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The Role of AI and ChatGPT in Enhancing Learning Achievement Among University Students: A Quantitative Analysis

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ABSTRACT

This study aimed to explore the students' Role of AI and ChatGPT in Enhancing Learning Achievement Among University students in public sector universities. A quantitative research method was used to conduct the research investigation. The study's population consisted of 9854 students from the three public universities in district Multan. To complete this research, a sample of one hundred and ninety-seven students (n = 197), including female (120) and seventy-six male (76) students, was selected through a convenient sampling approach from the faculty of education. The data was analyzed using descriptive statistics (frequency, percentage mean, and standard deviation) and inferential statistics (t-test). The results indicated that the students were positive toward the artificial intelligence ChatGPT. The study recommended that training workshops be used to demonstrate to students how to leverage these technologies responsibly and efficiently in educational institutions.

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1. Introduction

The field of artificial intelligence is undergoing fast development and has become integrated into many disciplines, including those of education. Before examining the influence of AI, it is essential to understand the precise meaning of "intelligence". Simmons and Chappell (1988) as cited in Fazal et al. (2018) define intelligence as embodying both a distinct aptitude for problem-solving in a certain manner and a capability to acquire the skills to tackle novel challenges. It was introduced in 1955 by John McCarthy invented the concept of "artificial intelligence" by characterizing it as the ability to instill intelligence in the computer, enabling it to exhibit behaviors that would be deemed intelligent if shown by a person (Shrivastava, 2023). Way back before, in 1950, Alan Turing envisaged that computing machines would think like humans, and automated machines would make calculations beyond human rationality (Shiohira, 2021).

A modern view characterizes AI as "computer systems capable of performing human-like activities such as learning, adapting, synthesizing, self-correction, and intricate data processing tasks" (Crompton & Burke, 2023). Artificial Intelligence (AI) originated in the 1940s, which aligns with the rise of computer science and cybernetics. It reached notoriety during a research and workshop held at Dartmouth College in the 1950s

(Shrivastava, 2023). Nonetheless, one can already find an increasing number of critics in translation studies who express their concerns about quality and the potential for job displacement by machine-generated translations, along with machines' inability to understand linguistic and social nuances (Alkhawaldeh & Khasawneh, 2023).

Artificial Intelligence personalized tutoring in the education sector caters to the diverse intellectual levels of students, especially in environments with limited resources and faculty. Furthermore, education must be such that it prepares students for a digital and automated future, with complexity in problem-solving, innovative reasoning, disciplined thinking, and collaboration as necessities (Channa et al., 2021). Chaturvedi et al. (2023) assert that modern customers are entering a new age when artificial intelligence (AI) provides them with a wide array of options and administers information in a more personalized way. The applications of artificial intelligence (AI) in education encompass a wide range of technologies, including intelligent robots in special education and AI-integrated learning management systems that improve learning experiences.

However, there is a need to carefully examine ethical considerations, potential unintended consequences, and broader implications for education (Ahmad et al., 2023). Artificial intelligence (AI) is revolutionizing and playing a crucial role in students' learning experiences all over the world. This transformative technology is also reshaping Pakistan's educational landscape. AI has wide competencies and the potential to change the very face of education; urgently, it needs to be integrated with a sense of responsibility and ethical soundness so that it can have a positive impact on the learning ecology. Within this context, understanding stakeholders' perceptions of AI is crucial as it expands in higher education. The principal goal of the study was to understand the students' perspectives on Chat GPT, an AI tool, and the factors influencing students' perceptions of Chat GPT to optimize these AI tools, paving the way for smart educational experiences in university settings. This research contributes to understanding the evolving role of AI and ChatGPT in education and its direct implications on students' academic performance and learning achievement among university students. The research objectives are to examine students’ perceptions of the role of artificial intelligence (AI), particularly ChatGPT, in enhancing learning achievement in public sector universities and to determine students’ perceptions regarding the role of AI and ChatGPT in Education based on their gender in public sector universities. The research questions are (i) What are students’ perceptions regarding the role of artificial intelligence (AI) and ChatGPT in enhancing their learning achievements in public sector universities? and (ii) What are the perceptions of students on the role of AI and ChatGPT based on their gender in universities differ significantly based on their gender in public sector universities?

