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Exploring the Role of Artificial Intelligence in Education, Students Preferences and Perceptions

Anna Ayu Herawati[1], Syamsu Yusuf[2], Ilfiandra[3], Agus Taufik[4], Ahmad Syaf Ya Habibi[5]

[1] Universitas Pendidikan Indonesia, Bandung, Indonesia; annaayuherawati@upi.edu
[2] Universitas Pendidikan Indonesia, Bandung, Indonesia; syamsu@upi.edu
[3] Universitas Pendidikan Indonesia, Bandung, Indonesia; ilfiandra@upi.edu
[4] Universitas Pendidikan Indonesia, Bandung, Indonesia; afiq@upi.edu
[5] Universitas Negeri Padang, Padang, Indonesia; habibidoang92@gmail.com

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ABSTRACT

The development of AI technology has opened new opportunities for the delivery and reception of education. Therefore, a profound understanding related to students' perspectives, expectations, and concerns regarding the utilization of AI in the learning process becomes a crucial aspect. This study explores the perceptions of university students in Indonesia towards the use of Artificial Intelligence (AI) in education. A quantitative descriptive survey was conducted involving 200 students from the Faculty of Teacher Training and Education at Bengkulu University. The instrument used is a student perception scale about AI adapted from Buabbas et al. (2023). Data analysis used descriptive analysis and Chi-Square test. The findings indicate that most students have a positive view of the use of AI in learning, seeing it as a tool that can enrich their learning experience and increase access to educational resources. However, concerns were also raised about the replacement of teachers' roles by AI, the loss of human elements in learning interactions, and data privacy issues. The study concludes that while AI has great potential to transform education, a careful, human-centered approach that involves the active role of teachers and safeguards students' privacy and data security is necessary. Further research is recommended to provide more comprehensive information about the impacts and benefits of the emergence of AI in education.

Corresponding Author:
Anna Ayu Herawati
Universitas Pendidikan Indonesia, Bandung, Indonesia; annaayuherawati@upi.edu

1. INTRODUCTION

Artificial Intelligence (AI) has become increasingly embedded in various aspects of daily life, notably in the education sector (Salehi & Burgueño, 2018; Yang et al., 2019). This technology extends beyond mere automation, imbuing machines and infrastructures—ranging from buildings to robots—with intelligent capabilities (Vermesan et al., 2017; Zhang et al., 2022). In educational settings, AI holds

the potential to revolutionize conventional teaching methodologies by offering personalized learning experiences that cater to the unique requirements of each student (Ahmad et al., 2021; L. Chen et al., 2020; X. Chen et al., 2022; Ciolacu et al., 2018; Sun & Gu, 2021). These adaptive educational models, powered by AI algorithms, promise to accommodate the varied needs and learning styles of students through customized instruction and feedback (Woyshner, 2016). Nevertheless, the integration of AI in education raises several concerns, such as issues surrounding data privacy, intellectual property rights, and the potential biases inherent in data and algorithmic decisions (Geis et al., 2019; Masters, 2023). As educational paradigms shift towards more adaptive models, it becomes imperative to address critical questions: How can we guide the deployment of AI technologies in education with ethical principles, ensuring respect for student privacy? Is it possible to develop algorithms that are unbiased and equitable? This article seeks to explore the multifaceted challenges associated with the implementation of AI in personalized learning, aiming to delineate strategies that ensure its efficacy, fairness, and ethical integrity.

Artificial Intelligence (AI) holds the promise of transforming education by identifying students' needs and tailoring learning methodologies accordingly, thus potentially narrowing the gap in educational outcomes and fostering equity (Lu, 2019). AI's capability to deliver real-time feedback can significantly enhance student engagement and involvement in the educational process (Kerr, 2004). By adapting to individual learning preferences and pacing, AI supports a more inclusive and accommodating educational environment. This personalized approach is designed to resonate with diverse learning styles, ensuring that each student can access content in ways that best suit their strengths and learning habits. Moreover, the application of AI extends beyond the confines of traditional classroom environments (Cope, Kalantzis, & Searsmith, 2021; Srinivasa, Kurni, & Saritha, 2022; Timms, 2016). AI technologies can empower online and remote learning platforms to offer personalized instruction, resources, and feedback, making education accessible to students regardless of geographic constraints. This advancement enhances inclusivity and equalizes opportunities, particularly in areas with limited educational infrastructure. Nonetheless, the integration of AI into educational systems must be managed with a strong commitment to ethical standards. It is crucial to ensure data privacy, address potential biases in AI applications, and maintain transparency in algorithmic decisions. Ethical stewardship in the use of AI in education preserves the integrity of the learning experience and protects the rights and well-being of all students.

