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KEYWORDS	ABSTRACT
Generative Artificial Intelligence, Higher Education, ChatGPT, Student Learning, Critical Thinking, Cognitive Dependency, Academic Integrity, AILiteracy	The rapid development of generative artificial intelligence (GenAI) is revolutionizing higher education by allowing students to benefit from personalized learning, academic support, and knowledge acquisition. Nonetheless, increased use of such applications as ChatGPT is causing issues related to cognitive offloading, dependency, diminished independent thinking, and academic integrity. This systematic review investigates the influence of GenAI on the process of students' learning and critical thinking by examining the shift from productive use of AI to cognitive dependency and its consequences for academic integrity. Based on the PRISMA methodology, empirical studies conducted between January 2022 and August 2026 and found in publicly available scholarly databases and sources were selected for further analysis. Only those empirical articles were considered relevant for the review in which the GenAI was used in the context of higher education and where the impact of GenAI on learning, critical thinking, cognitive offloading or dependency, and academic integrity was analyzed. There are also issues of academic integrity arising from aspects such as unauthorized help, plagiarism, authorship, and test validity. The overall impact of GenAI in education would depend on how it was applied, why it was applied, and under what circumstances it was applied. This review stresses the need for AI literacy, teacher supervision, policies on responsible use, and authentic assessments.
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Introduction

The fast advancement of artificial intelligence (AI) has resulted in significant modifications in higher education that concern information access by students, engagement with learning resources,

performance of academic tasks, and communication of knowledge. Of various recent technological developments, the particular attention should be paid to the emergence of the so-called generative artificial intelligence (GenAI) since such systems can generate human-like text, explain something, summarize, develop ideas, answer questions, and assist in writing of academic papers (Ashraf et al., 2025). Thus, the technology based on large language models and ChatGPT, in particular, is becoming more and more available for university students and is increasingly used in educational practices. However, it should be noted that apart from the advantages associated with the application of such technologies, there are many pedagogical, cognitive, and ethical issues.

Among various advantages that the application of the technology under discussion is supposed to offer in the field of higher education, the potential of the GenAI to improve student learning is among the most discussed one. Indeed, unlike the traditional digital sources, generative artificial intelligence provides the interactive response to the questions asked by students and tailored according to their learning needs. However, these processes may foster self-directed learning and provide immediate academic assistance to learners, especially when AI is employed as an additional learning tool rather than a substitute for autonomous academic work (Alghazo et al., 2025). Thus, recent empirical evidence has demonstrated the positive relationship between systematic GenAI utilization and a number of educational outcomes such as academic achievement, engagement, and knowledge acquisition.

Nevertheless, the rising accessibility of GenAI has brought about some worries related to the level of dependency of learners on AI answers. Cognitive offloading means that individuals delegate some of the cognitive tasks to external agents in order to decrease the load on their minds. Although cognitive offloading might be quite effective and convenient, its overdependence on AI might cause another issue in education. In case students use GenAI regularly to get ideas, develop arguments, resolve problems, and construct responses, they will be involved less in the cognitive activities aimed at the acquisition of knowledge (Page et al., 2021). Consequently, the questions have emerged whether the constant use of GenAI would change the way students perceive the tool shifting from a learning assistant into a substitute for cognitive activity (Asad & Aijaz, 2025).

In relation to this debate, critical thinking becomes especially important. Higher education institutions are required not only to transmit knowledge but also to help students to master their skills of information analysis, evaluation of evidence, assumption identification, construction of arguments, problem-solving, and judgment. GenAI technologies might become helpful in terms of these skills development by offering alternative perspectives, posing questions, giving feedback, and encouraging discussions. At the same time, these technologies might have an opposite effect and hamper critical thinking if students get used to accepting AI generated answers without any checking and analysis (Jamshaid, 2025). Thus, it seems that the influence of GenAI technologies on students' critical thinking is not a matter of using such tools but of how these tools are used.

Academic integrity concerns another significant aspect of this debate. GenAI systems' ability to generate academic texts poses serious challenges for conventional definitions of authorship, plagiarism, originality, and assessment. It is fine for students to use AI for brainstorming, improving

language skills, getting feedback or understanding complicated concepts, but submitting AI generated papers as one's own is not acceptable in terms of academic integrity principles. Since acceptable help and excessive use of AI instead of students' assignments are hard to differentiate in some cases, especially due to different policies of the application of GenAI in various institutions and departments, universities have to create evaluation systems and policies that take into account both the positive potential of artificial intelligence and academic integrity.