2. Literature Review

Artificial intelligence is increasingly infiltrating the processes of academic knowledge acquisition, tutoring, and education system supervision. Promising artificial intelligence (AI) technologies have changed the face and mode of teaching and learning, as well as the management of institutions and the distribution of knowledge (Rahman & Watanobe, 2023). These steps, such as using a new paradigm for effective learning environments, focusing on results-oriented feedback, and putting in place several advanced and new exam systems, make learning very difficult (Rasul et al., 2023) because they create moral problems, cause unfair learning, and hurt students' ability to think critically.

Artificial intelligence (AI) has been rapidly advancing in the process of creating educational programs, particularly in informal learning settings driven by online education and evolving student requirements. As a result, AI's ability to greatly improve curriculum design processes. This systematic review focused on AI's impacts on higher education quality, teaching ethics, learner evaluations, and emerging necessary professions for development in the future (Slimi & Carballido, 2023). The review aims to highlight some important AI techniques and tools that have recently been integrated into the education structure through this examination of AI's dynamic role (Chen, Chen, & Lin, 2020; Zhai et al., 2021).

OpenAI developed ChatGPT, one of the most widely used and preferred AI conversational systems in education, due to its capacity to generate natural-like text and facilitate fluid conversations with users (Hua, Jin, & Jiang, 2024). Educators and students

can derive benefits such as virtual support for learning, task automation, and intelligent teaching support (Mosaiyebzadeh et al., 2023). Secondly, ChatGPT can assist programming students who struggle with writing code and correcting errors (Rahman & Watanobe, 2023). This technology largely reduces the burden on teachers in administrative work. It could help teachers spend considerable time interacting with pupils (Elbanna & Armstrong, 2024).

In the study, Adeshola and Adepoju (2023) have enumerated several concerns. These doubts are fueled by a high level of AI-powered problem-solving that could interfere with the process of critical thinking and problem-solving on the part of the student. Incorrect or biased data produced by the AI would present devastating risks to the smooth flow of appropriate information (Rasul et al., 2023). Relevant ethical issues not only exist in the classroom but also extend beyond. More so, ethical considerations should not be confined to the four walls of the classroom but in situations that relate to society, including those who are marginalized. There is a need, therefore, to balance properly the pros and cons of AI in Asian education. These problematic areas mean developing tough strategies and stipulations for responsible use of the technology in the learning area.

Moreover, Alexopoulos (2024) studied students' perceptions regarding the employment of AI in supporting the teaching of students with specific learning difficulties (SLD). However, while AI is expected to greatly enhance the quality and efficiency of learning, opposition from parents and co-workers, as well as the realization of the solutions that already exist, causes the need for training staff members on how to implement AI in special education successfully. Furthermore, in their study, Long, Blunt and Magerko (2021), set up examples of AI literacy that result in goal achievement among clients of diversity by applying methods involving interactivity and invention. Their paper gives evidence of the excellence of such institutions in providing easily comprehensible AI learning to the public. The advancement of artificial intelligence (AI) in higher education is changing rapidly, with the development of ever more sophisticated solutions to cater to the needs of this industry, which is constantly under transformation.

The study by Bucea-Manea-Ţoniş et al. (2022) on perceptions about artificial intelligence in Romanian and Serbian higher education points clearly toward certain opportunities and challenges. Restrictions are still put in place even with an opportunity to enhance learning environments and foster development of the critical digital competencies: technical, pedagogical, and equity-related dimensions. This sets a backdrop on which strategic and tactical approaches to AI technology at work are applied. AI has several advantages, mainly for students from minority and disadvantaged groups. Salas-Pilco, Xiao and Oshima (2022) described that AI in the learning environment increases students' performance and interest. However, overcoming the technical, educational, and cultural barriers is realized for the positive effects of AI to be evident in diverse contexts.

While prior studies Bibi and Atta (2024); Kanwal, Hassan and Iqbal (2023) have highlighted the positive role of AI tools like ChatGPT in education, limited research has examined gender-based and program-level disparities in perceptions of AI integration. Furthermore, there is a lack of contextual studies exploring students' perceptions of public sector universities in Pakistan, particularly in underrepresented regions such as district Multan and Dera Ghazi Khan. This study addresses these gaps by investigating diverse student perspectives on ChatGPT and exploring its potential as a universal educational tool.

