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Platform & Workflow by: [Open Journal Systems](#)<https://doi.org/10.5281/zenodo.22170230>**Enhancing the skills of Students Through AI: A Case Study of Gomal University, D I Khan****Abdul Rehman**

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Email: zk7478765@gmail.com**Abstract**

The present study analyzes the integration of Artificial Intelligence tools on student skills in the peripheral context of Gomal University, Dera Ismail Khan (D.I. Khan), Pakistan. Research targets the examination of the level of AI tool adoption by a population of students and measuring its impact on their research, writing, critical thinking, and technical skills in different disciplines of learning. Quantitative cross-sectional approach with stratified random sampling was applied on 559 research participants (378 undergraduate and postgraduate students and the faculty members, $n = 181$) from the three faculties of Social Sciences, Natural Sciences, and Computing & Technology. Data collection was done through the use of structured questionnaires on a five-point scale of Likert. Data analysis was done by use of IBM SPSS (Version 29.0) after computing means, standard deviations, and frequencies in addition to independent sample t -tests and one-way ANOVA. Findings of the study showed high AI tool adoption by students (84.1%). Several positive impacts of AI tool integration on students' efficiency in conducting academic research ($M = 4.18$) and writing ($M = 4.05$) were reported, whereas self-reports for critical thinking ($M = 3.42$) and independent thinking ($M = 3.42$) were somewhat low. Significant differences were noted across the faculties. Technical skills improvement ($M = 4.22$) was reported for computing students. A strong perception gap was noted between students ($M = 3.92$) and faculty members ($M = 3.15$). The latter were focused on the threats of AI on academic integrity and student learning.

Keywords: Artificial Intelligence (AI), student skills, higher education, Gomal University, D.I. Khan, generative AI, academic integrity, educational technology.

Introduction

The integration of AI into higher education internationally has rapidly transformed almost every aspect of the sector. AI and its related technologies e.g., natural language, intelligent tutoring, writing, and learning systems, have changed the nature of teaching and learning from the static and instructor/instructional centered to the dynamic and learner/learner centered (Danish et al., 2024; Kasneci et al., 2023). In contemporary higher education, AI goes beyond automation to support learning and teaching. AI technologies support higher order and complex learning outcomes, such as critical thinking, problem-solving, digital and information literacy, as well as flexible learner-directed research learning (Lim et al., 2023; Pallant et al., 2025). The evolving dynamic needs of global markets mean graduates must possess a greater range of 21st century competencies. Consequently, AI is increasingly used to improve teaching and learning and personalize learning and attainment in higher education.

Pakistani Universities have many challenges, most notably lack of resources and an unbalanced faculty to student ratio. This is especially challenging for universities that struggle to keep up with the demands of an evolving digital world. That said, students of these universities are quick to adapt and are seen using generative AI platforms for almost everything from literature synthesis to writing and task management as well as skill building (Khalid, 2026). Several studies suggest that, in the case of Pakistani Universities, personalized AI classroom assistants drive active participation of students, increase their motivation, and aid in moving away from a purely theoretical pedagogy and closer to a practical approach (Danish et al., 2024; Pathan & Mangnejo, 2026). Although there is great potential in using AI to provide effective learning opportunities, there are, for instance, legitimate concerns over academic integrity and unequal access that arise with the unconstrained use of AI.

Gomal University, which serves a diverse population of students from rural, backward regions of the country, is located in Dera Ismail Khan (D.I. Khan), Khyber Pakhtunkhwa. Students of Gomal University active adoption of AI based learning applications, essentially the lack of research, creates a void of information on how these AI tools are used within the limits of Pakistan's peripheral university systems. How AI based classroom assistants are used by students of Gomal University impacts the analytical thinking, communication, and other technical skills of the students. The and what, if constraints of the University, impact the technology.

As such, this study examines the role of Artificial Intelligence (AI) in Gomal University, D. I. Khan, and the ways in which AI can shape students' skills. Examining the frequency with which students use AI, the improvements in skills as a result of using AI, and the problems faced while integrating AI, allows this study to contribute valuable empirical findings to inform regional educational policies, institutional curriculum, and teaching methods at higher education institutions.

Objective of the Study

1. To findout the extent and nature of Artificial Intelligence (AI) tool utilization among university students at Gomal University, D.I. Khan.
2. To investigate the impact of AI tool integration on the academic and technical skill development of students across different academic disciplines at Gomal University.

