Journal of Education and Practice
ISSN 2222-1735 (Paper) ISSN 2222-288X (Online)
Vol.16, No.13, 2025

Quantitative and Qualitative Research on the Use of Artificial Intelligence in Higher Education: A Systematic Literature Review

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Abstract

The development of artificial intelligence has demonstrated remarkable progress over the past five years, particularly with the emergence of generative artificial intelligence. Higher education is one of the sectors that has intensively implemented this cutting-edge technology in learning process, research, and other educational functions, particularly in the acquisition and dissemination of information and knowledge. This study aims to explore the opportunities and challenges in the implementation of artificial intelligence in higher education based on research findings, with the subjects of the study comprising lecturers, university students, or university personnels. A systematic review was conducted on 30 selected open-access articles published between 2020 and 2025, consisting of 12 qualitative studies, 14 quantitative studies, and 4 mixed-method studies. The review results revealed various factors influencing the successful implementation of artificial intelligence based on user perceptions. The findings of this review can serve as best practices or lessons learned in formulating strategies for integrating artificial intelligence into educational governance and processes in a manner that aligns with the fundamental objectives of education. Future research may further develop qualitative, quantitative, or mixed-method approaches, particularly multi-disciplinary studies that integrate learning theories or models with technological, human, social, institutional, and environmental factors.

Keywords: Artificial Intelligence, Generative AI, Quantitative Method, Qualitative Method, Mixed Method

DOI: 10.7176/JEP/16-13-09

Publication date: December 30th 2025

1. Introduction

The rapid advancement of digital technology today is marked by the emergence of artificial intelligence, driven by developments of computer. Artificial intelligence is a subfield of computer science dedicated to understanding human cognitive processes and recreating their effects through information systems (Wang et al., 2024). The OECD (2024) stated that artificial intelligence has triggered transformative possibilities in many aspects of human life in this era of rapid technological advancement. The routine use of artificial intelligence has increased drastically over the past decade (Monteith et al., 2024). According to the PEW Research Center (2018), artificial intelligence is expected to improve the lives of most people over the next decade. However, many express concern about how advances in artificial intelligence will impact what it means to be human, to be productive, and to exercise free will. The OECD (2019) noted that artificial intelligence is reshaping the economy, promising productivity growth, increased efficiency, and reduced costs.

Martinez (2019) mentioned that artificial intelligence is predicted to have a dramatic impact on all industries, just as the internet revolutionized the way we work today. The rapid adoption of artificial intelligence is influencing various aspects of society, including the education sector (UNESCO, 2019; Miao et al., 2021; Bellas et al., 2024; Monteith et al., 2024; Wang et al., 2024). According to Miao et al. (2021), the value of artificial intelligence in education is projected to reach $6 billion by 2024. Artificial intelligence plays an increasingly significant role in educational technology research (Luckin et al., 2016; Verma, 2018). Luckin et al. (2016) suggested that artificial intelligence research in education explores learning beyond spatial and temporal constraints to support both formal education and lifelong learning by integrating artificial intelligence, as an interdisciplinary field, with learning sciences. These sciences include education, psychology, neuroscience, linguistics, sociology, and anthropology, fostering the development of adaptive learning environments and flexible, inclusive, personalized, engaging, and effective artificial intelligence applications in education. Sposato (2025) argued that the implementation of artificial intelligence in education signifies more than a technological challenge, it represents a fundamental transformation of educational practices.

The selection of an appropriate research methodology is a crucial decision in conducting effective scientific research and is primarily based on the alignment between research objectives and the characteristics of the available research methodologies (Basias & Pollalis, 2018). Research in science education aims to uncover truths

that involve a combination of reasoning and experience (Daniel, 2016). Educational researches have debated the distinction between different research methods (Smith 1983) and researchers are highly polarized in pointing out the advantages of their preferred methods and approaches (Rahman, 2017). Although the qualitative and quantitative methods lie on separate continuums, both are design to identify the educational issues using different approaches (Daniel, 2016). Neither qualitative nor quantitative research method are entirely comprehensive and capable of fully answering research questions.

