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Impact of Using Artificial Intelligence (AI) Tools on Self-Esteem and Academic Performance of Students In Public and Private Universities of Lahore

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ABSTRACT

The purpose of this quantitative research was to identify the application of Artificial Intelligence (AI) tool and its influences on the self-esteem and academic performance of student in public and private universities of Lahore. In order to ascertain gender and university representation, 400 BS students were sampled using multi stage sampling technique. Data collection was carried out through three questionnaires, with five items in each that were made based on digital competencies, academic performance, and self-esteem. To reliable was assessed by a pilot study that revealed Cronbach Alpha .781. The data was collected by personal visits to the universities and was analyzed by IBM (Trial version) software, descriptive and inferential statistics were applied. Participants used AI tool moderately, reported high self-esteem and academic performance. A significant difference was observed based on the utilization of AI tools in private and the

public institutions, in the level of self-esteem and academic performance. Differences in the application of AI tools in various BS degree programs were identified. Socioeconomic background of students also determines self-esteem and the performance. The promotion of using a wide range of AI resources instead of possible alternatives like LMS or ChatGPT can augment the extent of learning and can enhance the outcomes of learning.
Keywords: Artificial Intelligence Tools, Students' Self-esteem, Academic Performance, Public and Private Universities.

INTRODUCTION

Education plays significant role in our life it is the excellent way to be successful. As we had the time to advance our education system, changes do always occur all around the world. Among the ways through which technology can carry out or enhance education are the development of educational materials by teachers and the ratification of new learning and working methods, among many others. This century requires us to tap high technologies in order to be able to get a good education. Newer technologies such as artificial intelligence have entered into our textbook institutions and are capable of transforming it completely. The products of man-made brainpower (Artificial intelligence) are playing an essential role in various fields, essentially triggering advancement in spheres such as medical services, finances, or transportation. That being the case, their relevance is particularly expressed within educational institutions and universities.

Artificial intelligence (AI) was first presented by John Mc Carthy (1956) during Dortmund Conference. He described the AI as a representation of human intelligent machines, and in particular, intelligent computer programs (Dergunova et al., 2022). Artificial intelligence refers to the use of computers in work that would traditionally require human wisdom. Self-esteem, which can be explained as the overall attitude of self-confidence and self-value, is a determinant when it comes to the academic lives and performance of the students. On the same note, academic performance is a practical indicator of the learning outcomes and the explicit nature of learning process and development of students. That is why there is a need to realize how AI tools affect these important parts of the student's life among educators, policymakers and researchers.

The aim of the research was to explore the intricate connection among the academic performance of students, self-esteem, and academic technology. Artificial intelligence has various benefits in the sphere of training as well. It works with personalized growth chances that are strongly adapted to the demands of the understudies to coordinate the academic experience to a higher level of understanding and commitment. One of the examples is artificial intelligence-based ones; such device like flexible learning stages can process information about understudy performance on the fly, differentiating between strengths and weaknesses to provide specific assistance (Chen, 2022).

Thinking, imagination and computerized competency emerge in essential

assets, in just next to a preeminence of communication and collaboration in other contexts. It becomes essential to be able to navigate through complex scenes of data and learn constantly. Also, the fluidity, empathy, and social imagination are identified as acute in the promotion of persuasive informational associations amid various social and mechanical environments. This constant interaction emphasizes the foundation of an effective spectrum of skills in the exploration of the leading-edge world (Owoc et al., 2021).

Artificial intelligence is aimed at providing intelligence to machines that will enable individuals to navigate in the environment with success. Intelligence in the same manner is being capable of acting in a strategic and adaptive manner, which ensures things operate in a flexible and predictive manner. The Artificial Intelligence is intended to imitate and enhance such property in technical systems. Following are some AI examples: plagiarism tracking, Exam integrity, Chatbots that help attract and retain users, Learning Management Systems faculty lecture transcription, better internet meetings, a study of student success criteria, scholarly research and campus connectivity (Keleş et al., 2021). UNESCO (Miao et al., 2022) estimates that the fields related to AI become increasingly prevalent in the course of secondary education; generally, they are taught during computing courses and are a part of general digital literacy; under special circumstances, they appear in the list of AI topics.