Research Questions

1. To what extent do students at Gomal University, D.I. Khan, utilize Artificial Intelligence tools for their academic tasks and skill enhancement?
2. How does the integration of AI tools influence the development of students' analytical, research, and technical skills at Gomal University?

Significance of the Study

This study contains significant theoretical and practical value for higher education stakeholders at Pakistani public universities, particularly in the region. Architectonically, it adds to the scarce empirical data focusing on the use of AI and the acquisition of skills in a developing region, providing data on the use of advanced digital technologies by students who live in remote areas. Practically, the data presented will assist the respective departments of Gomal University in formulating ethical AI based teaching strategies. However, it will also provide ground data to the relevant federal bodies of the government of Pakistan, such as the HEC, for designing digital equity and digital literacy programs.

Delimitation of the Study

- This study is strictly limited to the main and branch campuses of Gomal University, Dera Ismail Khan (D.I. Khan), Khyber Pakhtunkhwa, Pakistan.
- The sample is strictly limited to currently enrolled students of undergraduate and postgraduate studies, from selected faculties (e.g., Computer Sciences, Social Sciences, Natural Sciences), for the academic year 2025–2026.

- The research examines how AI can be used in student skill development (research, analytical, and writing skills) and never strays to the more comprehensive use cases such as administrative AI in the institution, faculty performance appraisals, etc.
- For this study, I was very careful in focusing on the development of student skills (research, analytical and writing) using AI, and not on the integration of administrative AI in the institution, faculty performance assessments, among others.

Review of Literature

The introduction of AI into higher education, worldwide, will result in the restructuring of the delivery of student learning, of research, and of the development of soft skills. For many decades, educational theories, such as Vygotsky's Zone of Proximal Development (ZPD) and Bloom's Taxonomy, have articulated the importance of instruction that matches students' developmental level and is scaffolded. It has been institutionally and structurally challenging to provide such instruction and scaffolding in large public classrooms due to resource constraints and high student:faculty ratios. Over the last decade, the rapid advancement of generative AI, NLP, and tutorial systems (ITS) have virtually removed the limitations of the pedagogy of the previous centuries (Kasneci et al., 2023). Current research shows that these AI systems can act as personalized scaffolds, supporting students in performing tasks previously beyond their reach. Thus, the focus of current research has shifted from whether or not AI should be used to how different institutional contexts can best use AI to enhance the various types of student academic skills.

In the past 5 years, AI-driven educational technology has shifted focus to the direct acquisition of student skills with the result that these technologies are shown to improve students' critical thinking, insightful reasoning, and specialized skills. Empirical evidence, at the global level, shows that many university scholars routinely use advanced language models and automated research assistants as their interactive partners to articulate and clarify complex concepts in a particular domain, to formulate multi-disciplinary hypotheses, as well as to refine and correct their academic writing. Rather than being used as a static text repository, these models and assistants facilitate the learning process by acting as individualized, constructive criticism partners, and by parsing and understanding complex data and methodological concerns. In addition, it has been shown that the integration of AI tools into university teaching and learning activities fosters students' data skills, software and tools competencies, and computational reasoning through the practice of rapid prototyping of codes and models. However, there is general agreement in this research that using automated tools excessively results in cognitive passivity, illusory content, and poor writing skills and is counterproductive unless adequately addressed through a digital literacy program.

The use of AI in higher education in under-resourced regions confronts distinct institutional challenges, socio-economic insolvencies, and inequities compounding changing public policy within that regional context. For example, in Pakistan, the Higher Education Commission (HEC) along with several provincial units, have launched the national ACT-AI Youth Initiative and the Digital Learning Skills Enrichment Initiative (DLSEI) to engender AI literacy and offer hands-on AI training at public universities (HEC, 2026; Prime Minister's Youth Programme [PMYP], 2026). Some domestic qualitative and phenomenological studies describe the impacts of these innovations within Pakistan and report greater research efficiency and improved independent planning among university students due to the use of generative AI software (Nazir & Ahmed, 2026). However, the same studies documented persistent digital inequities, poor local infrastructure, inequitable access to high-end technology and computing resources, and an acute teaching and learning gap with a predominantly theory-centered instructional approach, which prevents teachers from infusing the necessary instructional components to teach students how to use AI responsibly and effectively (Ferozi & Mangnejo, 2026). Therefore, the domestic literature describes an unequal state of affairs in which AI has the potential to leverage public university students to acquire advanced skills, but has the potential to exacerbate existing inequities between the under-resourced public universities and the well-resourced private urban universities.