According to Xiong (2022), both methods have strengths and limitations, which are supported by different theoretical foundations and assumptions, making the selection of an appropriate research paradigm dependent on the nature of the study. The qualitative method aims to understand the complex reality and the meaning behind actions in specific context, while the quantitative method aims to obtain accurate and reliable measurements that allow statistical analysis. (Queirós et al., 2017). The two approaches can complement each other and be applied together in one study. According to Mirom (1998), there is a growing consensus that the two approaches are not mutually exclusive, and their combination is acceptable and provides significant advantages. The combination of the two is referred to as “Mixed-Method”, which involves the combination and integration of qualitative and quantitative data (Terrell, 2012; Dawadi et al., 2021; Schoonenboom, 2023; McLeod, 2024).

This systematic literature review reveals a comparison of research methods – quantitative, qualitative, and mixed methods—in studies on artificial intelligence in higher education. It also examines various tools or artificial intelligence and its implementation in universities, along with the theoretical foundation underlying the research model. The ultimate goal is to propose critical points for policy formulation and future research direction based on the findings of the empirical studies examined in this study.

2. Method

This study employed a systematic, descriptive review of scholarly articles published in English in international journals or presented at international conferences between 2020 and 2025. The primary criterion for inclusion is the application of artificial intelligence in higher education through either quantitative and/or qualitative approaches. All selected articles are open-access and were retrieved from Google Scholar, Emerald, ScienceDirect, and other publishers that provide free public access to scientific articles. Open-access publication plays a crucial role in facilitating the dissemination of academic research by ensuring equal access to information and knowledge, thereby reaching a broader and more diverse audience (Christian, 2008; Kankam, 2024; Yang et al., 2024; Quaia et al., 2024). The search process involved the use of various keyword combinations, including "Artificial Intelligence" or "AI" in conjunction with terms such as "education," "higher education," "university," "academic," "learning," and "teaching." Additional keywords specifying different AI applications were used to identify relevant technological contexts, such as "ChatGPT," "Gemini," "Meta AI," and "DeepSeek," in accordance with the latest advancements in artificial intelligence applications. The search also incorporated terms related to AI techniques and algorithms, such as "machine learning," "deep learning," "natural language processing," "generative artificial intelligence," and "Generative AI.".

The next step involved filtering articles that employed quantitative, qualitative or a combination of both methods, which were clearly listed in the research methods. This step was conducted to ensure that the articles were empirical in nature and fully explained the stages of the research, particularly the data collection and analysis techniques. Conceptual and theoretical papers, as well as systematic reviews or meta-analyses, were excluded from the primary analysis but were used for comparative purposes. After this stage, 30 articles were obtained, which were further categorized into three main groups: quantitative research, qualitative research, and mixed methods research. The aspects recorded for all articles were the context or type of AI used, country of study, journal name, underlying theoretical models, number and type of respondents or participants (student or teacher/lecturer), and number of observations or research samples. For quantitative statistical techniques such as correlation, regression, and structural equation modeling were noted, particularly those involving inferential statistics and identified research variables. For qualitative studies, the research strategies employed were documented, including narrative inquiry, ethnography, action research, phenomenology, case studies, grounded theory, and other qualitative research methodologies.

3. Results

3.1 Publication Distribution

The articles reviewed were spread across 21 journals with the most in the Journal of Research in Innovative Teaching & Learning with 8 papers, followed by "Quality Education fo All" and "Saudi Journal of Language Studies", each with 2 articles. The research locations covered 17 countries, with the country with the most

articles being India with four articles, followed by Vietnam with three articles. One study was located in two countries, namely in Pakistan and China (Ahmad et al., 2023) using quantitative methods, as well as one study whose participants came from a global consortium that did not specifically mention its country of origin using qualitative methods (Kumar et al., 2024). The complete publication distribution can be seen in Table 1.

Table 1. Distribution of publications by journal name, country, and research method