3. Research Methodology

The main goal of the present study was to examine student perceptions regarding the usage of artificial intelligence and ChatGPT. To ensure a thorough analysis of the collected data, the current research employed a quantitative research design. The reason this quantitative technique was chosen, is that it is most appropriate to provide measurable and definite results in the assessment of students' perspectives toward AI utility. The population for this study consisted of 9854 students enrolled in the BS program in the Faculty of Education at three public universities: Emerson University Multan, Ghazi University Dera Ghazi Khan, and Islamia University Bahawalpur. This population was selected due to its representativeness of university students in a developing region with increasing exposure to AI tools.

For selecting a representative sample, a convenience sampling method was used to choose one hundred and ninety-seven students (n = 197), including female (120) and seventy-six male (77) students, from the Department of Education at chosen institutions. This method was chosen due to the accessibility of students within this faculty and their familiarity with technology-enhanced learning, which aligns with the study's focus on AI integration in education. This sample reflects a reasonable proportion of the broader population, considering the constraints of time and resources. Furthermore, the scale's reliability was assessed using Cronbach's alpha. The reliability coefficients for the three distinct aspects were documented as 0.87 for perceived utility, 0.891 for perceived ease of use, and 0.791 for attitude towards utilizing Chat GPT. The study instrument attained an overall scale reliability rating of 0.904, which was above the recognized threshold of 0.7 as established by Hair et al. (2020).

The questionnaire utilized had 16 items, primarily covering three areas the perceived utility of Chat GPT, perceived user-friendliness, and perceived ease of utilizing AI. In this regard, respondents were requested to indicate their degree of agreement with each item in the questionnaire using a five-point Likert scale that ranged from 1 to 5. The survey was conducted among students throughout the academic year of 2023-2024. To secure a reliable instrument for assessing students' perspectives, two educational specialists were approached to ensure the validity of the study questionnaire and offer their input on the quality of the content in measuring the target dimensions. The survey was disseminated via Google Forms and to the students present on campus at the Department of Education for data collection. All ethical principles, including obtaining informed permission from the participants, were followed, and their confidentiality was upheld during the study inquiry.

4. Results and Discussion

The statistical analysis in SPSS (Statistical Package for Social Sciences) was performed using several statistical techniques including descriptive statistics (frequency, percentage, mean, standard deviation, and T-test) to analyze the data.

Table 1: University Wise Analysis

University	Frequency	Percent
Emerson University Multan	95	57.2%
Islamia University Bahawalpur	47	28.3%
Ghazi University, Dera Ghazi Khan	24	14.5%
Total	166	100%

Table 1 indicates that the majority of students are from Emerson University, Multan comprising N (95) which is 57.2% of the total sample of 166 students. Islamia University Bahawalpur has a smaller representation, with N (47), which is 28.3% of the students, while Ghazi University, Dera Ghazi Khan has the least representation, accounting for only N (24), which is 14.5% of the total. This distribution shows a significant concentration of students at The Women University, Multan as compared to the other two universities.

Table 2: Gender Wise Analysis

Gender	Frequency	Percent
Male	11	6.6
Female	155	93.4
Total	166	100.0

Table 2 shows the distribution among the 166 surveyed students reveals a significant imbalance, with 93.4% identifying as female N (155) and only 6.6% N (11) as male. This pronounced disparity indicates that the majority of the survey participants are females, with a very small representation of males. This could reflect the actual gender composition of the student population or variations in survey participation rates between the genders.

Table 3 contains data from 166 participants regarding their experience with AI, and more specifically, ChatGPT. The usefulness of every explanation was evaluated on a scale of 1 to 5 where 1 represented minimal usefulness and 5 great usefulness.

Table 3: Students' Perspectives on the Usability of Chat GPT

Statements	N	Minimum	Maximum	Mean	Std. Deviation
I have improved my learning with ChatGPT	166	1.00	5.00	3.9639	0.85912
ChatGPT aided me with my academic journey.	166	1.00	5.00	3.7530	0.93703
I have raised my academic performance using ChatGPT	166	1.00	5.00	3.5843	0.99184
I have received training related to AI tools to use them at my academic level	166	1.00	5.00	3.0301	1.18794