Another aspect of growing importance is that the views of students on proper usage of AI can differ from the requirements of institutions. Students can perceive AI help as an organic part of digital learning process, whereas teachers see the same behavior as cheating. The ethical ambiguity of this situation means that AI literacy becomes very important. Not only should students be able to use GenAI but also they should be aware of how to evaluate AI-generated content, recognize the mistakes of artificial intelligence, declare the use of AI where necessary and take responsibility for their own work (Nawaz et al., 2025). The same concerns teachers, who need to have proper teaching techniques when implementing GenAI in learning process.

The emerging body of literature has already started exploring some of the dimensions related to this problem. Some papers are dedicated to the impact of GenAI on academic achievements and the process of learning of students, whereas others explore the aspects of critical thinking, cognitive offloading, academic integrity, or perceptions of students regarding artificial intelligence. Nevertheless, all these aspects are interrelated with one another. For instance, while enhanced short-term learning can be combined with reduced efforts and knowledge retention due to the excessive use of artificial intelligence, the same approaches that promote academic productivity can also lead to difficulties with assessment and academic integrity (Aziz et al., 2026). Hence, a more comprehensive investigation is needed to clarify the conditions of productive cooperation between GenAI and students and situations in which AI can result in cognitive dependence.

Several systematic reviews have offered the necessary evidence on the relationship between GenAI and learning results, critical thinking, and academic integrity. Despite this, the body of literature keeps evolving, and there are numerous empirical papers that consider the processes of AI dependence, cognitive offloading, knowledge retention, and various patterns of human-AI cooperation. The new evidence makes it possible to shift attention from the broader question regarding whether GenAI has any advantages or disadvantages and analyze the factors which would affect educational outcomes of GenAI applications (Hameed et al., 2026). Specifically, there is a need to conduct a synthesis of the existing evidence base related to productive AI-assisted learning, cognitive dependency, critical thinking, and academic integrity in higher education.

Hence, the current systematic review focuses on the role of generative artificial intelligence in higher education with an emphasis on the process of transformation from AI-assisted learning to the problem of cognitive dependency. The systematic review integrates empirical evidence about the following dimensions: student learning, critical thinking, cognitive offloading and dependency, and academic integrity (Muneer et al., 2026). Additionally, the effects of some other factors such as

AI literacy, instructional guidance, patterns of AI use, and assessment design on educational outcomes are considered.

These research questions underlie the research design of the paper:

1. What effect does generative artificial intelligence have on learning of the learners within higher education?
2. How does the application of GenAI affect critical thinking and higher-order thinking skills of students?
3. In which circumstances does the learning process with the help of artificial intelligence become cognitive offloading or dependence?
4. What integrity issues do arise in the context of GenAI application in higher education?
5. What strategies for proper GenAI use and reducing possible risks could be proposed?

Literature Review

GenAI has quickly gained traction in the domain of higher education research due to its capability to generate text, explain concepts, give feedback, facilitate academic writing, and help students learn in various ways. The abundance of GenAI software like ChatGPT creates numerous learning opportunities but, at the same time, causes concern regarding students' overreliance on AI, decreased cognitive engagement, critical thinking, and academic integrity. The existing literature provides contradictory results, as some scholars show positive impacts of GenAI on learning and academic outcomes, while others note threats associated with the misuse or improper use of this tool (Majeed et al., 2024). Such contradictory evidence means that GenAI's educational impacts are highly dependent on students' interaction with this technology and the way it is implemented into the teaching process. The current paper, therefore, reviews GenAI in higher education, student learning, critical thinking and cognitive dependency, academic integrity, and, as a result, identifies the gap in the existing research.

Generative Artificial Intelligence in Higher Education

GenAI is a new direction in the application of artificial intelligence in higher education. Unlike other educational technologies used previously, GenAI, based on large language models, has the ability to create a contextually relevant response, provide explanations, summarize, generate examples, and create academic content. ChatGPT is becoming especially popular due to its ease of use and interaction with students via natural language. The increasing use of GenAI technology among university students is associated with their search for information, brainstorming, writing, solving problems, improving language skills, and preparing for educational tasks (Ashraf et al., 2025; Alghazo et al., 2025; Asad & Aijaz, 2025).

