

THE FUTURE OF TEACHING AND LEARNING: STUDENTS' ATTITUDES TOWARD THE USE OF ARTIFICIAL INTELLIGENCE

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Abstract

This study explores the attitudes of university students from Western Romania regarding the use of artificial intelligence (AI) in education. A total of 600 valid responses were collected from students enrolled in various specializations and forms of study. The research aims to understand students' perspectives on the integration of AI in educational settings, examining their views on the current and future roles of AI in shaping the teaching and learning experience. The questionnaire aimed to capture the opinions of students concerning the potential benefits and challenges of AI, as well as its impact on their academic development and future career prospects. The findings provide valuable insights into how students perceive the evolution of AI technologies and their potential to transform educational practices in Romania. These results may inform educators and policymakers on how to better integrate AI tools into the academic environment, aligning with student expectations and the future demands of the workforce.

Keywords

Artificial Intelligence, Education, Student Attitudes, Teaching and Learning, Higher Education.

JEL Classification

D20, D21, D22, F60, F63, L20, M10

Introduction

The rapid advancements in artificial intelligence (AI) are transforming industries worldwide, including higher education. The integration of AI into educational environments promises to revolutionize teaching and learning practices, offering new opportunities for personalization, efficiency, and innovation in the classroom. As Popenici and Kerr (2017) argue, AI has the potential to enhance both the teaching and learning processes by enabling adaptive learning systems, intelligent tutoring, and data-driven decision-making in educational institutions. However, the extent to which these AI technologies will shape the future of education remains an ongoing area of investigation.

AI technologies can automate administrative tasks, provide personalized learning experiences, and support student learning by offering real-time feedback. However, these developments also bring challenges, particularly regarding the role of educators in an AI-enhanced environment and the potential ethical implications of widespread AI use in education. Ahmad (2020) highlights the need to reimagine higher education in a way that prepares students for an AI-driven future, where traditional skills may no longer suffice. As AI continues to

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evolve, the importance of AI literacy and the ability to work alongside intelligent systems becomes increasingly crucial.

Ullrich, Vladova, Eigelshoven, and Renz (2022) conducted a bibliometric analysis on the application of AI in teaching and administration within higher education institutions. Their findings suggest that while there is significant research attention on AI's potential, many gaps remain, particularly concerning how AI can best be integrated into pedagogical practices and the long-term implications for student learning outcomes. Addressing these gaps is essential for educators and policymakers to ensure that AI not only enhances learning but also aligns with educational goals and ethical standards.

This study contributes to this growing body of research by examining the attitudes of university students toward AI in higher education, exploring how they perceive its impact on their learning, career prospects, and ethical considerations.

Literature Review

Artificial intelligence in higher education has been a subject of significant academic interest over the past two decades, with researchers exploring its applications in both teaching and administrative processes. Gera and Chadha (2021) conducted a systematic review of the literature on AI in higher education from 2000 to 2020, identifying the key trends and future research directions. Their review highlighted that AI technologies are increasingly being integrated into higher education, with applications ranging from intelligent tutoring systems to automated grading tools and data-driven decision-making processes. However, they also noted several challenges, including the ethical implications of AI use and the potential displacement of human educators.

Shah (2023) further emphasizes the role of AI in transforming educational practices, suggesting that AI can personalize learning experiences by adapting content to individual students' needs, thereby enhancing student engagement and motivation. According to Shah, AI-driven systems have the potential to offer real-time feedback, allowing students to learn at their own pace while receiving targeted support. This represents a fundamental shift in the traditional teacher-student dynamic, as AI becomes a co-facilitator of learning.

Ivanashko, Kozak, Knysch, and Honchar (2024) explore both the opportunities and challenges of AI in higher education. They argue that while AI offers numerous advantages, such as improved efficiency and personalized learning, it also raises concerns about data privacy, algorithmic bias, and the reduction of human oversight in educational decision-making. Their research underscores the importance of addressing these challenges to ensure that AI technologies are implemented in ways that promote equity and inclusivity.

Westman et al. (2021) examine the role of AI in career guidance, identifying the potential for AI to support students in making informed decisions about their academic and professional paths. They suggest that AI systems can analyze vast amounts of data to offer personalized career advice, tailored to individual students' skills, interests, and job market trends. However, the authors also caution that AI-driven career guidance tools must be used responsibly to avoid reinforcing existing biases or limiting students' opportunities based on algorithmic predictions.