Several studies have investigated the potential benefits of AI-based personalized learning, providing empirical evidence of its positive impact on student engagement, academic achievement, and self-directed learning. In addition, other studies discuss AI's potential benefits in personalizing online learning environments. The personalized nature of AI-driven instruction promotes self-regulated learning and encourages student autonomy and metacognitive skills (Tang, Chang, & Hwang, 2021). Moreover, the adaptability of AI in tailoring instructional content allows educators to address the individual needs of students. This personalized learning approach accommodates varying learning paces and preferences, fostering a more supportive and inclusive educational experience. One notable advantage of AI-driven personalized learning is its ability to provide real-time feedback to students. This instantaneous feedback loop not only aids in identifying and addressing learning gaps promptly but also enhances students' understanding and mastery of the material. The continuous feedback mechanism contributes to a more dynamic and responsive learning environment (Brock, Nishida, Chiong, Grimm, & Rimm-Kaufman, 2008; Yesilyurt, 2023). Furthermore, AI's role in personalized learning extends beyond traditional academic subjects. It has the potential to support the development of essential 21st-century skills, such as critical thinking, problem-solving, and collaboration. By tailoring learning experiences to individual strengths and weaknesses, AI facilitates a holistic approach to education that goes beyond rote memorization, preparing students for the complexities of the modern workforce. Despite the promising aspects of AI in personalized learning, it is essential to acknowledge and navigate the associated challenges. Ethical considerations, data security, and the potential for algorithmic bias are critical aspects that demand careful attention. Addressing these

concerns is crucial to ensure that the benefits of AI-driven personalized learning are accessible to all students and do not inadvertently perpetuate educational inequalities.

Research on the use of AI was also conducted on medical students (Buabbas et al., 2023). Most students have a favorable view of the use of AI in the health sector and have the opportunity to facilitate their work in the future. This is relevant to the need for further research in education, especially in Indonesia. It is important to explore the impact of artificial intelligence (AI) usage in education, especially in Indonesia, to further understand the potential benefits and challenges that may arise. Several aspects that need examination involve the integration of artificial intelligence technology into educational curricula, preparing educators to adopt such technology, and its impact on students' understanding and clinical skills. Additionally, ethical considerations in the use of artificial intelligence in the context of medical education should be taken into account. This includes patient data security, privacy concerns, and ethical considerations related to clinical decisions assisted by AI. As technology continues to advance, stakeholders in medical education need to be prepared to address these issues and develop clear guidelines for the use of artificial intelligence in the context of medical education. In addition to its potential benefits in improving efficiency and accuracy in the learning process, the use of artificial intelligence in education can help create graduates ready to face challenges in the evolving workforce(Aoun, 2017; Meng & Sumettikoon, 2022; Shiohira, 2021). Therefore, further research efforts can provide valuable insights to support the development of up-to-date and relevant medical education strategies. Ethics and cultural perspectives in each country vary in the use of AI in education. The growing use of AI in Indonesia is becoming more widespread, necessitating students to prepare for technological changes in education-related professions.

Ethical and cultural differences in each country have different perspectives on using AI in education. The growth of AI use in Indonesia is expanding, requiring students to prepare for technological changes in education-related work. There are risks associated with using AI in education, such as reinforcing existing biases in data and algorithms (Wang, 2021). They recommend that educators and education researchers pay more attention to the potential impact of AI on learning outcomes and develop approaches that reduce negative impacts. It is crucial to be aware that artificial intelligence (AI) can reinforce and perpetuate biases present in training data. If the data used to train an AI model reflects specific biases or inequalities, the model may generate decisions or recommendations that are unfair or discriminatory. Therefore, it is important to critically assess the data used and take steps to reduce potential biases. Educators and education researchers are also expected to stay abreast of AI technology developments and ensure that the use of artificial intelligence in educational contexts is carried out with ethical considerations and transparency (Luckin & Holmes, 2016; Pedro, Subosa, Rivas, & Valverde, 2019). Establishing clear guidelines for the use of this technology can help protect students' rights and ensure that artificial intelligence is used positively to enhance the learning experience. Furthermore, it is essential to involve stakeholders, including students, in the development and implementation of AI technology in education (Bhimdiwala, Neri, & Gomez, 2021; Chiu & Chai, 2020). By incorporating various perspectives, a better understanding of the impact of this technology on different groups can be achieved, and ways to mitigate risks and maximize benefits can be identified.