There is a rapid change in our education industry because of artificial intelligence (AI). New strategy and opportunity of education occur when it comes to Artificial Intelligence in Education, addressing the methods of teaching and learning in various circumstances. The need of independent, changed and adaptable learning is fast emerging. Recent technological advances have fueled the growth of an interest in artificial intelligence within the school system. Such a trend reflects the desire to more personalization and flexibility in instructive experiences, emphasizing the revolutionary potential of simulated intelligence in learning environment (Ali et al., 2022).

ChatGPT, also called GPT-3, is the product of the OpenAI research laboratory and it is already used to produce software, develop online programs, and write books, novels, poetry, stories, dialogues, reviews, and information reports (Abdous, 2023). It is even able to write an educational paper about itself. The teachers also use ChatGPT to write their course introduction, lectures, homework, copy and grades. The number of teachers is increasing those using AI quiz authoring tools to optimize their assessment process and provide college students with opportunities to get engaged in interactive learning activities.

AI designers of tests: Machine learning is used to design instructions as part of AI test makers because the test contents can vary according to the needs of individual students. The device can automatically create questions and analyze student responses and provide it with invaluable time and effort on the part of the instructors. Artificial intelligence (AI) has concern analyzing fundamental thinking in the field of education and has the potential to transform the educational setup

completely. AI approaches are being employed to analyze huge amounts of data so as to identify patterns, develop models, recommend interesting publications, as well as prepare papers that are ready to be published (Murillo,2023).

Yet, as it is true of any emerging technology, there are dangers to its use. The possible advantages and disadvantages of artificial intelligence (AI) in education are the possibility of cheating, enhanced testing, constrained learning, and time gains on teacher preparation (Mario et al., 2023).

Despite the fact that there are certain concerns about artificial intelligence, there are also considerable opportunities in the field of education, and they are based on a range of studies and opinions. Particularly, in order to make sure that students are ready to live in the future society where robots are going to be rather active and to maximize the impact of AI on the education process. According to the review above, it can be concluded that AI tools may impact Self-esteem and Performance of students subsequently it was seen fit to investigate the Effect of using Artificial intelligence (AI) tools on Self-esteem and academic performance. Its goal is to help education practice and enhance the life of education students, through awareness creation over these impacts.

Research Objectives

These were the objectives of the study:

1. Identify the application of AI tools by students in Public and Private Universities.
2. Assessing the impact of AI resources on self-esteem of students of universities.
3. Examining the impact of application of AI platforms on the performance of university students.

Research Questions

Following were the research questions of the study:

I. How does AI equipment of university students used in learning contexts?
II. How does an AI tool contribute to the self-esteem of university students?
III. How does academic performance among students at the university change when they use tools of AI?
IV. How does the gender and AI tool in academic performance connected?
V. How does the Degree program connected with the application of AI tools?
VI. How does Institutional sector related to the usage of AI tools?

Significance of the Study

This research is significant because it can be helpful to know how the AI influences the self-esteem and the achievement of the students. They have enhanced the deployment of AI in the majority of domains of existence so that everyone must know how to utilize them. The studies have also revealed that the application of AI tools has a great impact on the academic achievement of children as well as learning and future prosperity. This research was formulated in such a manner that it aimed at determining the impact of the implementation of the AI tool on both self-esteem and academic achievement of the students in both the state and the privately funded Universities. Through the role of AI, educators will be able to see that technology

impacts positively instead of moderating the confidence of their students. Moreover, the consideration of the role of AI in academic performance brings about the possibility of making learning individualized and target-oriented. Nonetheless, this research also arouses knowing the ethical and social responsibility of AI in education, especially on the issue of equity and privacy. In the end, it generates a global appreciation of socio-economic contexts in integration with technological revolution, rendering evidence-based approaches in enhancing AI applications in education. Good citizen can be offered to the society with the aid of strategies.

