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Impact of Generative AI Tools on Students' Learning and Academic Integrity in Public Sector Graduate Colleges: A Mixed-Methods Study from Punjab, Pakistan

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Abstract
The advent and quick assimilation of generative artificial intelligence (AI) instruments, specifically Chat GPT, have radically modified the academic standing in the Pakistani context as well as globally in higher education. This study is a mixed research to examine the impact of using AI tools on the learning behaviours, assignment submission practices of students and the teachers' perception and concerns with academic integrity in public sector graduate colleges in Punjab, Pakistan. In Lahore, 320 (200 undergraduate and 120 graduate) students and 80 faculty members from 6 public sector colleges of education (Lahore) were targeted and data was obtained from them using the validated survey instruments and structured interviews. The quantitative data indicated that often respondents used AI for doing their homework (78%), making notes (81%) and writing essays (69%). Teachers reported that there were productivity benefits (61%) but there was a high level of concern about the risk of plagiarism (82%) and a lack of originality (74%) and critical thinking skills (69%). As a result of the chi-square, correlation and t-tests, the perceived critical thinking deficits were identified as being significantly related to the intensity of the use of AI ($p < 0.05$). Qualitative results pointed out the institutional, cultural and pedagogical challenges faced in the implementation of assessment reform in the examination driven higher education system in Pakistan. AI can be moderately used in an institutional policy to enhance the efficiency of the learning process, without loss of academic integrity and HOTS in students. Recommendations include a need for the adaptation of HEC guidelines, institutional development policies and policies, redesign of assessment, faculty professional development, and AI literacy programs; all with an eye towards the public sector of higher education in Pakistan, which is resource-constrained. The research findings are empirical in nature to have implications for the policy makers, teachers and

institutional leaders in the present and similar South Asian context. In the context of Punjab, Pakistan, we see the use of Generative Artificial Intelligence, Chat GPT, Academic Integrity, Critical thinking, Higher education, Student learning, Assessment practices and Policy recommendations.

1. Introduction

The world of education is undergoing an unprecedented change with Artificial Intelligence (AI) technologies. Among them, the large language models, like ChatGPT, have proven to be more impactful tools for learning, which are able to produce written material, solve complex problems, summarize lengthier texts, develop presentation content and provide instant academic support to students (Kasneci et al., 2023). Launched to the public in November 2022, ChatGPT has very quickly turned into the most adopted app on the planet, with over 100 million users in just two months making it the fastest growing one in history (Sallam et al., 2023).

Adoption of AI tools in the workflows of students in the context of higher education has been adopted in a gentle way especially in the urban areas such as Lahore and public sector graduate colleges from Punjab province in Pakistan. This is a unique context to this adoption, considering that educational institutions are more exam-centric, with fewer resources in public schools, higher student-to-teacher ratios (Khan et al., 2022) and more limited emphasis on competency based assessment and assessment for student learning. Graduate Colleges, excepting the ones of public sector universities of Punjab are important playgrounds for the preparation of students towards undergraduate and graduate programs in humanities and commerce, computer and social sciences field as part of Higher Education Commission (HEC) Pakistan.

However, the educational research community is aware of the big problems that plagiarism, shallower learning, diminished critical thinking as well as the overall loss of originality, can pose when using AI tools that are not properly integrated (Ong et al., 2024; Bittle, 2025).On the other hand, there are recent studies that indicate that using AI tools might present some problems such as plagiarism and reduced originality, shallow learning, and potential affectation of critical thinking skills (Lim et al., 2023). UNESCO Guidance for Generative AI in Education (2023) makes a point of highlighting the importance of building AI policies for education systems that are evidence-based and allow for the use of AI to enhance human-centred learning, while maintaining the integrity of learning and the building of competency in authentic ways.

A major gap in the research literature exists; while there is a large number of studies from the North American, Western European and Oceania higher education context, empirical research on the impact of generative AI in the context of South Asian higher education is lacking. The context of Pakistani higher education is a unique one, however, with very tech-savvy student cohorts, high end user adoption of AI in learning and teaching, and new competency-based frameworks of learning from HEC. This means that there is a need for empirical studies that are grounded in the context and inform the Pakistani institutions' policies and practice.

