
| Not defining rules means allowing all risks | 4 | 0.2 |
| Reason 2 = Misuses | | |
| Prevent potential misuse, fraud, plagiarism | 104 | 4.7 |
| Prevent being accused of AI misuse | 3 | 0.1 |
| Reason 3 = Responsibility (of university) | | |
| Promote awareness on AI ethics is a responsibility of university | 65 | 2.9 |
| Ensure fair assessment between users and non-users of AI | 30 | 1.3 |
| Eliminate spreading potentially false information by AI | 18 | 0.8 |
| Ensure value of university diplomas | 10 | 0.4 |
| Preserve academic integrity | 4 | 0.2 |
| Punish cheaters | 2 | 0.1 |
| Define real competent individuals | 1 | 0.1 |
| Reason 4 = Independent Learning | | |
| Ensure real and meaningful learning | 48 | 2.2 |
| Avoid overreliance to AI | 21 | 0.9 |
| Reason 5 = Adaptation/Keeping Up With | | |
| Maximize benefit from AI by responsible use | 37 | 1.7 |
| Consider the change and requirements of modern era | 33 | 1.5 |
| Universities Should Not Set Ethical/Unethical Guidelines (No) | n | % |
| | 1006 | 45.1 |
| Reason 1 = Potential Benefits | | |
| It leads to the abandonment of various benefits of AI | 222 | 10.0 |
| Reason 2 = Uselessness | | |
| Universities cannot completely check all misuses anyway | 175 | 7.8 |
| What is required is to modernize the way of assessment | 64 | 2.9 |
| Any rule development lay behind the pace of AI | 29 | 1.3 |
| Comprehensive rules cannot be implemented anyway | 3 | 0.1 |

(Continued)

Table 6. Students' perspectives for universities' setting ethical guidelines (*Continued*)

| Universities Should Not Set Ethical/Unethical Guidelines (No) | n | % |
|---|----|-----|
| Reason 3 = Unnecessity | | |
| Existing general ethical codes are already enough | 59 | 2.6 |
| AI does not work well in technical fields; it is more for A&H | 40 | 1.8 |
| AI does not help complex tasks anyway | 28 | 1.3 |
| Reason 4 = Self-Related Issues | | |
| Self-consciousness for ethics is much more important | 36 | 1.6 |
| Misusers will suffer from non-learning during exam or career | 36 | 1.6 |
| Reason 5 = Fairness | | |
| Framework be designed in state level to fairly address all | 7 | 0.3 |

Table 6 reveals that 52.8% of the respondents suggested that universities should set ethical guidelines for AI use, while 45.1% of them suggested that universities should not set ethical guidelines for AI use (2.1% of the participants did not reply). Participants suggested several different reasons for their answers. The qualitative analysis of their responses revealed that the most common reason for the idea that universities should set guidelines for ethical and unethical behavior was related to the theme of *clarification*. On the other hand, the most common reason for the idea that universities should not set guidelines for ethical and unethical behavior was related to the theme of *uselessness*.

5.5 Students' perceptions for their teacher's perspectives

Indirect questioning was used to understand students' perceptions of potential teacher attitudes towards the use of AI in academic activities. We tried to elicit to what extent teachers believe in the potential of AI, use it in their teaching and learning, and are open to improving their understanding of AI. The results are shown in Table 7.

Table 7. Teachers' perspectives towards AI

| According to Students, the Level of Teachers... (n = 2230) | n | % |
|---|-----|------|
| <i>Believing AI have potential to enhance teaching and learning</i> | | |
| Very Low | 305 | 13.7 |
| Low | 618 | 27.7 |
| Moderate | 997 | 44.7 |
| High | 223 | 10.0 |
| Very High | 43 | 1.9 |

(*Continued*)