Critics of AI in education have raised several concerns related to the application of AI in the context of learning (Mikelsten, Teigens, & Skalfist, 2022; Rensfeldt & Rahm, 2023). These concerns include the loss of the human dimension in the learning process, data privacy and security, bias, and discrimination in AI systems, and over-reliance on AI technology (Abivian, 2022; Fitri & Irwansyah, 2023; Korthagen, Attema-Noordewier, & Zwart, 2014; Musa & Ishak, 2021; Pianta, Hamre, & Allen, 2012). By exploring the potential benefits of AI in personalized learning, this article aims to provide a comprehensive understanding of the advantages offered by AI technology in enhancing educational experiences. Understanding the potential benefits of AI-based personalized learning will contribute to making informed decisions in designing and implementing future educational interventions. This article is

expected to contribute to a more informed and nuanced discussion of AI in education and highlight the importance of centering student perspectives in developing and implementing this technology.

Therefore, based on the above background, this study aims to examine the use of artificial intelligence (AI) in education. This study will answer the following questions:

1. What is the level of student perception about artificial intelligence in education?
2. How prepared are students to apply artificial intelligence to support education?

2. METHODS

Research Design This study was designed as a quantitative descriptive survey. This design was chosen because it allows the researcher to collect data from many respondents and provides a clear picture of students' perceptions of artificial intelligence in education.

2.1 Participants

The study involved 200 students from the Faculty of Teacher Training and Education at Bengkulu University. Participants were selected from the 2nd, 4th, sixth, and eighth semesters to get a broader picture of student perceptions at various levels of study. The snowball sampling technique was used to select participants, with the data collection process taking place over fourteen days. Before the study, all participants were given information about the purpose and procedures, and their consent was obtained.

The demographic characteristics of the respondents can be seen in Table 1 below:

Table 1. Demographic Characteristics of Respondents

Characteristic	N
Age	19-22
Gender	
· Male	90
· Female	110
The academic year of study	
· Semesters 2 and 4 (Level 1)	95
· Semesters 6 and 8 (Level 2)	105
Level of computer literacy	
· Learning	160
· Expert	40
Use of computer technology for learning	
· Always	50
· Sometimes	65
· Never	85

2.2 Instrument

The research instrument was a student perception questionnaire about artificial intelligence, adapted and modified by (Buabbas et al., 2023). This questionnaire was initially designed to measure "Students' Perceptions towards Artificial Intelligence in Medical Education." However, based on FGD discussions, we adapted it to be more relevant to our research context, namely "Teacher Education."

The questionnaire consists of 15 items, with ten items measuring student perceptions and five measuring the impact of artificial intelligence in education. For example, one of the items measuring student perceptions is "Artificial intelligence (AI) will play an important role in education," and one of the items measuring the impact of artificial intelligence on teacher education is "AI will replace my future role as Teacher."

Before being used in this study, the questionnaire underwent a back-translation process to ensure the accuracy and relevance of the translation. In addition, we also conducted FGDs to ensure that this questionnaire was appropriate to the context and objectives of our research.

The validity and reliability of the questionnaire have been tested. The Cronbach's Alpha value for the student perception scale is 0.755, indicating acceptable reliability. For the scale of the impact of artificial intelligence in education, Cronbach's Alpha value is 0.635, also indicating acceptable reliability.

2.3 Data Collection Procedure

Data was collected through an online questionnaire filled out by participants. The questionnaire was sent to participants via Google Forms and completed within fourteen days. After participants completed the questionnaire, the results were emailed to the researcher to ensure data confidentiality.

2.4 Data Analysis

Data collected for this study were subjected to descriptive statistical analysis. Techniques such as relative frequencies and percentages were employed to elucidate students' perceptions and the impacts of artificial intelligence on education. This approach facilitated the identification of patterns and trends within the data, thereby enabling the researchers to address the posed research questions effectively. The design of all research procedures adhered strictly to established principles of research ethics. Prior to commencement, all participants were fully informed about the study's objectives and methods, and their informed consent was obtained. Moreover, to safeguard participant privacy, all data acquired during this research are being maintained in an anonymous and confidential manner.

3. FINDINGS AND DISCUSSION

3.1 Findings

Based on the results of data processing, the results of this study can be depicted in Table 2. Table 2 shows students' perceptions of the role of AI in education. In this table, each statement is given an average score and percentage, which is then categorized into "Medium," "Low," or "High."