No.	Journal	Country	Qualitative	Quantitative	Mixed
1.	*Journal of Research in Innovative Teaching & Learning*	Malaysia; USA; Bangladesh; Philippines; Oman [*Qualitative*]; Vietnam; Saudi Arabia; India [*Quantitative*]	Zailuddin *et al.* (2024); Wood & Moss (2024); Eva *et al.* (2024); Aure & Cuenca (2024); Al-Mughairi & Bhaskar (2023)	Le *et al.* (2024); Hidayat-ur-Rehman (2024); Leelavathi & Surendhranatha (2024)	
2.	*Quality Education for All*	Pakistan [*Quantitative*]; India [*Mixed*]		Zaheer *et al.* (2025)	Abhishek N *et al.* (2024)
3.	*Saudi Journal of Language Studies*	Vietnam [*Qualitative*]; Saudi Arabia [*Mixed*]	Ha & Nguyen (2025)		Al-Sofi (2024)
4.	*Information and Learning Sciences*	Germany	Boguslawski *et al.* (2025)		
5.	*The International Journal of Information and Learning Technology*	South Africa	Adewale (2025)		
6.	*Asian Association of Open Universities Journal*	Malaysia	Tan (2024)		
7.	*Interactive Technology and Smart Education*	Mexico	Sanabria-Z & Olivo (2024)		
8.	*Public Administration and Policy*	Global Consortium	Kumar *et al.* (2024)		
9.	*Research on Education and Media*	Turkey	Gocen & Aydemir (2020)		
10.	*Transforming Government: People, Process and Policy*	Italy		Testa *et al.* (2024)	
11.	*Electronics*	Romania		Sova *et al.* (2024)	
12.	*Cogent Education*	Indonesia		Helmiatin *et al.* (2024)	
13.	*Social Sciences & Humanities Open*	Indonesia		Musyaffi *et al.* (2024)	
14.	*Amfiteatru Economic*	Romania		Şerban *et al.* (2024)	
15.	*Journal of Asian Business and Economic Studies*	Vietnam		Bui *et al.* (2024)	
16.	*Vilakshan– XIMB Journal of Management*	India		Ellikkal & Rajamohan (2024)	
17.	*Applied Computing and Informatics*	Mexico		Vazquez-Parra *et al.* (2024)	
18.	*Humanities and Social Sciences Communications*	Pakistan & China		Ahmad *et al.* (2023)	
19.	*IEEE Access*	India		Roy *et al.* (2022)	
20.	*International Review of Research in Open and Distributed Learning*	China			Wu *et al.* (2024)
21.	*International Journal of Entrepreneurial Behavior & Research*	USA			Somia & Vecchiarini (2024)

3.2 AI Tools and Areas of Implementation

There are 11 articles that do not specifically mention artificial intelligence tools or applications, or examine artificial intelligence in general. The remaining articles mentioned specifics, namely: Chat GPT/ChatBot/Generative AI in 11 articles, such as those conducted by Boguslawski et al. (2025) and Adewale (2025) with qualitative methods, as well as Le et al. (2024) and Leelavathi & Surendhranatha (2024) with quantitative methods. Three articles with mixed methods specifically examined ChatGPT: Al-Sofi (2024), Abhishek N et al. (2024), and Somia & Vecchiarini (2024). Other research areas include Natural Processing Model (Testa et al., 2024); AI-based Robot (Roy et al., 2022), AI-based assessment for English Language Teaching (Ha & Nguyen, 2025); AI Generated Content (Tan, 2024); and AI-augmented tools on design pedagogy (Zailuddin et al., 2024).

Areas of AI implementation with qualitative methods include: testing & assessment (Ha & Nguyen, 2025); motivation/engagement (Boguslawski et al., 2025; Adewale, 2025; Wood & Moss, 2024; Al-Mughairi & Bhaskar, 2023); Learning Management System/Pedagogy/Teaching Innovation (Tan, 2024; Zailuddin et al., 2024; Eva et al., 2024); Sanabria-Z & Olivo, 2024; Aure & Cuenca, 2024); and ethical concerns/Benefit/risk (Kumar et al., 2024; Gocen & Aydemir, 2020).

For quantitative methods, the topics or implementation focus are the impact of AI in general on improving the education system in times of crisis (Zaheer et al., 2025); factors that influence Intention to Use or AI Use/Adoption using the adoption model (Testa et al., 2024; Sova et al., 2024, Helmiatin et al., 2024; Musyaffi et al., 2024; Şerban et al., 2024; Bui et al., 2024; Le et al., 2024; Roy et al., 2022); Impact of AI on academic performance (Ellikkal & Rajamohan, 2024); Students' Engagement (Hidayat-ur-Rehman, 2024); Effect of Critical thinking, Creativity, Ethical Concern on Learning Enhancement and Educator Guidance (Leelavathi & Surendhranatha, 2024); student attitude toward AI (Vazquez-Parra et al., 2024); and effect of AI on Decision making; Human laziness; Security and privacy issues (Ahmad et al., 2023).