Table 7. Teachers' perspectives towards AI (*Continued*)

| According to Students, the Level of Teachers... (n = 2230) | n | % |
|---|-----|------|
| <i>Using AI during teaching and learning</i> | | |
| Very Low | 953 | 42.7 |
| Low | 867 | 38.9 |
| Moderate | 316 | 14.2 |
| High | 36 | 1.6 |
| Very High | 15 | 0.7 |
| <i>Being Open to improve their understanding towards the use of AI during teaching and learning</i> | | |
| Very Low | 533 | 23.9 |
| Low | 564 | 25.3 |
| Moderate | 711 | 31.9 |
| High | 244 | 10.9 |
| Very High | 94 | 4.2 |

Table 7 reveals that 41.4% of the students suggest that their teachers have either a very low or low level of belief that AI has the potential to enhance teaching and learning. When it comes to implementation, the ratio is more striking. This is because 81.6% of the participant students think that their teachers use AI during teaching and learning, either at a very low or low level. Furthermore, 49.2% of students suggest that their teachers are either at very low or low level open to improving their understanding of the use of AI in teaching and learning.

6 DISCUSSION

A large-scale survey conducted among students at a technical university aimed to capture their attitudes toward integrating AI technology into academic settings. The results of the questionnaire were analyzed to assess students' familiarity with the topic, perceived advantages and drawbacks of AI in education, ethical considerations, and potential perspectives of teachers on this technology.

Considering the sample of this study, male students outnumber female students in our research sample. At technical universities, male students have traditionally outnumbered female students. This trend is widespread globally, although the proportion of women in technical fields has been improving in recent years thanks to various initiatives aimed at supporting women in science, technology, engineering, and mathematics (STEM) fields. Most respondents were from the faculties of civil engineering, electrical engineering, and information technology. Nearly two-thirds were bachelor's students, one-fourth were master's students, and a minority of them were PhD students. Additionally, 90% of the respondents were in the 18–26 age category.

6.1 Students' familiarity with AI

A high percentage of students in our sample (88.8%) reported using AI. The estimated percentage of students using AI in their academic responsibilities can differ

based on the region, type of school, and field of study [28]. However, based on available information and trends, it could be said that approximately 30–50% of students use some form of AI directly in their academic work [28].

Comparing this data with similar studies of American and Swedish students suggests that 57% of American students had no experience using AI, while 43% had used it (as of March 2023). Among Swedish students, 5% were not familiar with AI potential, 32% knew about it but did not use it, 28% rarely used it, and 35% used it regularly. The Swedish students appear to be slightly more aware of AI's potential and use it more often [29], [30].

6.2 Purpose of use

In our research sample, students identified five dominant purposes of use: primarily for information processing and understanding, language and textual enhancement, writing and content development, technical and creative works, and resource and perspective seeking. Using AI for grasping a general understanding of a topic is the most common specific use reported by our student participants. These findings strongly align with other research in the field, indicating that these five purposes are not only dominant but also reflect broader trends in how AI is integrated into academic activities. Studies [31], [32], [33] show that students frequently use AI for several reasons, including quick understanding of fundamentals for a topic, data processing, and content development. AI tools are valued for their ability to provide concise summaries, answer specific questions, and generate explanations that help students understand complex concepts. AI's capacity to quickly process vast amounts of information and present it in a digestible format has been noted as a key advantage, particularly for students who need to get up to speed on a new topic quickly.

Research also highlights the use of AI for organizing, analyzing, and summarizing information. AI tools are often used to extract key points from academic papers, generate summaries, and even assist in comparing different sources [33]. This finding is consistent with our research, showing that students leverage AI to handle and make sense of large amounts of information efficiently.

Students from our research sample also declared to use AI tools for translating text. This purpose is widely documented in other studies, particularly in contexts involving non-native English speakers. Research notes that AI-based translation tools are crucial for students in translating academic materials, aiding in their comprehension of complex texts in different languages. AI can significantly advance translation accuracy, making these tools indispensable for academic work, as they not only translate but also provide contextual understanding, which is increasingly important in academic settings [34].

Studies such as those by [35] show that AI is frequently used in drafting and editing assignments. AI tools help students with grammar correction, style improvement, and even content generation. There is also a growing body of research examining the ethical implications of AI in writing, especially concerning originality and plagiarism. However, the convenience and productivity gains offered by AI make it a popular choice for students when completing writing assignments.