LITERATURE REVIEW

This review will give a detailed analysis of the multidimensional nature of artificial intelligence (AI) in education in terms of implications, usage, and theories. It starts with an introduction of what AI is and how it is used in education by using what is referred to as the AI in Education (AIED), and emphasizing on how it will affect human level of cognition and the way the brain develops. The argument is followed by the investigation of the Diffusion of Innovation (DOI) Theory, developed by Rogers (1962) and its application to the process of the adoption and integration of AI technologies within the educational context.

Moreover, the literature also addresses many of the higher education approaches within AI, such as learner modeling, personalized learning experience, adaptive learning, and the transformation of administrative functions. It is also considered the importance of the acquisition of digital literacy among students and the transformation of the education ecosystem through innovation on the web.

Artificial Intelligence

Artificial intelligence (AI) is terminology used to describe programs produced with the aim of executing tasks usually operated by human beings, such as language and facial recognition, game of chess, and automobile navigation. The technologies applied in education are implemented in AI in Education (AIED), which aims to improve the instruction process, student learning, and the overall educational process (Rodrigo, 2023).

Self-Esteem

The Self-Esteem Motivation Theory proposed by Orth and Robins (2014) and incorporated into the theoretical model of investigating the impact of the AI tools on the extent of self-esteem and academic achievement of students within the universities of Lahore.

Artificial Intelligence In Higher Education

Artificial intelligence has very many applications. Artificial intelligence is the most commonly employed definition of an ability by a computer or a computer-controlled machine to perform any activity that is related to higher mentally evolved processes, including reasoning, inference, generalization, and learning based on previous experience, which has been considered the exclusive attribute of a human being (Nabiyev, 2005).

Within the scope of AI learning systems, a learner model is one of the central

elements of promoting an independent learning ability. This model is thoroughly constructed based on the behavioral data obtained during the process of learning. Their learning proficiencies are comprehensively tested or rather analysed through examining the cognition and aptitude of learners. This will involve taking them into a thorough examination of the way their minds work to see where they excel and fail to establish their learning abilities. This is followed by analyses of knowledge which are carefully plotted so as to reveal the nature of control of learners over different subjects that they are learning. Learner modeling provides complex associations between learning products and a multiplicity of intervening situations, including the learning materials, resources and instructional processes. Such symbiotic interrelationship between learning and influencing variables gives provider modeling in educational context various dimensions of importance to learners. It acts as a guide to educators and developers so as to design learning experiences to maximize individual learning. With a more complex understanding of how the learners and their educational settings interact, the AI systems will allow us to support more individual and successful educational experiences (Nunn et al., 2016).

The study conducted by Murt et al., (2023) determines that Technologies related to artificial intelligence (AI) are applied in a number of aspects of our life, and education is certainly among them. The research is based on developing AI study, and it is proposed with the point of view of online distance education that is provided by an escalating quantity of AI technology and the art of science. The research considers 276 papers to combine data mining and analytics practices combined with systematic review procedure. Consequently, there is a rapid increase in the analysis of temporal trends which peaked in the recent years. The three best countries in the AI research in online and remote learning are the United States, China, and India.

METHODOLOGY

Research Design

The purpose of the study was to investigate the impact of AI tools on the self-esteem and academic achievements of the students in both private and public universities in Lahore. A causal-comparative quantitative research paradigm was utilized because it enables the researcher to explore existing differences between the groups since in this case there is no manipulation. This was considered to be an appropriate design because of the various demographics of the target population thereby increasing the possibilities of generalizing the results.