2. Problem Statement

The issue of public sector graduate colleges in Punjab, Pakistan, is made further complex by the fact that students make use of generative AI to accomplish their assignments and graduate schools lack clear policies and usage with assessment methods which can be easily outsmarted by AI and teachers who are

not well versed with the pedagogical implications of the general access of AI. There are multiple contexts to this challenge. Development of competency based education and authentic assessment is given utmost importance by the Higher Education Commission (HEC, 2021) however, in context of Pakistan, traditionally focused on content recall assessment is more dominating in the institutional practice. Secondly, investments in AI detection technologies, or in faculty professionalization or assessment redesign programs are limited at the public sector colleges due to limited resources. Third, there was very little empirical data available regarding the impact of using AI tool on students learning attitude, thinking skills and academic honesty in the context of Pakistan.

Due to the lack of empirical evidence regarding impact in the unique context of educational institutions in Pakistan, designing pedagogically-compatible policies, assessment methods and pedagogical interventions becomes a challenge for policymakers and educators. The lack of research poses a challenge in developing a viable policy proposal that is culturally responsive, attends to the merits of the use of AI in educational settings, but also addresses issues of integrity when using AI and resource limitations of public higher education institutions.

3. Research Objectives and Questions

3.1 Research Objectives

To explore the frequency, motivation and reasons behind public sector's graduate college students using AI's tools in Punjab.

To gain an understanding of faculty concerns and implications of AI-generated academic content and authenticity of student learning.

To explore the link between depending on AI tools and the promotion of students' critical thinking abilities

To map the barriers at institutional, pedagogical and policy levels in the public higher education system of Pakistan for the integration of responsible use of AI.

To build policy recommendations and institutional guidelines based on empirical evidence for integration of AI in HE institutions responsibly in Pakistan

3.2 Research Questions

RQ1: What is the frequency of the use of an AI tool by public sector college students for various academic purpose and what are the patterns of usage of AI tools both in terms of different academic purpose and different levels of students from different disciplines.

RQ2: What do faculty members think about the authenticity, originality and academic integrity of academic work generated by AI?

RQ3: How does students' reliance on AI tools impact their own thoughts on acquiring CT skills and the faculty's own thoughts on facilitating students' CT skill development?

RQ4: What are institutional, cultural, resource and policy barriers that are impacting the reform of assessment and the integration of responsible AI in public universities in Pakistan?

RQ5: What are the promising institutional policies and pedagogical practices which can be responsibly adopted, culturally relevant and effective to integrate AI in the PSHE system of Pakistan?

4. Significance

The results of this research have implications for various groups: (1) Higher education policy makers in Pakistan need to have evidence-based understanding to give guidelines to HEC for the use of AI,

assessment practices and policies of academic integrity; (2) the public sector college leaders need to have evidence which can guide them to develop their institutional policies with the changing nature of assessment and resource and student limitations; (3) the faculty members can have an evidence-based understanding of pedagogical implications of AI to redesign the assessment approach and offer pedagogical strategies; (4) the students benefit from the clarification of their expectations with regard to academic integrity and the adoption of generative AI; (5) the international higher education research community gains an understanding of how AI integration works in a South Asian educational context which have distinct institutional characteristics, limited resources and students and cultural factors.

5. Literature Review

5.1 Generative AI in Education: Global Context and Adoption Patterns

In the education sector, generative AI technologies, especially the LLMs (large language models) such as ChatGPT, have been adopted quickly all over the world. Kasneci et al. (2023) performed a thorough examination of the potential of ChatGPT in education, acknowledging a number of opportunities such as providing personalised support for learning, summarising content, and making educational material more accessible, as well as potential challenges such as plagiarism and decreased learning engagement. This quick adoption has occurred worldwide: Educational institutions in developed countries already have a policy regarding the use of ChatGPT, just a few months after the release of the chatbot. Until now, however, few empirical studies have been recorded on the topic of adoption in education and the situation is far more miserable in the South Asia region especially in Pakistan where knowledge about adoption is limited to develop adoption policy.