6.3 Pros and cons in using AI in education

The students provided a long list of potential advantages of AI in academic activities, dominantly referring to its efficiency and 24/7 accessibility. The extensive list

of perceived advantages, despite some of them being highlighted by less than one percent of the participants, reflects the diversity of student use of AI in their fields of study and taking into account individual needs of students. However, the respondents also identified a wide range of potential disadvantages of using AI in learning and teaching. They expressed severe doubts about the credibility of the data, the risk of over-reliance on AI, and the potential for misuse. These findings are in accordance with [29].

6.4 Ethical aspects of using AI in learning

Our research results highlight two key findings related to the integration of ethics into university education and the establishment of ethical guidelines for AI use.

1. Perception of ethical consideration in university studies:
 - More than half of the respondents (50.3%) believe that university students “never” or “rarely” consider ethical issues during their studies. In contrast, only 16.9% of respondents think that students “often” or “always” engage with ethical issues.
 - This suggests a significant gap in the perceived integration of ethics within university curricula, indicating a potential area for improvement in how ethics are taught or emphasized in higher education.
2. Opinions on ethical guidelines for AI use:
 - A slight majority (52.8%) of respondents support the idea that universities should establish ethical guidelines for AI use, while 45.1% are against it, and 2.1% did not respond.
 - The qualitative analysis reveals that those in favor of guidelines emphasize the need for “clarification,” meaning they believe such guidelines would provide clear standards for what constitutes ethical and unethical behavior in AI use. On the other hand, those opposed to the guidelines cite “uselessness,” indicating a belief that such guidelines may not be effective or necessary.

Overall, these results indicate a divide in opinions on the role of ethics in university education, both in general and specifically concerning AI use. There is a clear need for more discussion and perhaps action to address the perceived shortcomings in how ethics are integrated and regulated within academic settings.

6.5 Students' perceptions for their teacher's perspectives

In our study, indirect questioning was used to understand potential teacher attitudes toward the use of AI in academic activities. The students' views on their teachers' knowledge of AI's potential to enhance teaching and learning were rather skeptical. This aligns with other research, which shows that both students and teachers recognize gaps in AI knowledge among educators. This shared awareness underscores the need for more targeted professional development in AI for teachers [36], [37].

Similar skepticism was expressed regarding the current implementation of AI in common teaching practices and the teachers' openness to improving their understanding of AI's use in education. This is consistent with findings that indicate a cautious and often incomplete implementation of AI in educational practices [38]. The challenges associated with integrating AI into teaching, including infrastructure and pedagogical alignment, contribute to this skepticism. While there is documented

resistance among teachers, there is also evidence of a willingness to learn more about AI. The mixed responses in the literature reflect the complex attitudes of educators toward adopting AI, which is mirrored in students' skepticism [39].

Overall, our findings are well-supported by existing research, highlighting ongoing challenges in AI adoption in education, particularly in terms of teacher readiness, implementation effectiveness, and the openness to embracing new technologies.

7 CONCLUSIONS

The findings of our study revealed a variety of students' attitudes, and we anticipate a similar diversity in the future. Students' perspectives will likely stem from the expected rapid evolution of educational practices, driven by AI support tailored to learners' needs. Accordingly, students' attitudes will likely stem from diverse characteristics of their study programs.

Looking ahead, researching teachers' attitudes and perceptions related to the role of AI in higher education seems important to grasp a deeper level understanding of academia's perspectives about the use of AI in higher education. Gaining insight into these attitudes is essential for the future development of educational AI tools and for ensuring their convenient implementation in the classroom [30] [36]. A deeper understanding of teachers' attitudes could guide policymakers in higher education to emphasize clarity, transparency, and ethical standards. This focus would enable AI integration to better support teachers' roles, fostering trust and encouraging their engagement. The research findings indicate that promoting effective AI use is a collaborative effort requiring continuous communication among students, teachers, policymakers, and other stakeholders to ensure successful integration of AI in higher education.