Table 4: Students' Perspectives on the Usefulness of AI

Statements	N	Minimum	Maximum	Mean	Std. Deviation
I believe that AI tools helped me to improve my overall academic performance	166	1.00	5.00	3.9458	.83307
I believe that AI tools have improved my engagement in the classroom.	166	1.00	5.00	3.7349	1.01006
I believe that the application of AI techniques aided me in recognizing and fixing errors on time	166	1.00	5.00	3.8133	.90524
I have improved the quality of my assignments with the use of AI tools.	166	1.00	5.00	3.2590	1.10608
I think AI tools positively impact the quality of education.	166	1.00	5.00	3.9398	.85775

Table 4 depicts students' use of or interaction with AI tools and or systems, and the respondents totaled, 166 individuals. These tools were monitored based on several aspects of learning, motivation, errors, and assignment quality as well as positive impressions.

Table 5: Students Perspectives on Perceived Ease of AI

Statements	N	Minimum	Maximum	Mean	Std. Deviation
I believe that AI tools made education more enjoyable.	166	1.00	5.00	3.8916	.91469
AI has personalized learning experiences for students.	166	1.00	5.00	3.8916	.91469
AI facilitates the acquisition of practical, real-world skills.	166	1.00	5.00	3.9398	.85775
AI plays a crucial role in preparing students for the future.	166	1.00	5.00	3.8133	.90524
The integration of AI in education has increased overall student satisfaction.	166	1.00	5.00	3.8133	.90524

As noted in Table 5, the participants have a positive attitude towards the use of AI tools in education. Students feel it is fun and consider it an approach that enhances learning by making it personal, developing practical skills, and being future-focused. In aggregate, the application of AI improves satisfaction.

Table 6: T-test for Gender-Wise Comparison of Usage of Chat GPT

Gender	N	Mean	Standard Deviation	Std. Error Mean	t	Sig. (2-tailed)	Mean Difference
Male	11	61.09	6.252	1.885	0.210	0.834	0.523
Female	155	60.56	8.071	0.648			

Table 6 represents the statistical comparison of the two gender groups showing no significant difference in the measured variable. With Gender 1 (N=11) having a mean score of 61.0909 and Gender 2 (N=155) with a mean score of 60.5677, the t-value is 0.210, with a two-tailed significance of 0.834, indicating no statistical significance between the groups.

5. Conclusion and Policy Implications

The goal of the research was to investigate the perspectives of students regarding the usage of artificial intelligence in education The results of the survey indicated that students had a favorable view of the integration of artificial intelligence in their educational experience. This finding corroborates the previous study conducted by Kanwal, Hassan and Iqbal (2023), which emphasized that students had a favorable view of the efficacy of the AI tool ChatGPT in their educational domain. Likewise, the findings align with those of Bibi and Atta (2024), who noted that students recognize the practicality of AI technologies in their chosen field of study. Consequently, students considered the use of ChatGPT in instructional activities to be equally favorable. The second objective was to determine the disparity in students' perspectives on the integration of artificial intelligence in their educational process. The findings indicate that there is no notable variation in the assessment of artificial intelligence between male and female students when it comes to their views of ChatGPT across gender categories.

Similarly, Fast and Horvitz (2017) also observed that there exist different views on the integration of AI between males and females. The objective of the third study question was to ascertain whether participants' views of ChatGPT varied according to the program level. Acknowledging that students from different academic disciplines may possess distinct requirements and preferences. Nevertheless, the results suggest that no substantial disparity exists in the judgments of students across various programs. In the present research study, the absence of notable disparities across various programs indicates that students at different institutions have a comparable perception of ChatGPT. This suggests that ChatGPT can function as a viable educational instrument for students in all academic disciplines inside institutions.

In the future, researchers should explore how AI affects non-cognitive skills, including motivation, critical thinking, and social-emotional development, to ensure that AI tools enhance overall student growth. Ultimately, researchers can explore how AI tools can be scaled across diverse educational systems and environments, assessing their effectiveness in institutions of varying sizes and locations to offer insights into wider applicability and possible challenges. Further studies might investigate these long-term impacts, with particular emphasis on how AI and ChatGPT affect various student groups in different socio-economic and cultural contexts.

The universities should focus to demonstrate the students through training programs that AI and ChatGPT should be used ethically to improve the quality of learning. The educational institutions should initiate seminars for awareness among the students on the positive usage of AI and ChatGPT for academic purposes.

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