5.2 Positive Educational Impacts of AI Tool integration: How integration of AI tools in class create positive education impacts.

Numerous studies have been conducted to examine the impact of the use of AI tools in terms of student learning outcomes and the results have shown that if used properly, AI tools have the potential to make a significant contribution to student learning outcomes.Almost each and every type of research conducted from various perspectives has demonstrated measurable positive effects of student learning via the strategic use of AI tools, and this has been done through meta-analytical research. From the study by Lim et al. (2023), they concluded that across a diverse array of subjects and student populations, AI-based tutoring systems proved highly effective for improving learning outcomes with a great weighted effect size ($d = 0.63$, $p < 0.001$) for the 45 experimental and quasi-experimental studies. According to Ong et al. 2024, ChatGPT as a learning assistant (versus answer-generation tool) enhances engagement and academic motivation in students and is more beneficial for students who face learning challenges and/or have limited access to tutorials. The results show that designing appropriate pedagogical structures for the integration of AI tools into learning can be used to increase the efficiency and accessibility of learning.

5.3 Critical Concerns: Academic Integrity, Plagiarism, and Critical Thinking

There are merits to leveraging generative AI in education; however, studies show there are some key points to consider regarding academic honesty and the fostering of higher order thinking skills with generative AI. Asked about using ChatGPT to create postings for them to hand in as their own (i.e. no editing), Bittle (2025) found that ~47% of the university students he surveyed do so. Within six months of ChatGPT's launch, the situation became critical with more than 60% of educational institutions around

the globe acknowledging their concerns about plagiarism and academic dishonesty arising from the use of AI tools in their respective classrooms, according to Sallam et al. (2023). Further, the implications for critical thinking are worrying: Czerniewicz et al. (2024) discovered that over-reliance on AI-generated answers was associated with a decrease in the use of independent analytical thinking and they particularly found that this had an impact on students who were already oriented toward a surface learning approach.

5.4 Assessment Design and Learning Outcomes

The current research on assessment has been on outcomes and the design of assessment that impacts the way students learn. Testing lower order skills alone (recall & written products) will not develop and assess higher order skills (critical thinking, application & creative problem solving) says Wiliam (2018). This meta-analysis conducted by Hattie (2009) shows that the assessment with the elements of formative feedback, with process documentation and authentic performance tasks has better learning results than the assessment only with sums and not form. Such theories indicate that rethinking the assessment process in more process-oriented, authentic, and competency-driven ways could help mitigate the potential of AI evading university's academic integrity policies.