Research employing mixed-methods approaches includes Wu et al. (2024), which examined the relationship among the four variables of the Technology Acceptance Model – Perceived ease of use; Perceived usefulness; Attitude toward AI; Behavioral intention – using Structural Equation Modeling; and explored motivations and barriers in the use of AI with a qualitative approach. Al-Sofi (2024) employed descriptive statistical analysis of three variables, namely the effectiveness of ChatGPT and its challenges and mitigations in use, whose analysis was complemented by semi-structured interviews to explore these three variables. Abhishek N et al. (2024) examined the influence of Awareness, Benefit, Opportunity, Challenge, Risk, Sustainability and Ethical Aspects on Level of usage with statistical tests, and added an explanation of the relationship with a qualitative approach. Referring to Business Model Canvases (BMC), Somia & Vecchiarini (2024) examined the relationship between Generative AI and entrepreneurial competencies of university students with statistical tests, and used text analysis and thematic analysis to explore the benefits and limitations of using ChatGPT.

3.3 Theoretical and Research Model

A conceptual map of articles based on research methods—quantitative, qualitative, and mixed-methods can be seen in figure 1.

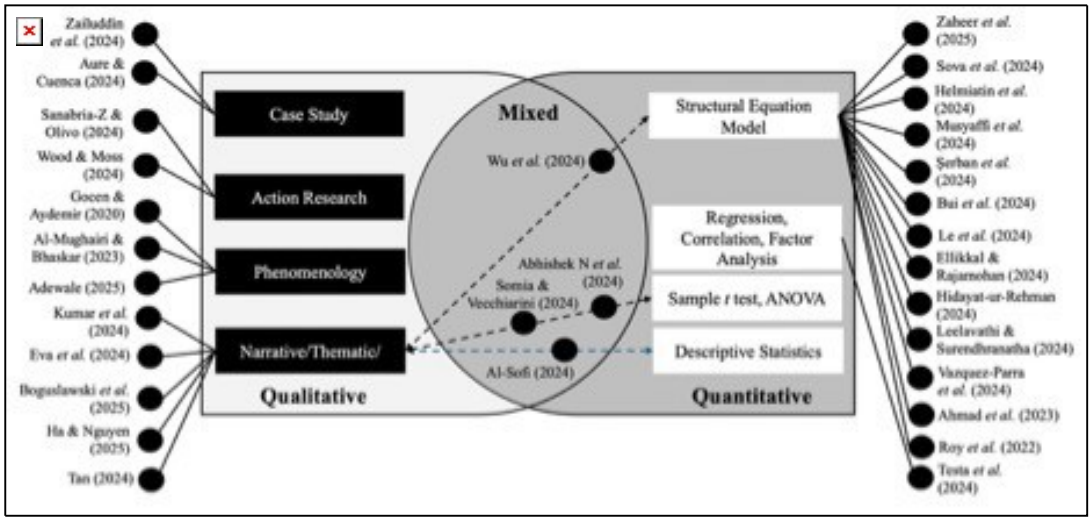

Figure 1. Map of analysis methods and techniques

Several theories adopted in qualitative research besides definition or theories related to AI and its implementation in education are Self-Determination Theory (Boguslawski et al, 2025); Gender Theory (Adewale, 2025); Gardner's Multiple Intelligences Theory, Constructivist Learning Theory, Csikszentmihalyi's Flow Theory, and Torrance's model (Zailuddin et al., 2024); Adoption model (Al-Mughairi & Bhaskar, 2023); and ICE (Ideas, Connections, Extensions) Model (Wood & Moss, 2024). The majority of quantitative studies—seven articles—utilized Structural Equation Modeling (SEM) referencing adoption models such as TAM (Technology Acceptance Model) and UTAUT (Unified Theory of Acceptance and Use of Technology). The primary objective of TAM is to establish a foundation for understanding external factors influencing user beliefs, attitudes, and technology adoption intentions. It posits two key determinants: perceived usefulness and perceived ease of use

(Davis, 1989). The UTAUT model identifies the main factors in the acceptance of Information and Communication Technology (ICT), measured by the intention to use technology and the actual usage rate. It comprises four determinants: performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkantesh et al., 2003).

