



Analyzing the Integration of Artificial Intelligence in Higher Education: A Study on Teachers' Attitudes and Perspectives

Fazila Iqbal¹, Dr. Samina Akhtar² & Dr. Farah Latif Naz³

¹M.Phil Scholar, Department of Education, The Women University, Multan, Punjab, Pakistan,
Email: fasilamalikmalik@gmail.com

²Assistant Professor, Department of Education, The Women University, Multan, Punjab Pakistan,
Email: samabdullah33@hotmail.com

³Assistant Professor Department of Education, Bahauddin Zakariya University, Multan, Punjab, Pakistan,
Email: farahlatif@bzu.edu.pk

ARTICLE INFO

Article History:

Received: February 05, 2025
Revised: February 28, 2025
Accepted: March 03, 2025
Available Online: March 06, 2025

Keywords:

Artificial Intelligence, Higher Education, Teacher Perceptions, AI Integration

Corresponding Author:

Dr. Farah Latif Naz

Email:

farahlatif@bzu.edu.pk

ABSTRACT

The current descriptive study explored teachers' perspectives on integrating artificial intelligence in higher education institutions. The study's population was comprised of all males and females ($N = 220$). Instructors are working in various departments of the faculty of social sciences at public universities in Multan, Punjab, Pakistan. A sample of one hundred and sixty teachers ($N = 160$), including forty-one males ($M, 41$) and one hundred and nineteen females ($F, 119$), were chosen through convenient sampling from the faculty of social sciences departments to accomplish this research. The questionnaire was utilized as a research tool to collect data. The data was analyzed using descriptive statistics, mean, standard deviation percentage, and frequency utilizing the Statistical Package for Social Sciences (SPSS) version 25. The results indicated a positive perception of teachers towards the integration of Artificial Intelligence in Higher Education Institutions. Based on the findings, the study recommended that higher educational institutions should focus on organizing AI-focused teacher training, ensuring access to essential AI resources, integrating AI into curricula, addressing ethical concerns, and launching pilot programs to facilitate effective AI adoption in education. These steps can support educators in leveraging AI tools to enhance teaching and learning experiences.



1. Introduction

The field of education has experienced a paradigm shift due to Artificial Intelligence (AI) in this age of unparalleled technical progress (Karaca & Kılcan, 2023). Understanding the viewpoints of educators is crucial as AI is transforming the way we learn and teach. Given the critical role that educators have in influencing the educational environment for generations to come, it is imperative to understand their viewpoints on the use of AI in the classroom (Alam, 2021). In addition, it is imperative to mention that AI innovations are still in their early experimental stages, and there have been limited partnerships between education and AI in related treatments, such as AI-enabled adaptive systems (Kabudi et al., 2021). Consequently, there is a significant disconnect between the capabilities of AI and their actual use in classrooms (Bates et al., 2020). As a matter of fact, new generative AI models, such as ChatGPT, have, however, focused more attention than ever before on AI's revolutionary potential in a variety of sectors (Lee et al., 2024).

There is a rising interest in the effects of AI on general education, and there is also a noticeable uptick in the use of AI in the classroom (Chiu et al., 2023). Specifically, after collecting student feedback on activities, Zhai et al. (2023) used machine learning methods to evaluate the accuracy of these models. The use of AI in the classroom is changing the way educators see and interact with technology. There is a growing need to comprehend how educators perceive the incorporation of Artificial Intelligence (AI) into classrooms (Karakose et al., 2023). According to Hermansyah et al. (2023), the ethical implications of artificial intelligence in education go beyond only technological concerns and include broader societal repercussions, including privacy protection and social fairness. Virtual environments may not provide the same tactile and hands-on learning opportunities as real-world interactions (Cooper & Tang, 2024; Afaq et al., 2022).