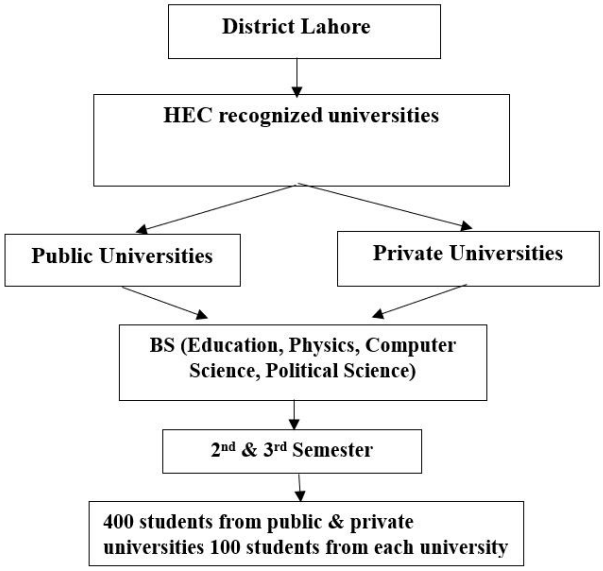
Population

The population of this study consisted of all BS-level students enrolled in public and private universities in Lahore. This includes students from various academic disciplines such as sciences and social sciences, across all semesters. Lahore hosts public and private universities, making it a diverse and significant hub for undergraduate education in Pakistan.

Sampling

The method (multi stage random sampling) was used to collect data and 400 participants were sampled (namely two Public universities and two Private universities at Lahore). I have selected two universities of the Private (Superior and UMT), sector and two ones of the Public (PU and UOL).

I have selected four BS including 2 in Sciences (Physics and Computer Science) and 2 in Social Sciences (Education and Political Sciences)



DATA ANALYSIS

This chapter presents the data analysis and interpretation using descriptive and inferential statistics via SPSS. Normality of data was confirmed before analysis. The study examined the effect of AI tool usage on students' self-esteem and academic performance. Data were collected through questionnaires from 400 BS students.

Table 4.1

Mean and Standard Deviation of resorts of AI tools, Self-Esteem, and Academic performance

Variables	Mean	Std. Deviation
AI tools	4.13	0.59
Self-Esteem	4.10	0.68
Academic Performance	3.37	0.88

The table shows the mean and standard deviation of three major variables of the study, AI tools (M = 4.13, SD = 0.59), Self-Esteem (M = 4.10, SD = 0.68), and Academic Performance (M = 3.37, SD = 0.88). Study subjects demonstrated an average involvement in AI tools, a fairly high level of self-esteem, and strong performance. Standard deviations, however, reveal that there was a significant level of deviation among all the three variables.

Table 4.2

Identification of mean difference of Self- Esteem of students on the basis of the use of AI instruments through one-way ANOVA

	Sum of Squares	df.	Mean Square	F	Sig.
Between Groups	4.19	2	2.09	4.60	.011
Within Groups	180.75	397	0.45		
Total	184.95	399			

The effect of using AI tools on the self-esteem of students was tested using the assistance of the one-way analysis of variance (ANOVA). This analysis outcome indicated an enormous variation among the groups ($F(399) = 4.60$, $p < 0.05$). In other words, one could obtain between-group variations (SS = 4.193, df = 2, MS = 2.096) of self-esteem level in various classes of AI tool usage. There was also a lot of variation among groups (SS = 180.759 df = 397, MS = .455)

Post Hoc Tests

Table 4.3

Dependent Variable: Self-esteem

Use of AI tool(I)	Use of AI tools (J)	Mean Difference(I,J)	St. Error	Sig.
Lower	Medium	0.05	0.07	0.769
	High	0.46	0.15	0.008
Medium	Lower	0.05	0.07	0.769
	High	0.40	0.16	0.033
High	Lower	0.46	0.15	0.008
	Medium	0.46	0.16	0.033

In the table given below, the results of the post hoc test comparing self-esteem levels at three levels of using AI tools Lower, Medium, and High respectively were evaluated. The significant difference between mean of High and Lower (MD = 0.461, $p = 0.008$) and High and Medium users (MD = 0.467, $p < 0.05$) was established with no significant difference coming up in case of Lower and Medium users. Such findings imply that the association between in-depth use of AI tools and self-esteem is positive, and the more people use the tools, the higher their self-esteem levels.