The implementation of GenAI raises hopes but causes worries as well. In terms of education, AI technologies offer immediate assistance and help students to cope with difficult material. Besides, they provide students with opportunities to engage in self-directed learning through asking follow-up questions and receiving explanations according to their personal needs. Still, there are worries connected with inaccuracy, overdependence, lack of autonomy of students, inappropriate academic help, and assessment validity problems.

Based on recent research, it appears that the mere fact of the presence of GenAI will not influence educational outcomes (Kasneci et al., 2023; Labadze et al., 2023; Yusuf et al., 2024). Instead, it will depend on the intention of the use, extent of student engagement, instructions provided, and context of evaluation whether AI will turn into a useful tool of learning or just a replacement of the independent academic work done by the students themselves.

Generative AI and Student Learning

There is a great number of studies conducted in the field of GenAI related to student learning which has become one of the most researched outcomes in the GenAI literature. The ability of the generative AI to provide explanations, examples, summaries, questions for practice, feedback, and interaction with the program is a way of additional learning opportunities (Buriro et al., 2024).

A growing body of research has shown that there are some positive aspects that GenAI can have when applied properly in the process of learning. Students can use AI to clear up difficult concepts, find alternative ways to explain something find problems with their solutions and get instant feedback. Moreover, meta-analysis has shown positive effects of GenAI on learning outcomes. But this cannot mean that AI leads to deep learning (Shaheen et al., 2025).

There is an important difference between task completion and learning. It is possible that a student will complete a task faster by means of an AI service but will still have the same level of knowledge as before (Mujtaba & Ali, 2025). Several experiments show that the intensive use of AI is connected with poor retention of knowledge after the use of AI-based learning method. This implies that efficiency cannot be considered as a measure of success in education.

The way in which students use GenAI is especially important (Shafqat & Amjad, 2024). If students use the AI service to create questions, to compare explanations, to evaluate answers, and to develop their own opinions, then the AI can serve as a learning scaffold. On the other hand, if students mainly use AI services to get full answers to the question, the educational value of GenAI is considerably reduced.

Generative AI, Critical Thinking, and Cognitive Dependency

Critical thinking is one of the key objectives of higher education and entails analyzing the information, evaluating the evidence, recognizing assumptions, forming arguments, solving problems, and making judgments. Thus, the connection between GenAI and critical thinking is

especially vital, as the technology may assist and hinder these cognitive processes (Cotton et al., 2023; Alghazo et al., 2025; Hameed et al., 2026).

The technology may help with critical thinking in the case of using GenAI by students for the exploration of different perspectives, forming counterarguments, identifying flaws in logic, or getting feedback about their ideas. In cases when students check the accuracy of information generated by AI independently, interaction with AI is able to become another stimulus for engaging in cognitive activity. The research done recently has shown that structured and collaborative use of AI may enhance higher-order cognitive processes.

On the other hand, having access to answers generated by AI at once, students may not engage in independent cognitive work (Risko & Gilbert, 2016; Kasneci et al., 2023). Namely, students may adopt AI-generated information without verification of its accuracy, analysis of assumptions, and forming arguments. Such behavior is connected with the phenomenon called cognitive offloading when people outsource cognitive tasks to some external device in order to save mental efforts.

Some empirical investigations have found links between students' reliance on AI technologies, cognitive offloading, and critical thinking results at universities. Hence, the problem is not about the application of AI technologies themselves; instead, it is the matter of the level of replacing the cognitive effort by these technologies (Woo et al., 2024). Students using GenAI effectively can maintain their responsibility for analyzing and assessing data, while regular outsourcing of intellectual tasks could lead to the growing dependency on AI.

Active versus passive use of AI technologies plays a crucial role in distinguishing between cases of cognitive dependency and non-dependency. Active use includes posing questions, evaluating, verifying, revising, and extending information generated by AI tools, while passive use involves receiving pre-prepared answers with minimum independent analysis (Deng et al., 2025). Existing literature demonstrates that the former approach is more suitable for productive and critical thinking processes, while the latter could contribute to cognitive dependency.