Moreover, as AI technologies promise to revolutionize pedagogical approaches and personalized learning experiences, understanding teachers' insights, concerns, and readiness is crucial for effective implementation. The integration of artificial intelligence (AI) in higher education institutions lies in the pivotal role that educators play in shaping and delivering quality education. Teachers' firsthand experiences and professional judgments can identify practical benefits, highlight potential ethical and technical challenges, and inform strategies for professional development and policy-making. Through gaining knowledge of teachers' viewpoints, researchers can discover how Artificial Intelligence tools affect student engagement, academic achievement, and the growth of critical thinking abilities.

There is no denying the fact that the potential of AI has revolutionized the field of education (Fullan et al., 2023). Furthermore, Zawacki-Richter et al. (2019) found that the majority of AI research is carried out in STEM domains, even though multidisciplinary approaches are necessary for the expanding use of AI in education. Several recent research studies have brought attention to the fact that artificial intelligence research is lacking in educational viewpoints (Chen et al., 2020; Hinojo-Lucena et al., 2019). Furthermore, academics are worried that there is a dearth of models and theories related to education in the e-learning studies that have used AI in the last 20 years (Tang & Hai, 2021).

While there have been numerous recent studies exploring the integration of Artificial Intelligence in education, many of these research efforts primarily focus on technical aspects and applications within STEM fields, often overlooking the critical educational perspectives necessary for effective implementation. This research aims to fill that gap by examining teachers' perceptions of AI in higher education, addressing the lack of interdisciplinary approaches and emphasizing the importance of educators' insights and experiences in shaping the future of AI in educational settings.

1.1 Research Questions

1. What are teachers' perceptions regarding the role of Artificial Intelligence in Higher Education Institutions in Higher Education Institutions?
2. What are teachers' attitudes towards the integration of Artificial Intelligence in Higher Education Institutions?
3. How do teachers' perceptions of AI in education vary based on gender in Higher Education Institutions?

1.2 Research Objectives

1. To analyze teachers' perceptions regarding the role of AI in Higher Education Institutions.
2. To analyze teachers' attitudes towards the integration of AI in Higher Education Institutions.
3. To examine gender-based differences in teachers' perceptions towards AI's role in Higher Education Institutions.

2. Literature Review

Several studies have looked at how educators see AI and what it means for education. One of these studies, by Almasri (2024), looked at how AI is changing science education by improving the learning environment, making quizzes, evaluating student work, and predicting grades.

Furthermore, Afiya Jamal (2023) discovered in their research that Artificial Intelligence (AI) is altering the way we engage with technology and live our lives. The study also examines the ethical, social, and cultural consequences of AI in teacher education. Furthermore, Chounta et al. (2022) discovered in their research study that despite their little knowledge of AI, educators regard it as a valuable educational opportunity. Furthermore, the report emphasizes the necessity for AI assistance to boost teacher efficiency. Furthermore, Derya (2024) researched artificial intelligence (AI), which is fast revolutionizing many parts of society, including education. A study with 74 educators used the Opinion Scale on Artificial Intelligence in Education to gain significant information. This study contributes significantly to the continuing discussion over the use of AI in education.

However, concerns have been made concerning changes to the teacher's role in the classroom, as well as the necessity for openness in AI decision-making. The research on teachers' perspectives on AI in education has made significant contributions, but there are still various gaps and topics for further investigation (Papadakis et al., 2023). As a result, Ashok Panigrahi and Vijay Joshi (2020) performed research on how artificial intelligence is one of the upcoming technologies that has the potential to change every area of our social interactions. First, this paper offers the reader an overview of artificial intelligence.

Finally, this paper provides some examples of the usage of AI technology in the education industry to improve the learning experience and quality of learning. Furthermore, teachers consider AI to be a tool for accessing and using multilingual content. Kim (2022) studied instructors' attitudes about an AI-enhanced scaffolding system for STEM education. The majority of STEM teachers saw AI as a valuable tool for improving scaffolding support.

3. Research Methodology

3.1 Research Design

This study employed a quantitative research design to explore the perceptions of teachers regarding various aspects within public sector institutions' social science departments. A structured questionnaire was developed to collect data from participants.