Table 4.4

The one-way ANOVA will determine the difference in the means of the academic performance rate of the students based on AI tools application.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	161.18	45	3.58	8.48	0.01
Within Groups	149.07	353	.42		
Total	310.26	399			

For this type of one-way ANOVA to conduct the investigation of the impact of the use of different AI tools on the academic performance of the students, the significant difference between the groups was observed ($F(45, 353) = 8.482$) $p < 0.05$. The between-groups variance of 161.186 (df = 45, MS = 3.582) showed that there are significant differences in academic performance in each category in terms of AI tool use. On the other hand, within-groups variance amounted to 149.07 (df = 353, MS = .422). In general, the overall variance in scores of academic performance was 310.26 (df = 399). Such results pose the idea that the selection of AI tools can greatly influence the academic performance of students.

Table 4.5

Independent sample t-test to identify the mean difference in responses of students' using AI tools on the basis of gender

Gender	N	Mean	Std. Deviation	df.	t-value	Sig.
Male	246	4.31	0.56	398	0.84	0.13
Total						
Female	154	4.42	0.60			

The table shown below represents the comparison of the mean score on the use of AI tools among learners of both genders according to independent samples t-test. The Mean and SD of the male (M= 4.31, SD= 0.56) and females (M=4.42, SD= 0.60) is ($t(398) = 4.84$, $p = 0.13$) and the p-value of (less than 0.13) which shows that there is a chance that the uses of the AI tools of the male students when compared with that of the female students may be statistically insignificant to be included in the data provided.

Table 4.6

One-independent sample t-test to find out the difference in mean of responses between the self-esteem of the students according to their gender

Gender	N	Mean	Std. Deviation	df.	t-value	Sig.
Male	246	4.12	0.69	398	0.90	0.21
Total						
Female	154	4.06	0.65			

The table allows comparing the mean Self-Esteem scores by gender students (male versus female) with the help of an independent samples t-test. The mean and the standard deviation values include (M = 4.27, SD = 0.86) in the case of male students and (M = 3.99, SD = 1.06) in the case of female students. The result, $t(398)$ 0.90, $p = 0.21$, shows that the difference between the means of Self-Esteem of male and female participants of the given data could not be considered as statistically

significant.

Table 4.7

To determine the mean difference between responses of students of Self-Esteem based on Private and Public institution is based on Independent sample t-test.

	Sector	N	Mean	Std. Deviation	df.	t-value	Sig.
Total	Private	200	4.03	0.64	398	4.23	0.01
	Public	200	4.06	0.69			

In this table the mean of the Self-Esteem scores of the private and the public students is compared with the normal t-test. The standard deviation and the mean of the Private students is (M=4.03, SD= 0.64) and the student of the public students is (M=4.16, SD= 0.69). The difference in means is significant as is shown in the $p < 0.05$.

To conclude, the data analysis demonstrated that the level of AI tool usage has a statistically significant impact on students' self-esteem, with higher usage associated with increased self-perception. However, academic performance showed no significant variation across different levels of AI tool engagement. Sector-wise analysis revealed meaningful differences in self-esteem between students from public and private universities, though academic performance remained consistent. No significant gender differences were found in the use of AI tools, self-esteem, or academic outcomes. These findings address the core research questions and set the stage for a deeper exploration of their implications in the following chapter.