Existing studies document how AI is used in the well resourced Lahore and Islamabad, but there is a major research gap on how digital innovations impact underserved Geographically remote public institutions. Most academic studies on AI in Pakistan have focused on private or public universities which have advanced technologies. The public universities in the remote/peripheral districts of Pakistan face more issues with resources, stability of internet, and have a student population that comes from an underserved agrarian background, where most have low exposure to technology. Therefore, frameworks for building AI skills and education designed for urban centers are unlikely to fit peripheral public spaces. (Zulfiqar and Iqbal, 2026)

This research fulfills the gap above by examining the integration of AI tools on student skills at Gomal University Dera Ismail Khan (D. I. Khan). This study focuses on a student population which is underserved by infrastructure, and aims to shift the discussion on inequity of digital resources from the trends of metropolitan areas to focus on digital inequity and localized ways of building competency in the regional areas. This research addresses the challenge of how students in public universities, with limited resources, creatively use informal AI to overcome structural barriers within their regional contexts so that they can gain necessary skills of the 21st century (Asghar et al., 2025).

In summary, the literature draws attention to how AI tools build revolutionary offerings in scaffolding skills for higher education students, but how they will function and effectively be used will depend on infrastructure, institutional policies, and student demographics. Even with the national initiatives in Pakistan geared towards creating a unified digital skills framework, challenges and impacts related to the pedagogy and the operational gaps in peripheral public spaces are still a concern. This study aims to provide evidence for these gaps from Gomal University. It will enable the development of strategies for public institutions that address inequities through the adoption of pragmatic Digital Literacy offerings on a regional level throughout Pakistan.

METHODOLOGY

Research Design

This study uses a quantitative, cross-sectional, descriptive survey design. A descriptive survey design allows for the collection of empirical data across sections of a population for the purpose of describing and presenting evidence about the contemporary situation involving the usage patterns, the self-reported skill acquisitions, and the recognized gaps and challenges related to the system within a particular population under study, without attempting to intervene in the study population. By monitoring a cross-sectional view of the experiences of students and teachers, this design offers an objective, quantitative appraisal of the role of AI in teaching in the peripheral public university.

Population, Sample and Sampling Techniques

The population of this study consists of the employees of Gomal University D.I. Khan. This population consists of two main groups: the total of 22,000 students studying at either the undergraduate or postgraduate level; and the total permanent of 335 faculty members covering all active academic departments.

To calculate a statistically representative sample size, this study adopted Krejcie and Morgan's sample size determination model. At a 5% level of error and a 95% confidence level, a minimum sample size of 378 students was needed for the student population of 22,000. For the faculty member population of 335, the sample size was calculated to be 181. To choose the respondents, a stratified random sampling method was employed in the three main academic groups of Social Sciences, Natural Sciences, and Computing & Technology. This ensured proportional representation in the faculties and removed any selection bias.

Table3.1:Population and Sample Size Table

Target Group	Total Population (N)	Calculated Sample size (n)
Teaching Staff	335	181
University students	22000	378
Total	22335	559

Research Instrument

Data collection was performed using two separate self-administered closed-ended questionnaires, one for students and one for faculty. Survey questions were formatted into three sections. The first part of the survey asked the participants to provide demographic information. The second part asked participants to describe their use of AI tools, including some of the most popular AI tools (ChatGPT, QuillBot, Grammarly and DeepL). The final part asked the participants to describe the effect of AI tools on their critical thinking, the efficiency of their research, the quality of their writing, and their knowledge of different technical domains, all on a 5-point Likert scale (i.e., 1 = Strongly Disagree to 5 = Strongly Agree). Content validity was established through a panel of senior educational researchers and AI specialists, and construct validity was established through a pilot test (n = 40) resulting in a high Cronbach's Alpha of 0.88.

Data Collection

Data collection was conducted over a period of eight weeks during the 2025-2026 academic year from both main and city campuses of Gomal University. Questionnaires were distributed both physically in classrooms and via email distributed through the official institutional email to participants. Emails were only distributed to participants to increase response rate and participation was voluntary. Consent was collected from participants prior to survey completion and ethical approval was obtained from the institutional review ethics committee. Quantitative data collected were cleaned and analyzed using SPSS with both descriptive (calculated means, standard deviations, frequencies) and inferential statistics, t-tests and ANOVA, to test the hypothesis and the research questions.