3.2 Population of the Study

The study population comprised all male and female instructors 220 employed in the social science departments at three public universities in Multan: The Women University Multan, Bahauddin Zakariya University, and Emerson University Multan.

3.3 Sample and Sampling Procedure

A convenient sampling technique was utilized to select 160 teachers (N=160) from the population. The sample included instructors from various disciplines within the social sciences, ensuring representation across the selected universities.

3.4 Development of Instrument

A questionnaire consisting of 26 statements was created through a comprehensive literature review and consultations with educational experts. Experts contributed to ensuring the content validity of the items, helping to improve both the structure and clarity of the statements.

3.5 Data Collection and Administration

The researcher distributed 160 questionnaires among available instructors from the universities' social sciences departments. Data collection was conducted over approximately three weeks, ensuring participants' confidentiality throughout the process.

3.6 Validity of the Instrument

To confirm the validity of the instrument, educational experts reviewed the questionnaire. Adjustments were made based on their feedback to enhance the accuracy and relevance of the statements used to gather data.

3.7 Reliability of the Instrument

The reliability of the questionnaire was assessed using Cronbach's Alpha, yielding a reliability coefficient of 0.755, indicating a good degree of internal consistency.

3.8 Pilot Testing

A pilot study was conducted to validate the instrument before the main research. Feedback from a small group of instructors was analyzed to ensure the instrument's clarity and effectiveness.

3.9 Data Analysis

Data collected from the questionnaires were analyzed using the Statistical Package for Social Sciences (SPSS), version 25. Descriptive statistics, including means, standard deviations, and frequencies, in addition to inferential statistics like t-tests, were employed to analyze the data.

3.10 Ethical Considerations

This study followed ethical rules, which included:

1. Obtaining informed permission from all participants before data collection.
2. Maintaining the privacy of participants' responses.
3. Ensure that data collection did not involve pressure.

4. Data Analysis

Table 1: *Institute-wise analysis*

Name of institute	Frequency	Percentage
The Women University	54	33.8
Multan	53	33.1
Bahauddin Zakariya	53	33.1
University Multan	160	100.0
Emerson University		
Multan		
Total		

Table 1 displays the frequency and percentage distribution of students across Women's University (54, 33.8%), BZU (53, 33.1%), and Emerson University (53, 33.1%), totalling 160 students.

Table 2: *Gender-wise analysis*

Gender	Frequency	Percentage
Male	62	38.8
Female	98	61.3
Total	160	100.0

Table 2 presents the frequency and percentage distribution of students by gender, with 62 males constituting 38.8% and 98 females constituting 61.3% of the total student population of 160.

Table 3: *Descriptive Statistics for Teachers' Perspectives towards the Role of Artificial Intelligence (N=160)*

No.	Statements	Mean	Std. Deviation
1	The benefits of integrating AI into education outweigh the challenges.	3.13	1.73
2	AI can contribute to more efficient and effective assessment methods.	4.10	1.84
3	I am open to adopting new AI tools and technologies in my teaching.	4.00	1.80
4	Integrating AI into education can improve students' critical thinking skills.	4.05	1.83
5	AI can play a role in bridging educational accessibility gaps.	3.58	1.17
6	I feel comfortable using AI tools in my teaching practices.	4.86	1.80
7	I am concerned about the ethical implications of using AI in education.	3.30	1.36
8	I am aware of the potential biases associated with AI technologies in education	4.00	1.94

9	AI can help personalize the learning experience for students.	4.86	1.73
10	AI technologies can enhance collaboration among students.	4.73	1.84
11	AI technologies can help in identifying and addressing individual student learning needs.	4.60	1.83
12	AI can help in predicting and addressing students' academic challenges.	3.81	1.26
13	AI technologies have the potential to enhance the teaching and learning experience.	3.93	1.29
14	I believe AI should complement traditional teaching methods, not replace them.	4.66	1.72
15	AI can contribute to a more inclusive and diverse learning environment.	3.65	1.31
16	I believe AI can assist in automating administrative tasks, allowing more focus on teaching.	4.00	1.95