Table 2. Students' Perceptions About the Role of AI in Education

No	Statement	Average	%	Category
1	AI will play an essential role in education	3.605	0.54075	Medium
2	AI will replace some specializations in educational work	3.69	0.5535	Medium
3	I understand the basic principles of AI	1.325	0.19875	Low
4	I am comfortable with AI terminology	3.44	0.516	Medium
5	I understand the limitations of AI	3.33	0.4995	Medium
6	The presence of AI will benefit my work as a student	4.265	0.63975	Medium
7	All students should accept the development of AI	3.485	0.52275	Medium
8	I will be confident using AI for my assignment needs	3.415	0.51225	Medium
9	I will have a better understanding when using AI	3.715	0.55725	Medium
10	AI systems will have a positive impact on the world of education	3.57	0.5355	Medium
11	Incorporating AI into the lecture system will facilitate the learning process	3.18	0.477	Medium
12	Using AI in education will prepare me to be skilled in lecture practices	3.38	0.507	Medium
13	AI will replace my future role as a Teacher	3.545	0.53175	Medium
14	Willingness to use AI in education	3.09	0.4635	Medium
15	The use of AI should be maximized in assisting educational work	3.655	0.54825	Medium

Based on the descriptive statistical analysis results, information was obtained about students' perceptions of AI in education as a whole, or the majority is classified with a medium category. Most students tend to agree on the application of AI in education, and their views on the development of AI in the world of education are still in the medium category. This highlights the impact of AI on education, as seen by students and their willingness to use it.

Table 3, detailing students' perceptions of AI, indicates that a substantial majority, 76 students (38%), concur that AI will assume a crucial role in education. Additionally, over half of the respondents, 102 students (51%), believe that AI will supplant certain specialties within educational professions. Regarding their comprehension of AI's foundational computational principles, 135 students (67.5%) acknowledged a lack of complete understanding.

Table 3. Perceptions Towards Artificial Intelligence (n=200)

Statement	Strongly Agree	Agree	Somewhat Agree	Disagree	Strongly Disagree
AI will play an essential role in education	35 (17.5%)	76 (38%)	68 (34%)	17 (8.5%)	4 (2%)
AI will replace some specializations in educational work	32 (16%)	103 (51%)	45 (22.5%)	14 (7%)	7 (3.5%)
I understand the basic principles of AI	0	0	0	65 (32.5%)	135 (67.5%)
I am comfortable with AI terminology	34 (17%)	54 (27%)	81 (40.5%)	28 (14%)	3 (1.5%)
I understand the limitations of AI	17 (8.5%)	65 (32.5%)	89 (44.5%)	25 (12.5%)	4 (2%)
The presence of AI will benefit my work as a student	92 (46%)	74 (37%)	29 (14.5%)	5 (2.5%)	0
All students should accept the development of AI	30 (15%)	71 (35.5%)	69 (34.5%)	26 (13%)	4 (2%)
I will be confident using AI for my assignment needs	37 (18.5%)	48 (24%)	79 (39.5%)	33 (16.5%)	3 (1.5%)
I will have a better understanding when using AI	52 (26%)	60 (30%)	71 (35.5%)	13 (6.5%)	4 (2%)
AI systems will have a positive impact on the world of education	31 (15.5%)	76 (38%)	72 (36%)	18 (9%)	3 (1.5%)

Table 4 presents student perspectives on the impact of AI in education and their readiness to adopt it. A significant proportion, 70 students (35%), somewhat agree that AI systems can have a positive impact on education by facilitating learning processes and better preparing students for practical applications. Contrarily, a majority of the students, 81 (78.7%), do not believe that AI will replace teachers in the future. Additionally, the willingness to use AI in their educational experiences is notably high, with 76 students (38%) expressing a keen interest in engaging with AI technologies.