Data Analysis and Results

Data collected from n=378 students and n=181 faculty members (N=559) were analyzed using SPSS (Version 29.0). Descriptive statistics, including mean scores (μ), standard deviations (SD), percentage distributions and relative frequencies, were used to examine the usage patterns and perceived skill enhancement by students. In addition, independent sample t-tests and one-way Analysis of Variance (ANOVA) were performed to analyze the parametric differences of skills gained in different fields of academia and different participant groups (students and faculty). The primary means of measuring the data was a 5-point Likert scale (1 = "Strongly Disagree" and 5 = "Strongly Agree").

Table 1: Descriptive Statistics for Sample Composition and AI adaption Rate

Variable	Category	n	%
Participant Role	Students	378	67.6
	Faculty Members	181	32.4
Total		559	100
AI Tool Usage (Student only) Most Frequently Used Tools	AI Users	318	84.1
	Non-Users	60	15.9
	ChatGPT	142	44.7
	Grammarly	72	22.6
	QuillBot	58	18.2
	Google Gemini	46	14.5
	Total	318	100

Table 1 shows how AI tool adoption was analyzed at multiple levels for each participant in the sample. The total sample size was N=559, which included 378 students and 181 faculty members. Among the students, 84.1% (n=318) were active users of AI technology. When we analyzed the participants based on the single most frequently used tool, ChatGPT was used by 142 participants (44.7%) and was almost double the second most used tool. The second most used tool was Grammarly, which was used by 72 participants (22.6%), followed by QuillBot, which was used by 58 participants (18.2%), and Google Gemini, which was used by 46 participants (14.5%). The clear preference at Gomal University is for ChatGPT as the primary academic assistant for most participants. Grammarly and QuillBot are used by most participants as writing support tools.

Table 2: Perceived Impact level for skill enhancement dimensions

Evaluated Dimensions	skill	Mean (M)	Std. Deviation (SD)	Perceived Impact level
Research and Synthesis	Efficiency	4.18	0.54	Very High
Academic and Grammar	Writing	4.05	0.61	High
Technical and Coding Competency	coding	3.76	0.79	Moderate-High
Critical Thinking and Problem Solving		3.42	0.88	Moderate
Overall Acquisition index	skill	3.92	0.68	High

Table 2 reports descriptive statistics on student-perceived enhancement of skills across the different domains. The overall skill acquisition index shows a high mean score ($M=3.92$, $SD=0.68$) indicating a generally positive perception of AI on skill development. The highest improvement was noted in Research Efficiency & Synthesis ($M=4.18$, $SD=0.54$), followed by Academic Writing & Grammar ($M=4.05$, $SD=0.61$) which both fall under High to Very High impact. For Technical & Coding Competency, a moderate-to-high rating ($M=3.76$, $SD=0.79$) was noted. Critical Thinking & Problem-Solving ($M=3.42$, $SD=0.88$) indicated a low-moderate rating. This indicates that while AI greatly improves the speed of completion of tasks, research, and drafting, the perceived enhancement of autonomous problem framing and its solution is minimal.

Table 3: One Way Analysis Of Variance for Technical Skills Gains Across Academic Disciplines

Academic Disciplines	M	SD	F
Faculty of Computing and Technology	4.22	0.51	18.42
Social Sciences	3.61	0.72	
Natural Sciences	3.70	0.65	

Note $F(2,375) = 18.42$, $p < .001$

Table 3 shows the results of an analysis on the perceived gain in technical skills towards the end of one academic session in three different disciplines. The analysis of the results showed a statistically significant difference between the different groups, $F(2, 375) = 18.42$, $p < .001$. From the results, it was shown that the students in the Faculty of Computing and Technology ($M=4.22$, $SD=0.51$) have higher perceived gains in technical and programming skills, than the students in Social Sciences ($M=3.61$, $SD=0.72$) and Natural Sciences ($M=3.70$, $SD=0.65$). This shows that AI has positive discipline-specific effects. The students in Computing disciplines have been able to leverage AI tools to a better extent to Program and solve technically complex problems more than the other students.