Table 3 presents the descriptive statistics on teachers' perspectives regarding AI integration in education. The results indicate a generally positive attitude toward AI, with mean scores ranging from 3.13 to 4.86, reflecting moderate to strong agreement across various statements. The highest-rated statement, "AI can help personalize the learning experience for students" ($M = 4.86$, $SD = 1.73$), suggests that teachers strongly believe in AI's ability to tailor education to individual student needs. Similarly, moderate agreement was observed for "AI can play a role in bridging educational accessibility gaps" ($M = 3.58$, $SD = 1.17$) and "AI can contribute to a more inclusive and diverse learning environment" ($M = 4.10$, $SD = 1.84$), indicating that AI is seen as a tool for enhancing equity and inclusion in education. Teachers also expressed high confidence in using AI tools in their teaching ($M = 4.86$, $SD = 1.80$) and recognized AI's role in enhancing student collaboration ($M = 4.73$, $SD = 1.84$), identifying learning needs ($M = 4.60$, $SD = 1.83$), and improving critical thinking skills ($M = 4.05$, $SD = 1.83$). However, ethical concerns were evident, with "I am concerned about the ethical implications of using AI in education" ($M = 3.30$, $SD = 1.36$) receiving one of the highest ratings. Similarly, awareness of AI biases ($M = 4.00$, $SD = 1.94$) indicates that teachers acknowledge potential risks associated with AI technologies. The lowest-rated statement, "The benefits of integrating AI into education outweigh the challenges" ($M = 3.13$, $SD = 1.73$), suggests that while teachers see AI as beneficial, they remain cautious about its challenges. Additionally, moderate agreement was found for openness to adopting AI tools ($M = 4.00$, $SD = 1.80$) and AI's role in automating administrative tasks ($M = 4.00$, $SD = 1.95$), suggesting that opinions vary regarding AI's role in reducing teachers' workload. Overall, these findings highlight that teachers view AI as a powerful tool for personalization, accessibility, and collaboration but are mindful of ethical challenges and institutional barriers to effective implementation.

Table 4: Teachers' Attitudes Towards Integration of Artificial Intelligence (N=160)

No.	Statements	Mean	Std. Deviation
1	My institution provides adequate resources for the integration of AI in education	3.69	1.17
2	I received adequate training and support to integrate AI tools into my teaching.	4.48	1.92
3	There is a clear strategy for integrating AI	4.00	1.99

	technologies into the curriculum		
4	I believe faculty members should be recognized and rewarded for the successful integration of AI in teaching.	3.95	1.25
5	AI integration is aligned with the overall educational goals and mission of the institution.	4.64	1.86
6	Students are actively involved in decision-making regarding AI integration.	3.30	1.36
7	I receive ongoing professional development opportunities related to AI integration.	3.73	1.23
8	There are opportunities for collaboration and knowledge sharing regarding AI among faculty.	4.50	1.11
9	The current infrastructure supports the seamless integration of AI tools.	3.93	1.29
10	I am confident that my institution has effective measures in place to address privacy and security concerns related to AI."	4.00	1.11
11	Faculty members are actively involved in decision-making regarding AI integration.	3.65	1.31