8 ACKNOWLEDGEMENT

The authors thank the students who participated in the survey.

9 REFERENCES

- [1] J. Biggs, C. Tang, and G. Kennedy, *Teaching for Quality Learning at University*, 5th Ed. London: McGraw-Hill Education, 2022.
- [2] C. Chan and W. Hu, "Students' voices on generative AI: Perceptions, benefits, and challenges in higher education," *International Journal of Educational Technology in Higher Education*, vol. 20, no. 43, 2023. <https://doi.org/10.1186/s41239-023-00411-8>
- [3] J. Hu, "Teaching evaluation system by use of machine learning and artificial intelligence methods," *International Journal of Emerging Technologies in Learning*, vol. 16, no. 5, pp. 87–101, 2021. <https://doi.org/10.3991/ijet.v16i05.20299>
- [4] D. Baidoo-Anu and L. Owusu Ansah, "Education in the era of generative artificial intelligence (AI): Understanding the potential benefits of ChatGPT in promoting teaching and learning," *SSRN*, 2023. <https://doi.org/10.2139/ssrn.4337484>
- [5] T. Adiguzel, M. H. Kaya, and F. K. Cansu, "Revolutionizing education with AI: Exploring the transformative potential of ChatGPT," *Contemporary Educational Technology*, vol. 15, no. 3, ep429, 2023. <https://doi.org/10.30935/cedtech/13152>

- [6] A. Aghaziarati, S. Nejatifar, and A. Abedi, "Artificial intelligence in education: Investigating teacher attitudes," *AI and Tech in Behavioral and Social Sciences*, vol. 1, no. 1, pp. 35–42, 2023. <https://doi.org/10.61838/kman.aitech.1.1.6>
- [7] G. J. Hweng and S. Y. Chien, "Definitions, roles, and potential research issues of the metaverse in education: An artificial intelligence perspective," *Computers and Education AI*, vol. 3, p. 100082, 2022. <https://doi.org/10.1016/j.caeai.2022.100082>
- [8] S. Beltozar-Clemente and E. Díaz-Vega, "Physics XP: Integration of ChatGPT and gamification to improve academic performance and motivation in Physics 1 course," *International Journal of Engineering Pedagogy*, vol. 14, no. 6, pp. 82–92, 2024. <https://doi.org/10.3991/ijep.v14i6.47127>
- [9] Y. Wardat et al., "ChatGPT: A revolutionary tool for teaching and learning mathematics," *Euroasia Journal of Mathematics, Science and Technology Education*, vol. 19, no. 7, pp. 2286–2286, 2023. <https://doi.org/10.29333/ejmste/13272>
- [10] M. Fishbein and I. Ajzen, *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley Publishing Co., 1975.
- [11] A. O. Ajlouni, F. A. Wahba, and A. S. Almahaireh, "Students' attitudes towards using ChatGPT as a learning tool: The case of the University of Jordan," *International Journal of Interactive Mobile Technologies*, vol. 17, no. 18, pp. 99–117, 2023. <https://doi.org/10.3991/ijim.v17i18.41753>
- [12] A. Shamsul, K. Amirrudin, and M. Ramlan, "Bibliometric analysis of mobile learning user experience industrial revolution 5.0," *International Journal of Evaluation and Research in Education*, vol. 13, no. 5, pp. 3259–3269, 2024. <https://doi.org/10.11591/ijere.v13i5.28958>
- [13] M. Javaid et al., "Unlocking the opportunities through ChatGPT Tool towards ameliorating the education system," *Bench Council Transactions on Benchmarks, Standards and Evaluations*, vol. 3, no. 2, p. 100115, 2023. <https://doi.org/10.1016/j.tbench.2023.100115>
- [14] M. Montenegro-Rueda, J. Fernández-Cerero, J. M. Fernández-Batanero, and E. López-Meneses, "Impact of the implementation of ChatGPT in education: A systematic review," *Computers*, vol. 12, no. 8, p. 153, 2023. <https://doi.org/10.3390/computers12080153>
- [15] X. Lin, "Exploring the role of ChatGPT as a facilitator for motivating self-directed learning among adult learners," *Adult Learning*, vol. 35, no. 3, pp. 156–166, 2023. <https://doi.org/10.1177/10451595231184928>
- [16] D. Dobrovská and D. Vaněček, "Motivation risks in teaching students at secondary technical schools," *International Journal of Engineering Pedagogy*, vol. 13, no. 8, pp. 20–32, 2023. <https://doi.org/10.3991/ijep.v13i8.44487>
- [17] A. O. R. Vistorte et al., "Integrating artificial intelligence to assess emotions in learning environments: A systematic literature review," *Frontiers Psychology*, vol. 15, p. 1387089, 2024. <https://doi.org/10.3389/fpsyg.2024.1387089>
- [18] T. K. F. Chiu, Q. Xia, X. Zhou, C. S. Chai, and M. Cheng, "Systematic literature review on opportunities, challenges, and future research recommendations of AI in education," *Computers in Education: Artificial Intelligence*, vol. 4, p. 100118, 2023. <https://doi.org/10.1016/j.caeai.2022.100118>
- [19] L. Soyoung et al., "Secondary social studies teachers' perception and training demand for AI-based education," *Korean Association for Learner-Centered Curriculum and Instruction*, vol. 4, pp. 743–759, 2023. <https://doi.org/10.22251/jlcci.2023.23.7.743>
- [20] S. Munawar et al., "Move to smart learning environment: Exploratory research of challenges in computer laboratory and design intelligent virtual laboratory for e-learning technology," *Euroasia Journal of Mathematics, Science and Technology Education*, vol. 14, no. 5, pp. 1645–1662, 2018. <https://doi.org/10.29333/ejmste/85036>
- [21] Y. A. Bachiri, H. Mouncif, and B. Bouikhalene, "Artificial intelligence empowers gamification: Optimizing student engagement and learning outcomes in e-learning and MOOCs," *International Journal of Engineering Pedagogy*, vol. 13, no. 8, pp. 4–19, 2023. <https://doi.org/10.3991/ijep.v13i8.40853>