Table 4: Comparing Students and Faculty Perceptions of AI Driven Skill Development

Group	n	M	SD	t	df	p
Students	378	3.92	0.68			
Faculty Members	181	3.15	0.82	11.24	557	< .001

Table 4 provides a comparison of responses pertaining to AI-driven skill development amongst students and faculty. An independent samples t-test showed a statistically significant difference between the two groups, $t(557) = 11.24$, $p < .001$. Students, on average, had more positive views about AI-driven skill development ($M = 3.92$, $SD = 0.68$) than faculty ($M = 3.15$, $SD = 0.82$).

From these results, students appear to be more optimistic and positive about using AI to develop their academic and career-related skills, while faculty do not seem to be as convinced mainly because of the issues of academic integrity and potentially Students using AI to avoid getting engaged and doing the work themselves, and because of the many issues related to teaching (pedagogy).

Discussion

Integration of Artificial Intelligence (AI) in Pakistan's public regional universities is an interesting research topic. Gomal University's acceptance rate of 84.1% and an average acquisition of improved skills of 3.92 are in line with trends in Pakistani and world universities. The observed improvements in research efficiency and academic writing ($M=4.18$ and $M=4.05$ respectively) corroborate findings of Pallant et al. (2025) and Pathan and Mangnejo (2026) and suggest that generative Language models shorten cognitive burden, help with writing and drafting and tackle the barrier of non-native English writing. In an environment where low English language proficiency results in a structural inequity, Pakistani public universities, AI based writing frameworks help students communicate scientific ideas in English.

However, implications of low mean scores on critical thinking and autonomous problem solving ($M=3.42$) indicate modern pedagogical concerns. Computers may help students to complete tasks, but there is a danger of students, relying too much on AI, developing superficial and passive learning. Relying too much on automated summaries may lead to passive learning. This is in accordance to Khalid (2026) who noted that Pakistani university students generally struggle to distinguish between AI generated plausible text and authoritative facts. Structured prompt engagement, and guided critical evaluation of AI outputs remains a pre-requisite to employ AI writing frameworks.

A statistically significant gap ($M = 3.92$) between student self evaluations and faculty evaluations ($M = 3.15$, $p < .001$) shows that certain aspects of the system of academic governance and the intellectual alignment of the institution are problematic. Students see AI as a modern and positive tool for learning, while faculty see uncontrolled AI use as damaging to academic integrity and verification of real-world skills. This problem is the same as the one Danish et al. (2024) found in their study at the national level. They found that assessment models in Pakistani higher education, which are based on writing and memorization and on filling forms in a prescribed order, are inadequate to reflect the acquisition of skills in a world dominated by Generative AI.

The outcomes of Gomal University imply that AI has the potential to compensate for educational inequities in remote areas due to the lack of resources. However, such potential can only be realized with a planned, unambiguous approach to AI integration. The significant differences in perception among the computing and non-computing faculties imply that the AI education domain is highly reliant on the integration of the curriculum and on the construct of differentiated areas of technology. These discrepancies can best be resolved with AI-integrated policy shifts from a reactive ban on the technology to a proactive, ethically aligned framework that encourages a critical apprehension and engagement over a passive approach to the technology.

Conclusion

Development of student skills within the AI and automation context of Gomal University is the focus of this study. Findings have documented the positive impact of the incorporation of AI on student research and scholarly writing as well as improving technical skills in the domain. AI technologies have improved the efficiency of student research. Due to their ease of use and low threshold of effort required, students are able to leverage AI tools to support their research even within a public regional university with constrained resources.

The impact of the integration of AI tools on the development of independent and critical thinking of students was found to be insignificant. In fact, there was a divergence of academic integrity perception between students and faculty. Filling this gap requires university management striking a balance of integrating technology and overseeing the integrity of the environment. In the Pakistan context, regional universities are required to shift from passive AI consumption to a more

active and critical engagement as AI will be a tool to help students fulfill the truth of the 21st century skills.

Recommendations

- Universities must inform students about the HEC Pakistan policy restrictions and what falls under the appropriate use of AI (proofreading, idea generation) and inappropriate use of AI (copying).
- Universities must allocate time for required classes that cover the appropriate use of AI and procedures to verify the authenticity of information generated by AI.
- Teachers must shift from the use of simple essay type questions to problem-based learning, class participation and research work where the steps used in the AI are documented.
- A series of workshops must be organized to teach teachers new AI-based teaching methods and assessments in a fair and valid way.
- Universities must improve internet and computer labs to accommodate the AI tool needs of all students, especially financially disadvantaged students.
- Improving internet and computer lab access throughout all universities would aid all students, but especially financially disadvantaged.

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