Table 4 findings indicate that institutional support for AI integration in education is generally perceived positively by faculty members. To begin with, the adequacy of resources for AI integration received a mean score of ($M= 3.69$, $SD = 1.17$), demonstrating a moderately favorable perception with a relatively low variation in responses. Similarly, the availability of training and support for integrating AI tools into teaching is rated quite high at ($M= 4.48$, $SD = 1.92$), indicating strong agreement among faculty members, though responses vary widely. Moreover, the presence of a clear strategy for AI integration within the curriculum is acknowledged with a mean score of ($M= 4.00$, $SD = 1.99$), suggesting that while many agree, opinions are somewhat dispersed. In addition, the importance of recognizing and rewarding faculty members for their successful AI integration is emphasized, receiving a score of ($M= 3.95$, $SD = 1.25$), reflecting a fairly consistent agreement. Furthermore, AI integration is found to align strongly with the institution's educational goals and mission, as evidenced by the highest mean score of ($M=4.64$, $SD = 1.86$), though responses show some variability. On the other hand, student involvement in AI-related decision-making is perceived as relatively lower, with a mean score of ($M=3.30$, $SD = 1.36$), indicating a weaker but still moderate level of agreement. Additionally, ongoing professional development opportunities for faculty members remain moderately available, scoring ($M=3.73$, $SD = 1.23$), with responses showing relatively low dispersion. Meanwhile, opportunities for collaboration and knowledge-sharing among faculty members are rated highly at ($M=4.50$, $SD = 1.11$), reflecting a strong consensus on the importance of peer learning. In terms of infrastructure, the support for seamless AI integration is rated at ($M=3.93$, $SD = 1.29$), suggesting a generally positive perception with moderate variability. Furthermore, confidence in institutional measures for addressing privacy and security concerns is reflected in a score of ($M=4.00$, $SD = 1.11$), indicating agreement with minimal variation in responses. Lastly, faculty involvement in decision-making related to AI integration receives a moderate score of ($M=3.65$, $SD = 1.31$), showing some room for improvement.

Table 5: *T-test for Teachers' attitudes towards Artificial Intelligence based on gender*

Factor	Gender	N	Mean	Std. Deviation	Std. Error Mean	T	df	Sig. (2-tailed)	Mean Difference
Artificial Intelligence	Male	62	45.483	6.7234	.85388	.900	158	.369	1.09612
	Female	98	44.387	7.9530	.80337				

Table 5 represents the statistical analysis of a factor. For males (N=62), (mean= 45.4839), (standard deviation=6.72344), while for females (N=98), (mean= 44.3878), (standard deviation=7.95300). The difference in means between genders is 1.09612, but it is not statistically significant ($p = .369$). The findings indicate that there is no significant gender difference in sentiments toward AI integration in education among the polled individuals.

6. Discussion

The findings of this study indicate that teachers generally hold positive attitudes toward the integration of AI in education, with strong agreement on AI's role in personalized learning, accessibility, and enhancing collaboration (Table 3). These results align with the research by Chounta et al. (2022), which found that despite limited knowledge of AI, educators perceive it as a valuable tool for supporting teaching practices. Similarly, Uygun (2024) highlighted that AI fosters a more interactive learning environment, allowing teachers to personalize instruction based on students' needs.

Furthermore, the findings of this study reinforce the argument by Zawacki-Richter et al. (2019) that AI research is often concentrated in STEM disciplines, leaving gaps in broader educational perspectives. This is evident in the present study, where teachers acknowledged AI's benefits but expressed concerns about inadequate professional development opportunities (Table 4). Similarly, Kim and Kim (2022) found that while AI-enhanced scaffolding systems were useful in STEM education, educators required structured training to implement them effectively.

Regarding gender-based perceptions, this study found no statistically significant differences between male and female teachers in attitudes toward AI adoption. This result aligns with the research by Jamal (2023), who also reported that gender did not significantly influence educators' perceptions of AI. However, these findings contrast with those of Alam (2021), who suggested that female educators might have more reservations about AI integration due to concerns about technical complexity and ethical considerations. While this discrepancy was not observed in the present study, it underscores the importance of further exploration into how demographic factors shape AI adoption in education.

Overall, the study underscores the need for educational institutions to strengthen AI-focused teacher training, enhance collaboration opportunities among faculty, and establish clear policies for AI integration. Addressing these areas can help ensure that AI technologies are effectively utilized to support both educators and students in higher education settings.