Other theories or models referenced include Uses and Gratifications theory (Le et al., 2024), and Self-Determination Theory (Ellikkal & Rajamohan, 2024; Hidayat-ur-Rehman, 2024). According to Ryan & Deci (2000), research guided by EDT focused on the socio-contextual conditions that facilitate versus hinder the natural processes of self-motivation and healthy psychological development. It postulated three innate psychological needs: competence, autonomy, and relatedness, which, when fulfilled will result in better self-motivation and mental health, and if not met will lead to reduced motivation and well-being. One mixed-method article used the Technology Acceptance Model (Wu et al., 2024). The other three articles did not specifically reference other theories or research models, other than explaining Generative AI, student competencies, and the negative and positive impacts of using AI in education.

4. Discussion

4.1 Quantitative Method

The study by Musyaffi et al. (2024) in Indonesia incorporated four external variables to the original model of TAM (Technology Acceptance Model), including: digital literacy and self-efficacy in AI, perceived risk, and student satisfaction. The three main variables of the TAM are: perceived ease of use (PEOU), perceived usefulness (PU), and intention to use (ITU). The result of structural model test demonstrated that the digital literacy and self-efficacy have significant effect on PEOU and then PU, PEOU, Self-efficacy, digital literacy, and perceived risk affect the intention to use artificial intelligence. The result is in line with the findings of Le et al. (2024) in Vietnam, which also employed TAM, namely: perceived ease of use has a positive effect on perceived usefulness and intention to use; and intention to use is positively influenced by perceived usefulness. However, Le et al. (2024) added three external variables: information seeking, novelty, and academic content creation, which are derived from uses and gratifications theory (UGT). The results indicated that information seeking and novelty affect intention to use, but academic content creation has no effect.

Roy et al. (2022) in India, integrated TAM with Theory of Planned Behavior (TPB) and Technology Readiness Index (TRI). The results revealed that that: (1) PEOU and trust affect PU, while discomfort and insecurity have no effect; (2) PEOU is influenced by trust, but not by discomfort and insecurity; (3) PU, PEOU and trust affect attitude; and (4) Intention is influenced by attitude, but not by subjective norm and perceived behaviour control. Referring to the study by Testa et al. (2024) in Italy, intention to use, in the context of using Natural Language Programming (NLP), was also influenced by perceived value. In addition, gender moderates the relationship where women are less likely to use NLP models than men. The study by Serban et al. (2024) in Romania highlight that intention to use AI for teaching, research, and evaluation activities was positively influenced by perceived advantages and negatively influenced by perceived disadvantages of using AI.

The Unified Theory of Acceptance and Use of Technology (UTAUT) model was employed in study conducted by Helmiatin et al. (2024) in Indonesia. His study reveals that: (1) users' attitude towards AI adoption are positively influenced by performance expectancy and Effort Expectancy, and negatively influenced by perceived risk; (2) Facilitating conditions have a positive impact on Effort Expectancy, but a negatively impact on Behavioral Intention; (3) users' attitudes toward AI positively influence behavioral intention; and (4) Behavioral intention positively influences AI adoption in higher education. Research by Bui et al. (2024) in Vietnam combined the UTAUT model with two other models, namely Technology Acceptance Model (TAM) and Theory of Planned Behavior (TPB). The results of their combined model analysis revealed that Perceived Usefulness, Perceived Ease of Use, AI Literacy, Social Influence, Facilitating Conditions and Technology readiness positively influenced the adoption of AI in higher education.

The next two Structural Equation Model studies refer to Self Determination Theory (SDT). SDT explains how social context can either support or hinder human functioning based on the ability of the social environment to fulfill basic psychological needs (Manninen et al., 2022). The study by Ellikkal & Rajamohan's (2024) in India, utilizing Covariance Based SEM, revealed that AI-enabled Personalized Learning (AIPL) positively affects three basic psychological needs, namely: autonomy, competence, and relatedness. Furthermore, Autonomy has a positive effect on Engagement, Relatedness has a negative effect on Engagement, while competence has no effect on Engagement; and finally, Engagement has a positive effect on Academic Performance. Another study utilizing SDT is Hidayat-ur-Rehman (2024) in Saudi Arabia, which revealed that cognitive learning, metacognitive learning, and Social and Motivational Learning are important components in digital informal learning. The results of testing the structural equation demonstrated that AI competency, chatbots' use by

students, perceived autonomy, and digital informal learning significantly influence Students' Engagement.