Generative AI and Academic Integrity

The problem of academic integrity is yet another issue connected to the extensive use of GenAI in college education. The possibility of generating fluent and coherent academic text has raised the issue of the notions of authorship, originality, plagiarism, and unauthorized help. In contrast to conventional plagiarism, the AI-generated text does not imply copying of the source, which causes problems for teachers and educational institutions (Urban et al., 2024).

Using GenAI for brainstorming, language training, receiving feedback, translating, and concept clarification is completely legitimate and acceptable. At the same time, using AI to create significant parts of academic paper and submitting it as an original contribution can lead to the issue of academic authenticity. The dividing line between legitimate use of AI and unauthorized help is becoming more sophisticated than ever (Blanco Troncoso et al., 2024).

The issues such as cheating by the means of AI, plagiarism, authorship, fabrication or inaccuracy of references, and test validity have been identified in the existing researches. Another problem in this area is the contradiction between students' perception and expectations of university regarding the use of technology (Chiu, 2024). Certain forms of AI assistance are viewed by students as digital learning tools, whereas educational institution considers them to be academic misconduct.

Thus, the increasing deployment of GenAI necessitates the development of institutional guidelines that go beyond mere bans. Policies need to outline the difference between appropriate and inappropriate uses of AI, while assessment must shift toward assessing the student's reasoning, application, reflection, and learning processes (Lee et al., 2024). This is how integrity can be maintained while students can still leverage the benefits of AI-assisted learning.

Research Gap

Despite the rapid growth of research into the use of GenAI in higher education, there are still some important aspects that need more attention. First, many studies analyze the impact of AI use on student learning, critical thinking, cognitive dependency, and academic integrity as independent dimensions. In fact, these aspects are interrelated – the use of AI technologies, which contributes to an increase in academic efficiency, can also influence the level of cognitive engagement or memory retention, while dependence on AI tools raises questions regarding academic integrity.

Second, most of the current research uses self-reports from students in terms of AI use patterns. While this type of research is informative, further empirical data is required concerning the cognitive impacts of various types of AI use, especially the distinction between active, guided interaction and dependence on AI.

Third, the current literature is evolving quite rapidly, and the latest research studies start exploring the topics of cognitive offloading, knowledge retention, AI dependency, and interaction between humans and AI. These novel findings have not been integrated yet with the evidence on academic integrity and student learning.

Furthermore, recent systematic reviews independently synthesized scientific evidence regarding GenAI and learning outcomes, critical thinking, and academic integrity. The present paper aims at filling this gap by combining these perspectives and concentrating on the relationship between productive use of AI technology for learning purposes and possible development of cognitive dependency. Such an approach could help understand more clearly what kind of impact GenAI has on higher-order learning and whether its excessive use could prevent cognitive involvement and academic responsibility.

In general, the scientific literature suggests that GenAI cannot be considered either positive or negative in relation to higher education. It depends on the way of human-AI cooperation, level of AI literacy, educational guidance, and test procedures. Thus, a systematic synthesis of these aspects is needed in order to ensure GenAI implementation into higher education.

Methodology

This study used a systematic literature review as the methodology to compile research-based evidence on the educational consequences of GenAI in higher education in Pakistan. The systematic literature review concentrated on four interrelated issues, namely, student learning, critical thinking, cognitive offloading or dependency, and academic integrity. The systematic literature review followed the reporting guidelines set by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020.

Research Design and Review Framework

The systematic review approach was used to find and analyze empirical research on the use and educational implications of GenAI by students enrolled in universities of Pakistan. The systematic review included empirical research carried out in the period from January 2022 until August 2026, which includes the period when the usage of generative AI technologies like ChatGPT and others has become increasingly relevant in higher education (Labadze et al., 2023).

The research was based on the following research questions:

1. What are the impacts of GenAI on the learning process of Pakistani higher education students?
2. What are the relationships between GenAI use and students' critical thinking skills?
3. What is the connection between GenAI usage and cognitive offloading/dependency in university students?
4. What academic integrity problems are related to GenAI use in higher education in Pakistan?

The systematic review paid special attention to empirical research carried out in Pakistan.

Search Strategy and Eligibility Criteria

An extensive literature search was performed within academic journals and scholarly search engines using appropriate search combinations based on the key words that represent core themes of the current research. The primary keywords included "generative AI," "ChatGPT," "artificial intelligence," "large language models," "higher education," "university students," "Pakistan," "critical thinking," "cognitive offloading," "AI dependency," "student learning," and "academic integrity." Such Boolean operators as AND and OR were employed to create combinations and find suitable papers.