- [22] Y. A. Bachiri and H. Mouncif, "Increasing student engagement in lessons and assessing MOOC participants through artificial intelligence," in *Business Intelligence*, M. Fakir, M. Baslam, and R. El Ayachi, Eds., *Business Intelligence. CBI 2022. Lecture Notes in Business Information Processing*, 2022, vol. 449, pp. 135–145. https://doi.org/10.1007/978-3-031-06458-6_11
- [23] D. T. K. Ng, J. K. L. Leung, J. Su, R. C. W. Ng, and S. K. W. Chu, "Teachers' AI digital competencies and twenty-first century skills in the post-pandemic world," *Educational Technology Research and Development*, vol. 71, pp. 137–161, 2023. <https://doi.org/10.1007/s11423-023-10203-6>
- [24] A. O. Thunstrom and S. Steingrimsson, "Can GPT-3 write an academic paper on itself, with minimum human input?" *HAL Open Science*, 2022. [Online]. Available at: <https://hal.science/hal-03701250>
- [25] A. Mitchell, "Professor catches student cheating with ChatGPT: I feel abject terror," *New York Post*, 2022. [Online]. Available at: <https://nypost.com/2022/12/26/student-using-chatgpt-to-cheat-professor-warns/>
- [26] S. Aguilar, "AI in K12 classrooms: Ethical considerations and lessons learned," in *Critical Thinking and Ethics in the Age of Generative AI in Education*, 2023. [Online]. Available at: https://today.usc.edu/wp-content/uploads/2024/02/USC_GenerativeAI_011624_FINAL.pdf
- [27] D. R. E. Cotton, P. A. Cotton, and J. R. Shipway, "Chatting and cheating: Ensuring academic integrity in the era of ChatGPT," *Innovations in Education and Teaching International*, vol. 61, no. 2, pp. 228–239, 2022. <https://doi.org/10.1080/14703297.2023.2190148>
- [28] M. B. Miles and A. M. Huberman, *Qualitative Data Analysis: An Expanded Sourcebook*, 2nd ed. Thousand Oaks, CA: Sage Publications Inc, 1994.
- [29] C. McKearim, "Report on student attitudes towards AI in academia," UIC University of Illinois Chicago, 2024. Available at: <https://learning.uic.edu/news-stories/report-on-student-attitudes-towards-ai-in-academia/>
- [30] R. G. Jurado, T. Pettersson, and M. Zwierewicz, "Students' attitudes to the use of AI," in *16th International Conference of Education, Research and Innovation*, 2023. <https://doi.org/10.21125/iceri.2023>
- [31] A. R. Vargas-Murillo, I. N. M. de la Asuncion, and F. de Jesús Guevara-Soto, "Challenges and opportunities of AI-assisted learning: A systematic literature review on the impact of ChatGPT usage in higher education," *International Journal of Learning, Teaching and Educational Research*, vol. 22, no. 7, pp. 122–135, 2023. <https://doi.org/10.26803/ijlter.22.7.7>
- [32] L. Chen, P. Chen, and Z. Lin, "Artificial intelligence in education: A review," *IEEE Access*, vol. 8, pp. 75264–75278, 2020. <https://doi.org/10.1109/ACCESS.2020.2988510>
- [33] J. von Garrel and J. Mayer, "Artificial intelligence in studies – use of ChatGPT and AI-based tools among students in Germany," *Humanities and Social Sciences Communications*, vol. 10, p. 799, 2023. <https://doi.org/10.1057/s41599-023-02304-7>
- [34] L. Wang, "The impacts and challenges of artificial intelligence translation tool on translation professionals," in *8th International Conference on Social Sciences and Economic Development – ICSSSED 2023*, 2023, vol. 163, p. 02021. <https://doi.org/10.1051/shsconf/202316302021>
- [35] L. T. Ameen et al., "The impact of AI on computational thinking in education at university," *International Journal of Engineering Pedagogy*, vol. 14, no. 5, pp. 192–203, 2024. <https://doi.org/10.3991/ijep.v14i5.49995>
- [36] S. Bezjak, "Perceptions and perspectives: Understanding teachers' attitudes towards AI in education," in *International Conference – Artificial Intelligence for Human-Technologies Economy Sustainable Development*, 2024. [Online]. Available at: <https://toknowpress.net/ISBN/978-961-6914-31-4/68.pdf>