Two additional studies employing Structural Equation Modeling examine AI adoption in connection with AI training programs. The first study, conducted by Sova et al. (2024), identified four latent variables: training & integration, awareness & familiarity, concerns, and perceived usefulness & positive attitudes, all of which influence the adoption of AI tools in higher education in Romania. The findings suggested that increased usage frequency of AI tools is substantially linked to enhanced positive attitudes, perceived benefits, and formal integration. However, concerns about AI negatively affect positive attitudes and perceived benefits. The impact of training was also revealed in the second study by Vazquez-Parra et al. (2024) in Mexico, which found a significant relationship between understanding of AI tools and the perceived value of artificial intelligence training, as well as between perceptions and attitudes towards the integration of AI in professional training programs.

The use of AI, especially Generative-AI with exemplified by ChatGPT, can increase student engagement, foster critical thinking, and develop creativity. However, concerns regarding ethical, legal, and other risks associated with AI usage must be acknowledged. The study by Ahmad et al. (2023) in Pakistan and China found that the perception of Artificial intelligence positively influence decision making, human laziness, and safety & privacy. A study by Leelavathi & Surendhranatha (2024) on ChatGPT usage in India revealed that (1) “AI integration” is positively associated with “critical thinking” and moderately associated with “creativity” and “ethical awareness”; (2) “learning enhancement” is strongly and positively correlated with “critical thinking” and weakly but positively correlated with “creativity”; and (3) “Educator guidances” exhibits a moderate positive correlation with “ethical awareness”. Both studies highlight the dual nature of AI adoption in higher education, where benefits coexist with potential negative consequences, posing challenges for academic institutions.

The last quantitative study, utilizing the Structural Equation Modeling, focuses on the organizational, stress, and work mode aspects among university lecturers in Pakistan, as examined by Zaheer et al. (2025). The role of Artificial Intelligence, as measured through AI Awareness, positively moderates, i.e. strengthens, the relationship between job stress and turnover intention, and the relationship between remote working and organizational commitment. Structural equation testing further indicates that remote working significantly increases organizational commitment, while at the same time decreases turnover intention. In contrast, perceived work stress has a negative impact on organizational commitment, but a positive impact on turnover intention. Finally, organizational commitment partially mediates between perceived work stress and turnover intention, but shows no mediating effect between remote working and turnover intention.

4.2 Qualitative Method

Three studies employed phenomenology, with two focusing on ChatGPT usage and one examining AI adoption more broadly. Adewale (2025) investigated the use of ChatGPT by female academics and researchers in South Africa, revealing diverse perceptions regarding the benefits of AI in research productivity. While many utilized ChatGPT to support academic work, others expressed concerns about ethical violations that could undermine academic integrity. Despite these concerns, the tool contributed to research productivity. The study by Al-Mughairi & Bhaskar's (2023) in Oman further highlighted the motivational factors and inhibiting factors for ChatGPT adoption. The results identified four motivational factors: Exploration of innovative educational technologies; Personalized teaching and learning; Time saving; and Professional development. However, five inhibiting factors were also identified: reliability and accuracy issues, reduced human interaction, data privacy and security, lack of institutional support, and over-reliance on ChatGPT. The study by Gocen et al. (2024) in Turkey highlighted both the benefits and drawbacks of using artificial intelligence. The finding suggested that AI-powered systems can align content delivery with learners’ pacing, help the system better determine learner needs, avoid waste of time and resources, enable rapid data analysis, and empower informed decisions. However, the widespread use of AI will lead to an overly mechanized way of processing information, pragmatic approaches, an excessive focus on knowledge over aesthetics, reduced roles for educators, ethical and security concerns, and adverse social implications in interpersonal relationships. In addition, the research participants advocated that the inclusion of AI in personal matters should be limited and not considered as a one-size-fits-all answer to prevent legal issues from arising.