Table 4. Impact of Artificial Intelligence and Readiness to Use (n=200)

Statement	Strongly Agree	Agree	Somewhat Agree	Disagree	Strongly Disagree
Incorporating AI into the lecture system will facilitate the learning process	24 (12%)	55 (27.5%)	70 (35%)	35 (17.5%)	16 (8%)
Using AI in education will prepare me to be skilled in lecture practices	34 (17%)	57 (28.5%)	71 (35.5%)	27 (13.5%)	11 (5.5%)
AI will replace my future role as a Teacher	29 (14.5%)	81 (40.5%)	62 (31%)	26 (13%)	2 (1%)
Willingness to use AI in education	18 (9%)	45 (22.5%)	84 (42%)	43 (21.5%)	10 (5%)
The use of AI should be maximized in assisting educational work	36 (18%)	76 (38%)	74 (37%)	11 (5.5%)	3 (1.5%)

These results indicate that students have diverse perceptions of AI in education. Although most students see the positive potential of AI in education, there are still concerns and uncertainties about how AI will affect education and their role as students or teachers in the future. While the majority of students expressed positive views on the use of Artificial Intelligence (AI) in learning, these findings are tempered by significant concerns. One primary concern arising from this survey is apprehension related to the potential replacement of teachers' roles with AI technology. Students voiced concerns about the potential loss of human elements in learning interactions due to technological dominance.

Furthermore, another area of concern that surfaced is related to data privacy issues. Students demonstrated awareness of potential risks associated with the use of AI technology in divulging their personal information. This discussion highlights the need for the implementation of stricter security measures to protect students' privacy and data security.

In discussing these findings, serious consideration is warranted for the implementation of Artificial Intelligence in education, ensuring a balance between leveraging technology for educational advancement and safeguarding human values in education. As a result, recommendations for the development of policies and ethical guidelines addressing these concerns become crucial to guarantee the responsible and sustainable implementation of AI technology in the educational context.

3.2 Discussion

In this section, we delve into a detailed discussion of the survey analysis results to uncover the principal findings and draw comparisons with prior research. Furthermore, we will explore the various factors that may influence students' perceptions of employing artificial intelligence (AI) in education.

3.2.1 What is the level of student perception of artificial intelligence in education

Based on the results of descriptive statistical analysis, information regarding students' perceptions of AI in education can be categorized as moderate overall or majority-wise. Most students tend to approve of the application of AI in education, and their views on the development of AI in the education sector also fall within the moderate category. This underscores the impact of AI on education, as perceived by students, and their willingness to embrace it. The significance of these findings lies in highlighting the influence of AI on the education landscape as understood and observed by students. The fact that the majority of students approve of AI application indicates an acceptance of this technology in an educational context. However, the moderate category suggests that students' attitudes are not extremely positive or negative but rather situated somewhere in the middle.

These findings offer valuable insights into students' readiness to adopt AI technology in the learning environment and can serve as a foundation for designing implementation strategies that take into account students' perspectives holistically. Furthermore, the results underscore the expanding role of AI in education and how students' perceptions can shape its future trajectory.

Overall, integrating artificial intelligence (AI) into education has been met with optimism and caution. On the one hand, proponents argue that AI can transform the traditional one-size-fits-all teaching model by providing a learning experience tailored to the individual needs of students (Goksel & Bozkurt, 2019). This approach can help bridge the gap between students' learning disparities and provide more equal opportunities in education (Goksel & Bozkurt, 2019). On the other hand, critics point out that AI can perpetuate social and economic inequalities if not designed and implemented correctly, as it can reinforce existing biases in data and algorithms (Remian, 2019).

Artificial intelligence is powerful and potentially permeates and causes significant changes in various sectors of society, with the education sector being one of the most likely to be impacted by artificial intelligence (Brougham & Haar, 2018; Chatterjee, Sreenivasulu, & Hussain, 2021; Goksel & Bozkurt, 2019; Kelley, Fontanetta, Heintzman, & Pereira, 2018). Indeed, from various reviewed articles, it is evident that AI has been adopted and applied in the education sector, driving improvements in various sector fields.

The main findings from this survey reveal that the majority of students exhibit a medium level of perception regarding the use of artificial intelligence (AI) in education. This category, denoting a neutral or ambivalent attitude towards the integration of AI in educational settings, corresponds with several previous studies that also report moderate levels of student receptivity towards AI in education (Bhandari et al., 2021; Mousavi Baigi et al., 2023; Santomartino & Paul, 2022).

Furthermore, the results indicate a noteworthy comparison in student perceptions on specific statements with a study conducted in Kuwait by Buabbas et al. (2023). Particularly, Statement item 3, which pertains to students' grasp of basic AI principles, showed that understanding remains low—contrasting sharply with findings from Kuwait University where medical students exhibited a higher comprehension of these principles.