- [37] E. Sabornido *et al.*, “Assessing future teachers’ readiness in an AI-driven classroom,” *International Journal of Current Research*, vol. 16, no. 5, pp. 28129–28133, 2024.
- [38] W. Holmes, M. Bialik, and C. Fadel, *Artificial Intelligence in Education: Promises and Implications for Teaching and Learning*. Boston: Center for Curriculum Redesign, 2019.
- [39] J. Kim, “Leading teachers’ perspective on teacher-AI collaboration in education,” *Education and Information Technologies*, vol. 29, pp. 8693–8724, 2024. <https://doi.org/10.1007/s10639-023-12109-5>

10 AUTHORS

Dana Dobrovská is an associate professor of psychology at the Masaryk Institute of Advanced Studies (MIAS), Czech Technical University in Prague, former president of the International Monitoring Committee IGIP. In her research, she specialized in technical teacher education, virtual and augmented reality in education and motivation in learning.

David Vaněček is an associate professor of teaching methodologies at the Masaryk Institute of Advanced Studies (MIAS), Czech Technical University in Prague. He is currently deputy director of the MIAS and head of the Institute of Pedagogical and Psychological Studies. In his research, he specialized in technical teacher education, artificial intelligence in education, teaching methodologies, and virtual and augmented reality in education (E-mail: david.vanecek@cvut.cz).

Yilmaz Ilker Yorulmaz is a post-doctoral researcher at Masaryk Institute of Advanced Studies (MIAS), Czech Technical University, Prague, and also affiliated with Mugla Sitki Kocman University, Turkey. In his research, he is specialized in organizational behavior in education, and digitalization and AI in educational administration.