Five studies employed narrative in nature with in-depth interviews, semi-structured interviews, and thematic analysis on the use of AI on content development, evaluation materials, and learner motivation. Tan (2024) in Malaysia explored AI-generated content (AIGC), revealing mixed perceptions among students. While most students viewed AIGC positively, recognizing its role in enhancing social presence and instructor motivation, variations in responses were attributed to differing learning styles and AIGC feature diversity. The study by Ha & Nguyen (2025) in Vietnam revealed that AI should be used in the creation of ELT (English Language Test) exams due to its obvious advantages in automatically creating test items, adaptive testing, improved feedback mechanisms, quality assurance, and innovative formats; but at the same time, several disadvantages were noted,

including language complexity and nuances, technical limitations, ethical issues and biases, and human supervision and validation. The study by Boguslawski et al. (2025) in German identified three themes that influence motivation and learning outcomes in programming education, namely customized learning, affect, and support, in the context of utilizing the Large Language Model (LLM). LLM can significantly increase learner autonomy and competence by increasing options for customized learning; fostering emotions conducive to cultivating and sustaining motivation; and inhibiting negative affective states that hinder learning. However, LLM is currently unable to provide or adequately replace social support, which is still a major factor in student motivation.

The fourth study, which adopts a narrative approach, is that of Kumar et al. (2024). The study presented an optimistic scenario regarding the potential benefits of AI implementation, while its pessimistic scenario highlighted concerns related to academic integrity, inequality, and ethical implications. The optimistic scenario aligns with the findings of Eva et al. (2024) in Bangladesh, which indicated widespread acceptance and useof learner-centered technology, with online and hybrid learning offering greater flexibility, accessibility, self-directed learning, and enhanced student engagement opportunities. The pessimistic scenario presented by Kumar et al. (2024) is also consistent with Eva et al. (2024), who highlighted a gap between commitment and action in regulating unethical AI use, emphasizing the need for clearer guidelines and greater investment in technological solutions to ensure effective assessment processes. Such unethical usage is further reinforced by the findings of Aure & Cuenca (2024), who asserted that as AI continues to advance in education, questions arise regarding perceptions of guilt and academic dishonesty, teacher expectations, and the prioritization of authenticity and emotional intelligence.

Two studies employed action research, namely Sanabria-Z & Olivo (2024) in Mexico and Wood & Moss (2024) in the USA. The first study applied Participatory Action Research and UCD (User-Centered Design), which highlighted the importance of addressing the Fourth Industrial revolution (4IR) megatrends in higher education to prepare students for a technology-driven world through a proposed model based on ATL (Active and Transformational Learning (ATL). The model is powered by AI to integrate essential competencies to overcome challenges and generate innovative solutions. The integration of AI into the platform encourages personalized learning, collaboration and reflection and enhances creativity by offering new insights and tools, while UCD ensures alignment with user needs and expectations. The second study incorporated Generative-AI into an instructional design course. The results showed an increase in students' comfort with Generative-AI and their understanding of its ethical implications. Most students were at an initial stage of engagement, with an increased awareness of the limitations and ethical issues in the use of Generative-AI.

The final two qualitative studies employed a case study methodology. First, a study by Zailuddin et al. (2024) in Malaysia highlighted that the integration of AI with creative disciplines is not just a passing fad, but signals the start of a new era in technology enablement in creative education. The integration has the potential to redefine the boundaries of creative education, enhancing various aspects of the learning process. However, the study also emphasized the irreplaceable value of AI in human guidance in fostering creativity and advancing analytical thinking. Second, the study conducted by Aure & Cuenca (2024) in the Philippines found that students used Generative-AI tools as brainstorming partners, co-authors, and co-readers, which improved research efficiency and comprehension. The findings indicated two main implications. First, practical implication suggests the implementation of meta-reflection to enhance responsible AI use, self-awareness, critical thinking, and ethical engagement among students, with structured reflection yielding notably positive outcomes. Second, social implication underscores the need for open discussion concerning social perceptions and emotional responses to AI use, encouraging an environment for authentic, reflective, and emotionally intelligent engagement with AI.

4.3 Mixed Method

One of the four mixed method studies combined the structural equation modeling (SEM) with a qualitative approach to further investigate the results of hypothesis testing from SEM, particularly those yielded non-significant results. This is the study conducted by Wu et al. (2024) in China. he findings of the study employing the Technology Acceptance Model (TAM) demonstrated that the perception of ease of use (PEOU) significantly and positively affects the perception of usefulness (PU) and attitude towards AI, and attitude towards AI has a significant and positive effect on behavioral intention to use AI. However, perceived usefulness did not significantly influence attitude and intention to use AI. The qualitative research conclusion is that perceived ease of use and perceived usefulness are the main factors that facilitate students' behavioral intention to use AI for learning, and difficulties in using AI will hinder the use of AI in continuous learning.