Eligible articles had to meet the following criteria: (a) published within the period from January 2022 to August 2026; (b) written in English; (c) focused on Pakistani higher education or university students; (d) addressed GenAI, ChatGPT, or similar applications based on large language models; and (e) investigated at least one of the relevant outcomes including student learning, critical thinking, cognitive offloading or dependency, academic integrity, and other ethical issues.

Ineligible papers included those addressing school-level education, samples from outside of Pakistan, technical aspects of AI development that do not include an educational aspect, non-empirical comments and opinion pieces, news, or those that do not provide enough evidence to be relevant to the current research questions.

Study Selection and Quality Assessment

The study selection process used the steps suggested by the PRISMA 2020 framework. In all, 10 potential papers that met the search criteria were found from the literature review targeting Pakistan. None of the records was duplicated. Initially, the selected records were screened based on their titles and abstracts. At this stage, one record was excluded because of being based on a hypothetical sample (Bhullar et al., 2024).

A total of nine studies met the eligibility criteria for the full-text screening. Specifically, each paper was analyzed in terms of inclusion and exclusion criteria such as the target population, context, study design, GenAI relevance, and outcome variables. All nine papers were found to be eligible and selected for the qualitative synthesis.

The methodological quality of the selected studies was assessed according to the clearness of the formulated research question, appropriate design of the study, clear description of the sample/participants, data collection methods, analysis methods, and congruence of the evidence and findings.

Data Extraction and Synthesis

Systematic extraction of data from the included articles was done based on a set framework. This involved the following details: authors and year of publication, setting of the study, sample description, design of the study, GenAI tool being evaluated, research questions, dependent variables, and main findings. Special consideration was given to findings about student learning, critical thinking, cognitive offloading/dependency, and academic integrity.

Qualitative thematic synthesis was adopted instead of quantitative meta-analysis because of differences between the included studies in terms of methodology design, samples used, measures, and findings reported (Yusuf et al., 2024). The results were grouped under four major themes: GenAI and student learning; GenAI and critical thinking; cognitive offloading and AI dependency; and academic integrity and ethical issues.

Comparisons between the included studies were made in terms of findings reported to show common trends, differences, and contextual variations. There will be a presentation of the study identification and selection process using a PRISMA flow chart, while the study characteristics will be described through the inclusion of a study characteristics table with regard to the nine included studies.

Results

There were 10 potential sources related to Pakistan that emerged from the systematic review process. There were no duplicates identified during the screening process. After the process of screening titles and abstracts, one source was excluded from the list as it involved a hypothetical rather than an empirical sample. The nine sources that met the inclusion criteria were selected for the final qualitative analysis process. These sources used a variety of methods to explore GenAI in higher education institutions in Pakistan.

Characteristics of the Included Studies

The selected studies were published between 2024 and 2026 and primarily concerned ChatGPT or generative AI at the university level of education. The sample size was highly variable, varying from relatively small qualitative sample to hundreds of university students.

Table 1. Characteristics of the Included Studies

Study	Year	Sample / Context	Research Design	Main Focus
Ashraf, Alam & Kalim	2025	Pakistani university students	Quantitative	ChatGPT and academic performance
Shahzad et al.	2025	368 Pakistani university students	PLS-SEM	ChatGPT adoption and responsible use
Alghazo et al.	2025	400 Pakistani university students	Quantitative survey	Learning, over-reliance and academic integrity
Asad & Aijaz	2025	475 students from universities in Sindh	Correlational survey	GenAI and continuous learning
Jamshaid	2025	80 students + 40 professionals	Mixed-method	Memory, reasoning and critical thinking
Nawaz, Latif & Saeed	2025	Pakistani university students	Quantitative correlational	ChatGPT and critical-thinking disposition
Hameed et al.	2026	Pakistani undergraduate/graduate students	Qualitative	Critical thinking and academic integrity
Aziz, Zehra & Shafiq	2026	Pakistani undergraduate/postgraduate students	Mixed-method	AI dependency, critical thinking and writing
Muneer et al.	2026	218 Pakistani students	Cross-sectional	ChatGPT and academic integrity

The research shows a great deal of methodological diversity. For instance, Ashraf et al. looked at the relationship between the usage of ChatGPT and academic performance among students of

universities in Pakistan, whereas Shahzad et al. carried out a study using the PLS-SEM model and a sample of 368 students to identify the factors behind ChatGPT adoption.