Al-Chaer (2024) explores the broader implications of AI in higher education within the context of digital transformation in the Arab world. His work highlights the potential for AI to enhance access to education and improve the quality of learning experiences, particularly in regions where educational resources may be limited. However, Al-Chaer also points out that the successful integration of AI in education requires a comprehensive approach that includes not only technological advancements but also a focus on developing students' digital literacy and critical thinking skills.

Together, these studies highlight both the potential benefits and the challenges associated with AI in higher education. While AI offers opportunities for personalized learning, increased efficiency, and improved decision-making, it also presents ethical dilemmas and concerns about its impact on human agency in education.

The present study seeks to build on this existing literature by investigating the following research question: *How do university students perceive the impact of artificial intelligence on their learning, career prospects, and ethical considerations in their field of study?*

Methodology

This study employed a quantitative research design using a cross-sectional survey to collect data from university students. The survey was designed to measure students' attitudes toward artificial intelligence (AI) in education and its potential impact on their academic development and future career prospects.

This study sought to explore students' attitudes toward the integration of artificial intelligence (AI) in higher education. Specifically, the research aimed to address the following question:

How do university students perceive the impact of artificial intelligence on their learning, career prospects, and ethical considerations in their field of study?

Participants

The study included a total of 600 university students from Western Romania, enrolled in various specializations and forms of study at Aurel Vlaicu University of Arad. Of these participants, 577 (96.2%) identified as female, and 23 (3.8%) identified as male.

In terms of education level, 470 students (78.3%) were enrolled in undergraduate programs, while 130 students (21.7%) were pursuing graduate studies. The participants were spread across different years of study, with 292 students (48.7%) in their first year, 190 students (31.7%) in their second year, and 118 students (19.7%) in their third year.

The sample was selected through convenience sampling, allowing for easy access to students enrolled at the university during the study period. Participation was voluntary, and informed consent was obtained from all participants prior to their inclusion in the research. Respondents were assured of the confidentiality of their responses and that the data would be used solely for research purposes.

Instruments

A self-administered questionnaire was utilized to assess students' attitudes toward the use of artificial intelligence (AI) in education and its perceived impact on their academic and professional development. The questionnaire consisted of 9 items, each rated on a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). These items were designed to capture students' views on how AI might influence their career prospects, their understanding of the ethical implications of AI, and AI's perceived utility in the educational context. The items in this questionnaire were inspired by previous research on AI's role in education, particularly the work of Hwang et al. (2020), which outlined the vision, challenges, and roles of AI in education, and Alam & Mohanty (2022), which discussed the potential and concerns of AI in higher education. These references served as a foundation for adapting the items to reflect the specific educational environment of Romanian students.

For example, items such as "AI will impact my career" and "Students should learn the basics of AI" were designed to gauge students' views on the professional implications of AI and its importance in education. Additional items like "I understand the ethical implications of using AI in my field" and "AI can increase students' motivation to study" explored students' awareness of AI's ethical dimensions and its potential to enhance academic motivation.

The internal consistency of the scale was high, with a Cronbach's alpha of .888, indicating that the instrument was reliable for measuring the intended variables.

Results

The data were analyzed to examine the reliability, factor structure, and item performance of the scale measuring students' attitudes toward artificial intelligence (AI) in education.

The descriptive statistics for the nine items in the scale are presented in Table 1. The grand mean of the scale was 3.84, with individual item means ranging from 3.59 to 4.15, and standard deviations ranging from 0.936 to 1.014. These results suggest a generally positive attitude among students toward AI's impact on their education

and career, with the highest mean observed for the item regarding the importance of students learning the basics of AI (M = 4.15, SD = 0.968).

The internal consistency of the scale was examined using Cronbach's alpha, which was .888, indicating good reliability for the instrument. The scale had a total variance of 40.791, and the standard deviation across the 9 items was 6.387.

An exploratory factor analysis (EFA) was conducted to assess the underlying factor structure of the scale. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.863, indicating that the data were suitable for factor analysis. Bartlett's test of sphericity was significant, $X^2(36) = 3434.571, p < .001$, further supporting the suitability of the data for factor analysis. Two factors emerged from the analysis, accounting for 58.7% of the total variance. Factor 1, labeled "AI's Role in Learning and Motivation", accounted for 35.4% of the variance, and Factor 2, labeled "AI's Professional and Ethical Impact", explained 23.4%. The rotated solution indicated that the items loaded clearly onto these two distinct factors (see Table 2 for factor loadings). Items related to AI's contribution to motivation, active learning, and educational assessment loaded onto Factor 1, while items focused on AI's impact on careers and ethical implications loaded onto Factor 2.

Table 1 shows the descriptive statistics for each item, including the mean and standard deviation.