Three other mixed-method studies examined the use of ChatGPT. The study by Al-Sofi (2024) in Saudi Arabia found that students were generally satisfied with the effectiveness of ChatGPT in improving their academic writing skills. However, they also found several challenges related to the use of ChatGPT, including plagiarism, over-reliance, inadequate documentation, threats to academic integrity, and inaccurate information. These

findings align with the study of Abhishek N et al. (2024) in Malaysia, which employed primary data for quantitative research and secondary data for qualitative research. The study identified several significant factors influencing the perceptions of the academic and research communities towards the adoption of AI/interactive tools including challenges, benefits, awareness, opportunities, risks, sustainability, and ethical considerations. The study by Somia & Vecchiarini (2024) in the USA has revealed sustained ethical thinking as a fifth factor in increasing the entrepreneurial competence of students using ChatGPT. The other four factors are as follows: finding opportunities, creativity, vision, and valuing ideas.

4.4 Themes of Future Research

One of the central themes for future research is the integration of different theories or research models that are multidisciplinary in nature. Some of the relevant theories include psychological or social science theories such as Self-Determination Theory (Ryan & Deci, 2000); communication sciences theories, such as Use and Gratification Theory (Katz et al., 1973); and Technology Adoption Model and Innovation Diffusion Theory, such as TAM (Davis, 1989), UTAUT (Venkantesh et al., 2003). and IS Success Model (Delone & McLean, 2003). The integration of different models or theories in understanding both the positive and negative impacts of AI in higher education can provide a more comprehensive and holistic understanding. This integration may also empirically confirm that AI implementation is a complex and multidisciplinary phenomenon.

4.5 Limitation

These recommendations are based solely on a review of 30 open access articles. It is possible that there are other theories or research methods that have not been identified. Therefore, future systematic reviews should expand their scope to include articles published in subscription-based academic journals. In addition, future systematic reviews could focus on specific analytical methods, such as exclusively employing Structural Equation Modeling (SEM), or limiting the scope to certain factors or variables, such as ethics, integrity and risks associated with the implementation of artificial intelligence in higher education.

5. Conclusion

The implementation of artificial intelligence in higher education is like two sides of a coin, it has both positive and negative sides. The positive side as evidenced by various studies is that it can help develop strategies or frameworks for integrating AI technology into the educational process (Serban et al., 2024; Sova et al., 2024; Wood & Moss, 2024; Hidayat-ur-Rehman, 2024); assist policymakers in the acceptance of AI in higher education (Gocen et al., 2020; Roy et al., 2022; Helmiatin et al., 2024), enhance learning experience (Ha & Nguyen, 2025; Tan, 2024), improve effectiveness (Ellikkal & Rajamohan, 2024; Al-Sofi, 2024) or efficiency of learning (Musyaffi et al., 2024; Abhishek N et al., 2024). Conversely, the negative side includes concerns related to academic dishonesty, guilt or integrity (Kumar et al., 2024; Aure & Cuenc, 2024; Al-Sofi, 2024; Adewale, 2025); ethical issues (Leelavathi & Surendhranatha, 2024; Gocen et al., 2024; Kumar et al., 2024); Eva et al., 2024; Wood & Moss, 2024; Aure & Cuenca, 2024; Abhishek N et al , 2024; Ha & Nguyen, 2025); risks (Helmiatin et al., 2024; Abhishek N et al., 2024; Musyaffi al., 2024); safety & privacy (Ahmad et al., 2023; Al-Mughairi & Bhaskar, 2023; Gocen et al., 2024); and discomfort and insecurity or disadvantages (Roy et al., 2022; Serban et al., 2024).

The successful implementation of artificial intelligence in the education sector requires a well-structured strategy optimizes its potential benefits, while at the same time mitigating the risks that may arise. According to the World Economic Forum (2024), it is crucial to recognize the potential risks of generative AI rapid adoption in education if implemented without proper planning, security measures, governance measures, and equity frameworks. Innovative and ethically grounded strategies are essential for leveraging AI/GPT technologies in education to enhance learning. Furthermore, the irreplaceable role of human educators is even more pronounce, highlighting the necessity of aligning technology with pedagogical principles (Kumar et al., 2024). However, ensuring the ethical integration of such AI technologies demands a delicate balance where the potential benefits of technology should not undermine the important role of human educators in the learning process.

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