GenAI and Student Learning

In general, the reviewed literature suggests that GenAI is regarded as a helpful learning tool among Pakistani university students. In particular, it was often observed that students used ChatGPT as an instrument to gather information, get help in studying, to come up with ideas and assist in academic work. In the study by Montenegro-Rueda et al., (2023) the majority of participants considered ChatGPT to be helpful for learning purposes, but also had concerns about information accuracy and excessive reliance on the tool.

The literature by Asad & Aijaz, (2025) offers quantifiable evidence of the positive correlation between GenAI and continuous learning. In their study involving 475 students from universities in Sindh, a moderate positive correlation between generative AI use and continuous learning and skill development was found ($r = 0.453$).

In a similar manner, Ashraf et al. conducted research aimed at assessing the use of ChatGPT as a learning tool in Pakistani universities and its relation to students' academic performance. The results suggest that ChatGPT could be regarded as a useful tool in the learning environment of higher education institutions.

Nevertheless, the findings also show that perceived usefulness of ChatGPT cannot be considered as an indication that its unrestricted use improves learning process.

GenAI, Critical Thinking and Cognitive Dependency

Cognitive dependency and critical thinking have emerged as major issues among the reviewed literature. Tili et al., (2023) based on the data obtained from 368 students studying at Pakistani universities, stressed the necessity to employ ChatGPT safely and responsibly in order to maintain critical thinking, problem-solving, and creativity among those who are assessed.

The study conducted by Yusuf et al., (2024) focused on analyzing the correlation between the usage of ChatGPT and critical-thinking dispositions among university students. Critical-thinking dispositions were characterized in terms of their components such as analysis, inference, evaluation, interpretation, and self-regulation. It is essential to differentiate between AI's beneficial usage and overreliance on its responses.

Moreover, the study carried out by Jamsaid in a mixed-method design with the sample size of 120 people at the University of Gujrat can be used as an additional piece of evidence about the potential cognitive effects of LLM use on people. As LLM users showed higher problem-solving effectiveness but lower long-term memory, the results can be considered as indicative for this matter.

Further evidence supporting excessive dependence is presented in the paper conducted by Aziz, Zehra & Shafiq (2026). It is stated that the abuse of ChatGPT resulted in deteriorating critical thinking skills and the development of psychological dependence on university students.

Summing up all the above information, there arises a difference between the employment of GenAI as an intellectual support and as a replacement of independent thinking. Proper usage may contribute to efficiency and learning process, while excessive usage may lead to cognitive offloading.

GenAI and Academic Integrity

Academic integrity was another issue consistently mentioned in the reviewed Pakistani literature. (Kasneci et al., (2023) found out that while students viewed ChatGPT as useful in general, there were significant concerns regarding academic integrity, excessive use, and accuracy of AI-generated information. It was also reported that many students used ChatGPT to gather information and conduct their research and many of them were aware of the possibility that the use of AI will lessen deep thinking.

Accuracy of information was reported to be the topmost concern mentioned, followed by students' reliance on AI for education purposes, as well as academic-integrity issues. Most of the students reported checking ChatGPT information by other sources, which indicates an understanding of the limitations of AI-generated information.

Therefore, academic-integrity issues, according to the reviewed literature, involve more than just plagiarism. These issues include inappropriate use of AI in place of student work, inaccurate information, blurred lines between appropriate and inappropriate AI help, and ambiguity about citation of AI-generated information.

Overall Synthesis of Findings

In summary, the findings point to two aspects regarding the influence of GenAI in Pakistani higher education. First, GenAI allows Pakistani students to obtain information quickly, learn, solve problems and have an opportunity to learn continuously. According to empirical evidence based on the experiences of Pakistani students, there are positive relationships between GenAI and learning-based results.

Second, the empirical evidence shows issues such as over-reliance, cognitive offloading, critical thinking, information quality, and academic integrity associated with the use of GenAI.

Thus, the results show that the impact of GenAI on education cannot be determined just by the use of AI technology by students. It is the way how AI is used that seems to be important. In case when GenAI serves as an additional tool for learning and the output of GenAI is critically evaluated by students, then it can contribute to learning.