Findings

These are the finding of the research:

1. Students reported moderate usage of AI tools, with the most common being LMS and ChatGPT.
2. Higher usage of AI tools was significantly associated with increased self-esteem.
3. No significant difference was observed in academic performance based on the level of AI tool usage.
4. Public and private sector students showed significant differences in self-esteem but not in academic performance.
5. Gender differences in AI tool use, self-esteem, and academic performance were not statistically significant.
6. Degree program and institutional affiliation showed minimal impact on AI usage patterns.
7. Mobile devices and mobile internet were the most common means of accessing AI tools.

DISCUSSION

The findings of this study align with and diverge from previous literature in significant ways. The positive correlation between high AI tool usage and elevated self-esteem supports Orth and Robins' (2014) Self-Esteem Motivation Theory, suggesting that students who frequently use AI tools may perceive themselves as

more capable and autonomous learners. Similar results were found in a study by Wang et al. (2020), which concluded that personalized digital feedback through AI enhances learners' confidence and motivation.

However, unlike studies by Shute and Rahimi (2017) and DreamBox learning initiatives that showed improvements in academic performance through AI-driven personalized learning, the current study found no statistically significant impact of AI tools on students' academic performance. This discrepancy could be attributed to differences in the types of AI tools used, as the students in this study primarily engaged with general-purpose tools like LMS and ChatGPT, rather than fully adaptive AI learning systems.

Furthermore, the finding that self-esteem was significantly higher in students from public universities compared to private ones contradicts some literature suggesting private institutions often have better digital infrastructure and student support systems (Slimi, 2023). This could imply that factors such as academic pressure or institutional culture play a larger role in shaping students' self-perception than access alone.

The lack of significant gender differences contrasts with studies by Aguilar et al. (2019), who found that digital confidence often varies by gender. The current results may reflect increased digital equity among students in urban academic settings, particularly as access to smartphones and AI tools becomes more widespread.The absence of academic program-based differences in AI tool usage or outcomes suggests that AI integration in higher education may be progressing evenly across disciplines. However, studies like Parsakia et al. (2023) have emphasized the importance of discipline-specific AI applications. This points to a potential area for improvement—encouraging faculty to incorporate field-specific AI tools that could better support students' academic growth.

Lastly, the use of the Diffusion of Innovations Theory (Rogers, 1962) provides a framework for understanding why adoption levels varied by institution. As with prior research by Lutfi et al. (2022), institutional readiness, perceived usefulness, and trialability of AI tools significantly impact user engagement.

CONCLUSION

This study concludes that the integration of AI tools has a notable positive effect on student self-esteem but no significant direct effect on academic performance. The data highlights how public university students reported higher self-esteem than their private university counterparts, suggesting institutional differences in culture and support may shape psychological outcomes more than digital access alone. Furthermore, the absence of significant gender or academic program-based differences indicates a broad and relatively equitable spread of AI tool usage among students. These findings reflect a nuanced landscape in which AI contributes to the affective domain (self-esteem), while its impact on academic achievement may require more targeted or sophisticated integration to be effective. Overall, the study emphasizes the growing relevance of AI in higher education and

the need for strategic, inclusive, and context-sensitive implementations to optimize its benefits.

RECOMMENDATIONS

These are the following recommendation:

1. Universities should provide AI literacy training to enhance students' confidence and effective tool usage.
2. Equal digital access must be ensured across public and private institutions.
3. Tailored interventions should be designed to support diverse academic programs.
4. Beyond LMS and ChatGPT, exposure to a wider range of AI applications should be promoted.
5. Institutions should continuously assess the impact of AI usage on both academic and psychological outcomes.

Limitations And Future Research Directions

This study was limited to BS students from selected universities in Lahore and relied on self-reported data. Future research should consider longitudinal and qualitative methods to explore deeper mechanisms. Broader sampling across different regions and levels of education would also improve generalizability. Additionally, future studies may explore the role of faculty support, digital infrastructure quality, and student digital literacy as mediating variables in the relationship between AI tool usage and student outcomes.

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