Table 1 Means and Standard Deviations for Scale Items

| Item | Mean | Std. Deviation | N |
|--|------|----------------|-----|
| 1. AI will impact my career | 3.91 | 0.982 | 644 |
| 2. Students should learn the basics of AI | 4.15 | 0.968 | 644 |
| 3. I understand the ethical implications of AI in my field | 4.00 | 0.967 | 644 |
| 4. AI can be useful in my professional field | 3.93 | 0.990 | 644 |
| 11. AI can increase student motivation for study | 3.59 | 1.014 | 644 |
| 12. AI can stimulate active learning | 3.66 | 1.009 | 644 |
| 14. AI can enhance the quality of educational assessment | 3.94 | 0.958 | 644 |
| 15. AI can improve learning outcomes | 3.61 | 0.975 | 644 |
| 16. AI can streamline instructional regulation strategies | 3.76 | 0.936 | 644 |

Table 2 presents the factor loadings and uniqueness values for each item. The loadings ranged from .501 to .850, with the highest loading observed for the item related to AI's role in students' basic learning (Factor 2, loading = .850). Uniqueness values ranged from .294 to .657, indicating that a reasonable proportion of variance in each item was explained by the identified factors.

Table 2 Factor Loadings and Uniqueness for Each Item

| Factor Loadings | | | |
|------------------------|--|--|-------------------|
| | Factor 1 - AI's Role in Learning and Motivation | Factor 2 AI's Professional and Ethical Impact | Uniqueness |
| item16 | 0.833 | | 0.294 |
| item12 | 0.800 | | 0.342 |
| item11 | 0.790 | | 0.385 |
| item14 | 0.769 | | 0.332 |
| item15 | 0.762 | | 0.452 |
| item2 | | 0.850 | 0.323 |

Factor Loadings

| | Factor 1 - AI's Role in Learning and Motivation | Factor 2 AI's Professional and Ethical Impact | Uniqueness |
|-------|--|--|-------------------|
| item1 | | 0.761 | 0.434 |
| item3 | | 0.711 | 0.496 |
| item4 | | 0.501 | 0.657 |

Note. Applied rotation method is promax.

The fit of the two-factor model was evaluated using various fit indices. The root mean square error of approximation (RMSEA) was .178, with a 90% confidence interval of .163 to .193, and the standardized root mean square residual (SRMR) was .045. The comparative fit index (CFI) was .881, and the Tucker-Lewis index (TLI) was .773. While the RMSEA was relatively high, the SRMR and CFI indicated an acceptable model fit.

These findings provide a clear structure of how students perceive the role of AI in their academic and professional lives, suggesting a bifurcation between AI's influence on learning and motivation and its broader professional and ethical implications.

The results from the exploratory factor analysis were further supported by the scree plot, which visually represents the eigenvalues associated with each factor. The scree plot indicated a clear point of inflection after the second factor, supporting the decision to retain two factors for further analysis. This suggests that the majority of variance in students' attitudes toward AI in education can be explained by these two factors.

The scree plot is presented in **Figure 1** below:

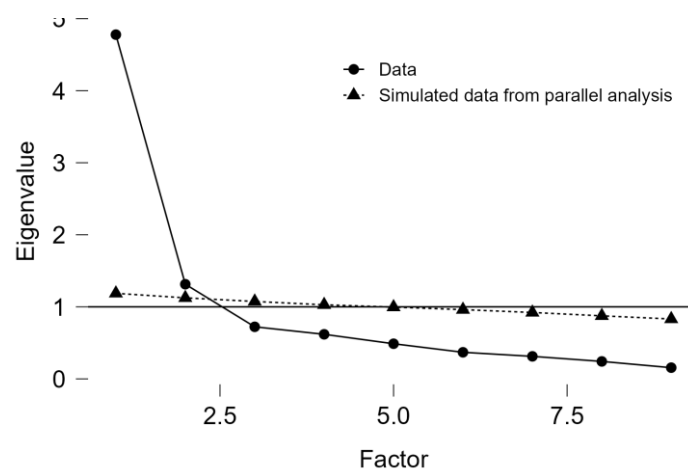


Figure 1. Scree Plot of Eigenvalues for Factor Retention

The two-factor structure aligns with the eigenvalue threshold, where factors with eigenvalues greater than 1 were retained. This confirms the appropriateness of distinguishing between Factor 1, labeled "AI's Role in Learning and Motivation," and Factor 2, labeled "AI's Professional and Ethical Impact."