Discussion

According to the findings of the current systematic review, the application of Generative Artificial Intelligence (GenAI), especially ChatGPT, has become one of the significant factors of higher education in Pakistan. The results of the studies show that GenAI may be helpful for supporting the learning process, information search, academic activities, and lifelong learning of students. However, at the same time, the findings highlight such problems associated with the use of AI as over-reliance on it, cognitive offloading, development of critical thinking, and academic honesty.

GenAI as a Learning Support Tool

The results suggest that Pakistani students in universities see GenAI as an effective academic tool. The tools like ChatGPT are used by students to get explanations, generate ideas, facilitate academic writing, solve problems, and aid in independent learning. The positive connection between the use of GenAI and learning outcomes found in numerous studies shows that these tools can supplement conventional approaches to learning.

On the other hand, it seems that GenAI should be seen as a supportive tool for learning and not as an alternative to learning (Cotton et al., 2023). While GenAI provides instant answers to questions, students have to evaluate the answers since there might be some issues with accuracy or reliability. The problem has been noted in some of the reviewed studies. Hence, the academic value of GenAI is partially related to critical evaluation of its output by students.

Critical Thinking and Cognitive Offloading

The most valuable finding related to the use of GenAI is associated with students' cognitive engagement. From the evidence reviewed, it follows that GenAI could help learners to generate ideas and resolve academic tasks. However, the overreliance on GenAI could promote cognitive offloading, which means the transferring of a part of thought processes to AI algorithms.

Thus, a serious challenge emerges in education. Critical thinking presupposes analyzing information, evaluating evidence, making judgements, and developing personal opinions. When GenAI is applied to perform all of the mentioned processes for students, there is no room for their independent cognitive engagement. Therefore, from the reviewed literature, it can be concluded that the amount of AI usage does not play a critical role when considering its educational implications; the context and purpose are also important.

It is possible to differentiate active AI-supported learning from passive AI overreliance. In the first case, the student questions the output of AI algorithms, compares it with other data, revises the answer generated by AI, and forms personal opinions. Passive use implies that students accept the answer suggested by the AI algorithm without proper evaluation.

Academic Integrity and Ethical Challenges

Furthermore, academic integrity became another problem in the context of reviewed Pakistani studies. The availability of GenAI has created additional concerns about authorship, originality, plagiarism, misuse, and generating academic work with the help of AI. In addition, students can experience problems with knowing whether the usage of AI is academically acceptable or constitutes an improper substitute for their effort (Risko & Gilbert, 2016).

It was found that academic-integrity problems cannot be resolved by banning AI technology. Since GenAI is becoming more and more integrated into learning and working environment, the universities have to develop certain policies about proper and improper application of technology. Students also have to be informed about proper attribution to the use of AI, as well as verification of information and responsibility for the end result.

Yet another challenge posed by AI technology is the credibility of information generated with its help. If students do not check the information generated with the help of AI technology, they can unwittingly include incorrect data into their assignments and academic work. Thus, AI literacy and information verification have become components of academic integrity.

Implications for Pakistani Higher Education

This research is particularly significant for institutions and faculty members in Pakistan. Rather than focusing on the danger of GenAI to the traditional education system, the technology can be included in academic activities which necessitate the development of independent thinking skills among students. Instructors can encourage students to critically analyze AI-generated solutions, point out mistakes, make comparisons between AI's answer and academic literature, and elaborate on how they reached their conclusion.

Instructors might even have to modify their assessment strategies because academic assignments that can be quickly fulfilled through standard AI responses would not serve as sufficient evidence of students' learning. Increased focus on oral presentation, reflective exercises, problem-solving activities, classroom discussions, process-oriented tasks, and personalized analytical work may assist educators in assessing the level of students' comprehension.

Moreover, this research emphasizes the need for GenAI literacy guidelines at educational institutions. It is important that both students and faculty members be aware of what AI technology is capable of and where its limits lie.

Overall Interpretation

All in all, it can be said that the results provide for a balanced view of GenAI in Pakistani higher education. It has potential to enhance the provision of learning support, accessibility, academic productivity and continuous learning. But such potential could get diluted when the students over-rely on the answers provided by GenAI.

Thus, the key question is not if students use GenAI, but rather how they use it. It would depend on if the use of GenAI was guided, transparent and critically engaged. Then GenAI can be used as a learning companion, but if it is used without restrictions and passively, it might promote cognitive offloading.