7. Conclusions

The findings of this study indicate that teachers generally hold a positive attitude toward the integration of AI technologies in education, recognizing their potential to enhance personalized learning, student engagement, and administrative efficiency. High levels of agreement were observed regarding AI's role in bridging educational accessibility gaps, fostering inclusive learning environments, and enhancing collaboration among students. However, concerns about ethical implications, biases, and institutional support structures remain significant.

While institutions provide some level of training and professional development opportunities, the findings suggest that these efforts lack uniformity and structured implementation. Although workshops and resources are available, teachers expressed a need for clearer strategies and standardized training programs to effectively integrate AI into their teaching practices. Additionally, concerns regarding faculty involvement in AI decision-making highlight the importance of engaging educators in discussions about AI policies and implementation strategies.

Furthermore, while this study found no statistically significant gender differences in AI adoption, previous research suggests that some demographic factors, such as technological familiarity and ethical considerations, may influence perceptions of AI integration. Future research should explore these aspects further to ensure equitable AI adoption across different teaching demographics.

Therefore, it is evident that there is an urgent need for a clear and comprehensive policy framework that outlines the integration of AI into teaching practices. Such a policy should address potential challenges, outline best practices, and propose measurable goals to ensure that AI tools are effectively utilized to enhance educational outcomes. This approach will not only empower educators but also ultimately benefit students in Higher Education Institutions, making the learning experience more engaging and effective.

8. Limitations

Limitations in this study stem from the data collection process and sample characteristics. The convenience sampling strategy, which was employed to pick participants from certain HEIs and departments, may induce selection bias, potentially restricting the generalizability of the findings to other schools. Even though a sufficient sample size was sought, it's possible that the sample may not fairly reflect the range of viewpoints held by all university-level instructors. When generalizing results to larger groups, caution is needed. Relying solely on self-reported questionnaire data can introduce response biases, such as socially desirable answers or falsification of experiences. These limitations emphasize the importance of adopting a variety of data collection approaches in addition to self-reports and more representative, diverse samples.

9. Recommendations

In light of the study's findings, the following recommendations are put forth:

1. Develop workshops aimed at enhancing educators' comprehension and assurance in the application of AI tools in the classroom setting.
2. Guarantee that educators possess the necessary software and hardware to support the incorporation of AI into their instructional methods.
3. Integrate AI components into current curricula to improve the overall educational experience for learners.
4. Establish comprehensive guidelines to support educators in navigating the ethical implications associated with the implementation of AI in educational settings.
5. Initiate pilot programs that enable educators to explore AI, yielding important insights into successful implementation approaches.

References

1. Alam, M. (2021). Exploring gender differences in AI adoption among educators. *Journal of Educational Technology & Society*, 24(2), 78-91.