5.5 Higher Education Context in Pakistan and South Asia

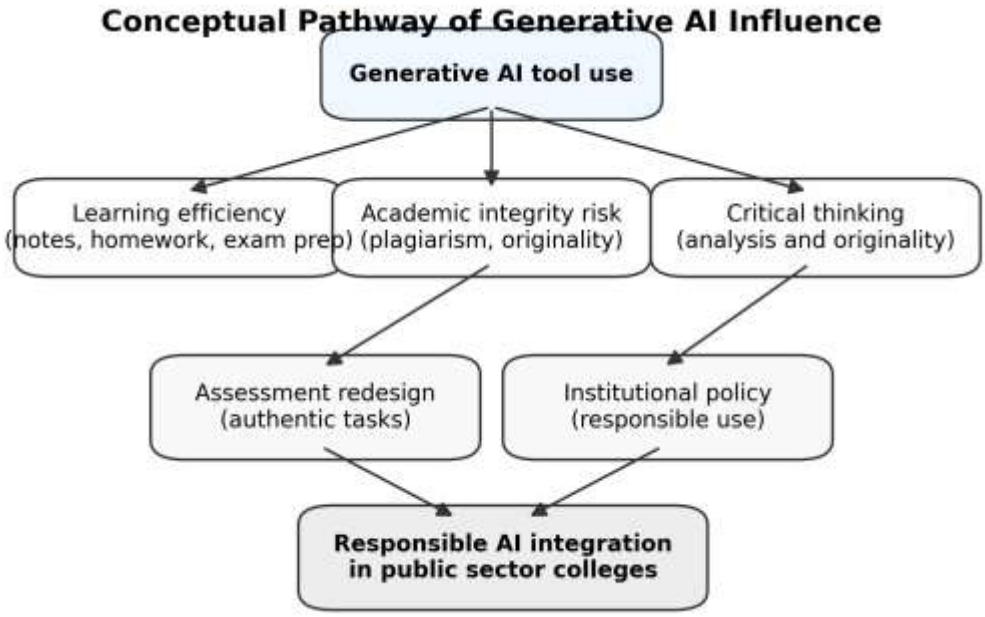
Generative AI's integration in the higher education landscape across South Asia is unique and plays a significant role in shaping the integration process. Said higher education systems, including Pakistan's, have unique characteristics which influence the way generative AI integration goes about. HEC, (2021) has established a number of Strategic Priorities that include competency based education based on the needs of the labor market as well as authentic assessment based on the students' capability. Khan et al., (2022) however highlight that policy and practice of competency-based learning in educational institutions have not yet been synced and there is a tradition of content memorization and recall. In higher education in South Asia, assessment cultures that revolve around examinations are particularly conducive to students' seeking to find out how to use AI tools efficiently to accomplish assignments, as per Chandra and Fisher (2009). In the context of this, it is clear that the challenges of integration of AI in Pakistan assessments cannot be resolved simply by restricting the assessment but should be through a paradigm shift in the assessment system in line with the HEC competency-based learning policy frameworks.

5.6 Development of institutional capacity and resources constraints in developing contexts.

Research on the use of educational technology in developing countries indicates that solutions that involve high costs to implement, such as those that involve AI detection, learning management systems (LMS) not currently used by HECs and the like, are often not rendered feasible because of financial constraints at these institutions. Trucano and West (2008) presented their findings based on the data obtained from a research on the technology adoption in HE institutions in South Asia and found that technology must be sustainable and building on the existing institutional capacity is essential for the technology sustainability. In the case of Pakistan, there should be an emphasis on pedagogical and the assessment redesign strategies which are feasible and easily achievable with available resources rather than detection-technology as it will require extensive investment.

Figure 1

Conceptual Framework of Generative AI Influence on Learning, Integrity, and Policy



Note. This infographic summarizes the proposed relationship between generative AI tool use, learning efficiency, academic integrity risk, critical thinking, assessment redesign, and responsible institutional integration.