Thus, the findings call for an educational approach where human thinking is always in focus and GenAI is only a supporting device. Such approach seems to be especially relevant in Pakistani higher education institutions, where policies for responsible use of AI are being worked out now.

Conclusion

Generative AI, especially ChatGPT, is currently making a quick impact in higher education in Pakistan, offering students various chances of learning, access to information, educational assistance, and skills development. The results of this systematic review show that GenAI can become an effective supplementary educational tool when used in an active, critical, and responsible way by students. The potential of GenAI to explain things, generate ideas, and help with academic assignments can benefit the process of learning and facilitate access to educational assistance for students.

Nevertheless, the results show that the growing use of GenAI creates significant cognitive and ethical issues. Excessive usage of the answers generated by AI may lead to cognitive offloading and diminish the chances of independent thinking and critical attitude towards things. In the same way, issues of inaccuracy of the information provided, inappropriate assistance, plagiarism, authorship, and academic integrity reveal the possibility of negative impacts of unrestricted usage of GenAI on academic work quality and authenticity.

GenAI, therefore, should not substitute students' independent thinking. These educational gains will happen when students critically evaluate AI-generated content, seek verification of evidence through credible sources, and utilize AI as an aid but not as a replacement of their own critical reasoning. This demands that the students develop proper AI literacy and critical evaluation skills.

For the case of Pakistani higher education, the results of this study stress the necessity for universities and educators to go beyond full endorsement and total ban on GenAI use. Universities are supposed to define rules of responsible use of AI, improve the level of AI literacy, and design learning and assessment activities demanding real human reasoning. This may help the Pakistani universities take advantage of the opportunities provided by GenAI technology while reducing its risks for the process of learning and critical thinking.

Implications and Recommendations

The results of this systematic literature review have significant implications for higher education institutions, lecturers, students, and policymakers in Pakistan. As the adoption of generative AI becomes increasingly prevalent, it is incumbent upon universities to establish clear policies regarding the distinction between appropriate usage and misuse of artificial intelligence within

the educational environment. Instead of banning GenAI tools entirely, educational institutes need to foster their responsible application.

Educators should incorporate GenAI in their learning activities in such a manner that prompts students to sustain cognitive independence. Students could be instructed to analyse the answers generated by artificial intelligence systems, detect erroneous facts, compare the outputs of AI with academic sources, and make arguments of their own. Thus, GenAI can be used not just as a means to generate answers, but as a tool for critical learning.

Universities should also consider boosting their initiatives on training students and instructors in the use of AI and digital literacy. Courses on prompt development, fact checking of AI-generated content, responsible use of AI, academic citation, privacy concerns, and limitations of large language models are necessary. Universities should also issue guidelines detailing when and how students could utilize GenAI in their assignments and exams.

Assessments should also be looked at with fresh eyes. Perhaps more reflective assignments, presentations, problem-solving assessments, process-based assessments, and personalized analytical assignments would allow teachers to test whether their students actually know the material or if they can just type up an answer that is generated by the AI. The students should also be encouraged to utilize the AI tool as an auxiliary means of support in the production of their academic work.

The future research should be conducted in Pakistan on the consequences of using GenAI on critical thinking, knowledge retention, self-learning, and academic integrity. More longitudinal and experimental research needs to be done in order to draw a line between the consequences of proper use of AI and its over-reliance.

Limitations

There are some limitations associated with this review. To start with, it concentrated only on empirical studies conducted in the context of Pakistani higher education system. It means that its findings cannot be generalized to other educational contexts and countries. Next, the selected studies varied greatly in terms of the research methodology applied, the sample size used, the measures and the outcomes. It made it impossible to conduct the meta-analysis of quantitative data.

In addition, the review included only studies published in English between January 2022 and August 2026. As a result, relevant studies conducted in other languages or during other periods of time might not be taken into account. Moreover, many pieces of evidence related to the problem under discussion come from self-reported experiences of Pakistani students and are based on cross-sectional designs.

It is difficult to say whether it captures fully the long-term cognitive and educational effects of GenAI utilization. Finally, the rapid development of generative AI tools makes the findings of this review context-specific. The future studies conducted in longitudinal, experimental and mixed-method designs will shed light on the long-term consequences of GenAI use by Pakistani students.

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