2. Almasri, F. (2024). Exploring the impact of artificial intelligence in teaching and learning of science: A systematic review of empirical research. *Research in Science Education*, 54(5), 977-997.
3. Afaq, A., Khan, Q., Arshad, A., Sibte-Ali, M., & Malik, A. A. (2022). The job satisfaction of academic staff in higher educational institutes. *Journal of South Asian Studies*, 10(1), 95-101.
4. Athanassopoulos, S., Manoli, P., Gouvi, M., Lavidas, K., & Komis, V. (2023). The use of ChatGPT as a learning tool to improve foreign language writing in a multilingual and multicultural classroom. *Advances in Mobile Learning Educational Research*, 3(2), 818-824.
5. Bates, T., Cobo, C., Mariño, O., & Wheeler, S. (2020). Can artificial intelligence transform higher education? *International Journal of Educational Technology in Higher Education*, 17, 1-12.
6. Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. *Ieee Access*, 8, 75264-75278.
7. Cheng, K. H., Tang, K. Y., & Tsai, C. C. (2022). The mainstream and extension of contemporary virtual reality education research: Insights from a co-citation network analysis (2015–2020). *Educational technology research and development*, 70(1), 169-184.
8. Chiu, T. K., & Li, Y. (2023). How can emerging technologies impact STEM education? *Journal for STEM Education Research*, 6(3), 375-384.
9. Chounta, I. A., Bardone, E., Raudsep, A., & Pearce, M. (2022). Exploring teachers' perceptions of artificial intelligence as a tool to support their practice in Estonian K -12 education. *International Journal of Artificial Intelligence in Education*, 32(3), 725-755.
10. Cooper, G., & Tang, K. S. (2024). Pixels and pedagogy: Examining science education imagery by generative artificial intelligence. *Journal of Science Education and Technology*, 33(4), 556-568.
11. Daniel, B. K. (2019). Big Data and data science: A critical review of issues for educational research. *British Journal of Educational Technology*, 50(1), 101-113.
12. Fullan, M., Azorín, C., Harris, A., & Jones, M. (2023). Artificial intelligence and school leadership: Challenges, opportunities and implications. *School Leadership & Management*, 1-8., 122-234.
13. Hermansyah, Y. (2023). Assessing the Impact of Communicative Artificial Intelligence-Based Accounting Information Systems on Small and Medium Enterprises. *Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications*, 14(3), 230-239.
14. Hinojo-Lucena, F.-J., Aznar-Díaz, I., Cáceres-Reche, M.-P., & Romero-Rodríguez, J.-M. (2019). Artificial intelligence in higher education: A Bibliometric study on its impact in the scientific literature. *Education Sciences*, 9(1), 51. <https://doi.org/10.3390/educsci9010051>
15. Jamal, A. (2023). The role of Artificial Intelligence (AI) in teacher education: Opportunities & challenges. *International Journal of Research and Analytical Reviews*, 10(1), 140-146.
16. Joshi, V., Pitke, M., & Panigrahi, C. M. A. (2020). Exploring the Use of Artificial Intelligence and Blockchain Technologies in Achieving Sustainable Development.' *PENSEE, ISSN*, (0031-4773).
17. Karaca, A., & Kılcan, B. (2023). The Adventure of Artificial Intelligence Technology in Education: Comprehensive Scientific Mapping Analysis. *Participatory Educational Research*, 10(4), 144-165.
18. Karakose, T., Tülübaş, T., & Papadakis, S. (2023, July). The scientific evolution of social justice leadership in education: Structural and longitudinal analysis of the existing

- knowledge base, 2003–2022. In *Frontiers in education* (Vol. 8, p. 1139648). Frontiers Media SA.
19. Kim, Y. E., & Kim, Y. (2022). STEM educators' perceptions of AI-enhanced scaffolding tools for teaching and learning. *Educational Technology Research and Development*, 70(4), 985-1003.
 20. Lee, Y. J., Oh, J., & Hong, C. (2024). Exploratory research on understanding university students' artificial intelligence literacy in a Korean university. *Online Journal of Communication and Media Technologies*, 14(3), 202-440.
 21. Papadakis, S., Kravtsov, H. M., Osadchyi, V. V., Marienko, M. V., Pinchuk, O. P., Shyshkina, M. P., ... & Striuk, A. M. (2023). Revolutionizing education: using computer simulation and cloud-based smart technology to facilitate successful open learning.
 22. Tang, J., & Hai, L. (2021). Construction and Exploration of an Intelligent Evaluation System for Educational APP through Artificial Intelligence Technology. *International Journal of Emerging Technologies in Learning*, 15(5).
 23. Uygun, D. (2024). Teachers' perspectives on artificial intelligence in education. *Advances in Mobile Learning Educational Research*, 4(1), 931-939.
 24. Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). A systematic review of research on artificial intelligence applications in higher education—where are the educators? *International Journal of Educational Technology in Higher Education*, 16(1), 1-27.
 25. Zhai, X., & Lu, M. (2023, June). Machine learning applications in educational studies. In *Frontiers in Education* (Vol. 8, p. 1225802). Frontiers Media SA.