Discussions

The findings of this study offer valuable insights into university students' attitudes toward the integration of artificial intelligence (AI) in higher education, revealing both optimism and critical reflections on AI's future role in academia. The positive response from students, as reflected in their generally high mean scores across items, underscores the growing recognition of AI's potential in transforming educational practices, echoing the perspectives found in previous literature (Alam & Mohanty, 2022; Luan et al., 2020). However, the data also

point to the complexity of AI adoption in education, with students expressing both enthusiasm and concerns regarding AI's broader implications.

Students' strong agreement with the statement that AI will impact their careers ($M = 3.91$, $SD = 0.982$) suggests a high level of awareness about the potential for AI to shape future job markets, aligning with Alam and Mohanty's (2022) argument that AI in higher education may foster either optimism or apprehension regarding future employment. The findings support the notion that students view AI as a crucial factor in preparing for professional life, a sentiment also echoed by Leoste et al. (2021), who emphasized the importance of integrating emerging technologies into curricula to equip students for the evolving job market.

Moreover, the high scores related to students' recognition of the need to learn the basics of AI ($M = 4.15$, $SD = 0.968$) reflect a growing consensus that AI literacy is becoming essential in education. As noted by Luan et al. (2020), the rapid advancement of AI technologies in education necessitates that students acquire fundamental AI skills to thrive in a data-driven world. This recognition, coupled with the belief that AI can stimulate active learning and increase motivation ($M = 3.66$, $SD = 1.009$), suggests that students are increasingly viewing AI as a tool for enhancing their academic experience. This is consistent with research by Popenici et al. (2023), which highlighted the transformative potential of AI to reshape pedagogical approaches and improve learning outcomes.

However, despite the positive attitudes toward AI's role in education, students also expressed concerns about the ethical implications of AI use in their fields ($M = 4.00$, $SD = 0.967$). This finding aligns with the critical perspectives found in Bennett and Abusalem (2024), who stressed that while AI offers significant opportunities for higher education, it also raises ethical challenges that must be carefully considered. The concern over ethical issues suggests that students are not only thinking about AI's practical applications but also its broader societal impacts, particularly in relation to data privacy, bias, and fairness. As emphasized by Roumate (2023), the successful integration of AI in education must involve addressing these ethical concerns to ensure that the technology is used responsibly and equitably.

The factor analysis revealed two distinct dimensions of student attitudes: AI's role in learning and motivation, and its professional and ethical impact. The high loadings of items related to AI's contributions to active learning, motivation, and assessment (Factor 1) reinforce the view that AI is perceived as a positive educational tool. These findings are in line with Luan et al. (2020), who argued that AI has the potential to personalize learning and enhance student engagement. On the other hand, Factor 2, which highlights AI's impact on career prospects and ethical considerations, underscores the dual nature of student attitudes, reflecting both excitement about the professional opportunities AI might create and caution about its ethical implications (Leoste et al., 2021).

In line with the findings of Popenici et al. (2023), students recognize that AI can facilitate learning and offer innovative solutions in education, but they remain concerned about how these technologies will affect human-centered aspects of education, such as critical thinking and ethical decision-making. These concerns point to a need for higher education institutions to provide not only technical training in AI but also opportunities for students to engage with the ethical dimensions of AI use in society (Bennett & Abusalem, 2024).

Conclusion

In conclusion, while students view AI as a valuable tool for enhancing education and preparing them for future careers, they are also mindful of the ethical challenges posed by the increasing use of AI technologies. These findings suggest that educational institutions must strike a balance between promoting AI literacy and fostering critical discussions on its ethical use. As AI continues to shape the future of higher education, it is crucial for educators and policymakers to address both the opportunities and challenges presented by this transformative technology.

Despite the valuable insights provided by this study, several limitations should be noted. First, the sample was limited to university students from a single geographical region (Western Romania), which may affect the generalizability of the findings to other contexts. Future research should consider larger, more diverse samples from different regions and educational systems to provide a broader understanding of students' attitudes toward AI in education. Additionally, the cross-sectional design of the study only captures students' attitudes at a specific point in time. Longitudinal studies would be beneficial to track changes in these attitudes as AI

technologies continue to evolve and as students gain more exposure to them in their academic and professional lives.

Future research could also explore the perspectives of other stakeholders in higher education, such as educators and administrators, to provide a more comprehensive view of AI's impact on the educational ecosystem. Moreover, qualitative studies could offer deeper insights into the specific ethical concerns students have regarding AI, as well as the ways AI is being integrated into curricula and teaching practices. These future directions would contribute to a more nuanced understanding of AI's role in shaping the future of higher education.

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