Several factors might account for these perceptual variations. Differences in education quality and technological exposure between regions like Indonesia and Kuwait could significantly influence these disparities. For instance, students in Kuwait are likely to have greater exposure to AI through more robust curricular integration and practical experiences, facilitated by the country's advanced technological infrastructure. Conversely, in Indonesia, limitations such as less access to technology, an education curriculum not fully incorporating AI, and lower overall technology awareness may contribute to a limited understanding of AI principles among students.

Cultural influences and public awareness also play crucial roles in shaping students' understanding of and attitudes toward AI. In Kuwait, higher societal acceptance and cultural support might foster a more profound comprehension and embracement of AI. Meanwhile, in Indonesia, cultural perceptions and public awareness of AI are still evolving, necessitating enhanced efforts to bolster understanding and acceptance of AI technologies.

Additionally, infrastructure conditions markedly differ between the two countries. Kuwait's advanced infrastructure, especially in key economic sectors like telecommunications and oil, supports more widespread technology adoption. In contrast, Indonesia's ongoing development in infrastructure might affect the pace and extent of technology integration in educational and other sectors.

3.2.2 How prepared are students to apply artificial intelligence to support education

In the context of readiness to apply AI to support education, research findings show variations in the level of student readiness. Some students may feel prepared enough to integrate AI technology into their learning, while others may feel the need for further preparation. It should be noted that concerns regarding the impact of using AI may also affect students' readiness levels. Therefore, recommendations for developing skills and increasing AI technology literacy may be needed to increase the level of student readiness in adopting and applying this technology to support the educational process. Some students feel adequately prepared to integrate AI technology into their learning processes. It is likely that these students have developed sufficient skills and literacy related to the use of AI technology. However, the findings may also indicate that there are some students who may feel the need for further preparation before applying AI in the educational context. Factors influencing students' readiness levels may be associated with their knowledge of AI, the technological skills they possess, and their willingness to comprehend and adopt AI technology as a supportive tool in learning. Additionally, concerns regarding the social impact and ethics of AI usage may also play a role in students' readiness levels.

Factors influencing students' perceptions of using artificial intelligence in education are essential to understand. One factor that may influence perceptions is knowledge and understanding of AI technology itself (Bhandari et al., 2021; Kerr, 2004). Students with a better understanding of AI tend to have more positive perceptions of its application in education. Additionally, direct experience with the use of AI in education can also influence students' perceptions. Students who have had positive experiences with AI applications in learning will likely have a more positive attitude toward its use (Bhandari et al., 2021; Kerr, 2004). Furthermore, social and cultural factors can influence students'

perceptions of AI in education. Social norms, individual preferences, and societal views on using technology in the educational context can shape students' perceptions (Bhandari et al., 2021).

Based on the research results, it is essential to acknowledge that students' perceptions of AI in education can vary significantly. Some students may see AI as a tool that can enhance the efficiency and effectiveness of learning, while others may worry about the replacement of teachers' roles or the loss of human elements in the educational process (Brougham & Haar, 2018; Chatterjee et al., 2021).

In this context, examining students' perspectives and concerns is crucial. Understanding their concerns, such as the ethics of using AI, fairness in technology use, and data privacy, is essential in designing and implementing sustainable and responsive AI applications (Avella, Kebritchi, Nunn, & Kanai, 2016). Moreover, using AI in education raises various ethical and legal issues related to data privacy, security, intellectual property, and human oversight (Remian, 2019). The potential displacement of teachers and the need for technological literacy also require careful consideration to avoid negative impacts on the workforce and society (Kukulska-Hulme, 2012). Therefore, we believe it is essential to explore students' perceptions and preferences towards AI-supported learning to gain insights into how AI developments in education and the perceptions generated by its users.

4. CONCLUSION

Artificial Intelligence (AI) plays a crucial role in today's education, potentially enhancing efficiency, personalization, and the quality of education. The results of this study indicate that most students have a favorable view of the use of AI in learning, seeing it as a tool that can enrich their learning experience and increase access to educational resources.However, this study also reveals students' concerns about replacing teachers' roles with AI, losing human elements in learning interactions, and data privacy issues. Therefore, educators and technology developers need to ensure that the use of AI in education remains human-centered, involves the active role of teachers, and safeguards students' privacy and data security. In conclusion, AI has great potential to transform education in beneficial ways, but a careful approach focused on student's needs should be adopted. The recommendations from this study are that further actions need to be taken, including enhancing understanding of AI and using AI wisely in educational environments, considering the prevailing academic norms. Further research in comparative studies between students exposed to AI and those not exposed to AI is deemed necessary, given that this will provide more comprehensive information about the impacts and benefits of the emergence of AI in education.

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