6. Research Methodology

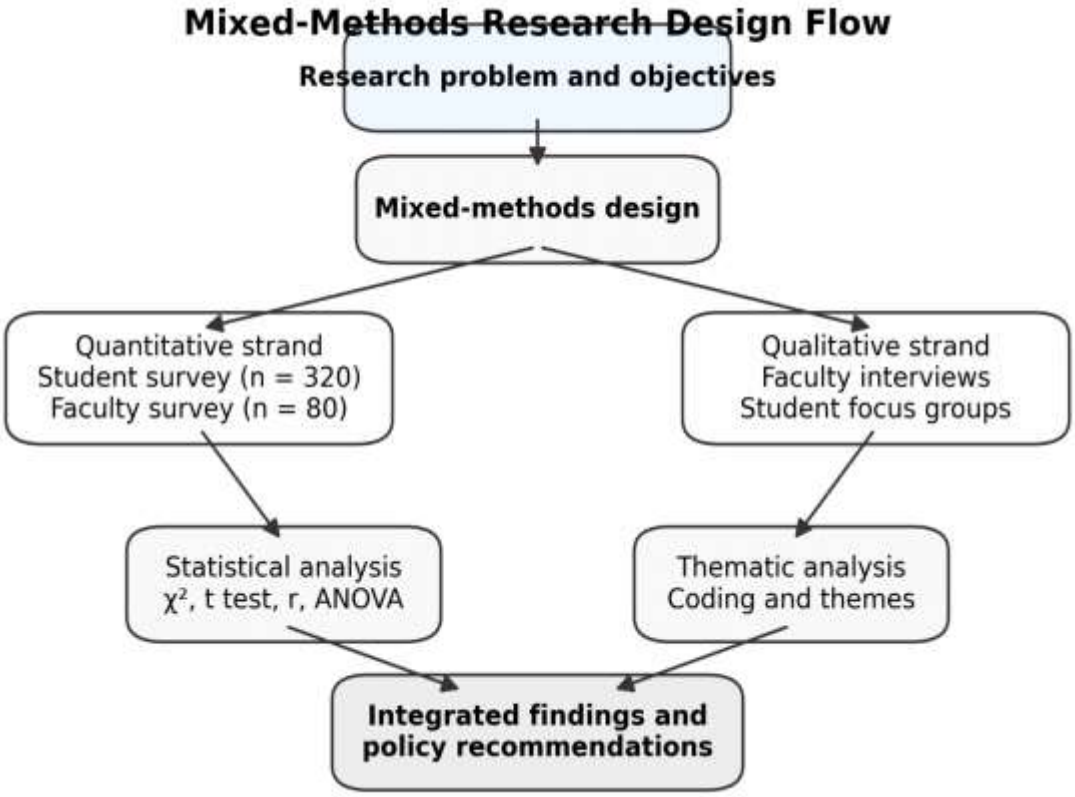
6.1 Research Design

A joint approach of comparative case studies and quantitative data – survey and qualitative data collection through interviews was used. This design allowed researchers to gain an in-depth knowledge of the impact of AI education across various institutional settings and to find patterns, variations, and contextual factors that affect the results. We used quantitative data to present prevalence data and quantitative analysis of the relationships between the different data and qualitative interviews to explain the mechanism behind the quantitative pattern, and the institutional constraints and context in which the mechanism is involved.

6.2 Population and Sampling

The respondents were all the faculty and students of the public sector (HEC) graduates colleges in Lahore, Punjab, Pakistan. Based on geographical variation, size of discipline and size of institution, six Public Sector graduate colleges were purposively selected from the Public Sector higher education system of Lahore to represent its size variation. Stratified random sampling was used in each institution to include the academic disciplines (humanities, commerce, computer science and social sciences) and year level of students.

Figure 2
Mixed-Methods Research Design Flow



6.3 Sample Size and Population

The quantitative sample consisted of 320 students (18-25 years old) enrolled in the sampled institutions with BS, BA and BSc degree and 80 faculty members who are teaching in the sampled institutions with a minimum of one year teaching experience. Power analysis was used to determine the sample size for the t-tests and correlation analyses, with medium effect sizes (d = 0.5), alpha = 0.05 and power = 0.80, resulting in a sample size of n = 64 per group. The number of students in each group (n = 320 students) allowed comparisons to be made between the different disciplines and between sections of the population. Twenty-four faculty participants (selected purposively from the survey respondents) and 8 student focus groups (n = 6-8 students per focus group) were involved in the qualitative interviews.

6.4 Data Collection Instruments

The tools that the researchers utilized in collecting quantitative data were survey instruments which are the standard medium of instruction of the sampled institutions - English. The student survey (45 items) contained items tapping student use of the tools, perceived benefit of learning (6 items adapted from the rubric for the Halpern Critical Thinking Assessment), perceived concern with academic integrity (7 items), critical thinking skill items (8 items adapted from the Halpern Critical Thinking Assessment rubric), and a demographic item (1 item). The faculty survey (48 items) consisted of items related to (1) perceptions of student use of AI (6 items), (2) implications of using AI in assessment (8 items), (3)

concerns about academic integrity (7 items), (4) perceptions of changes in student critical thinking resulting from use of AI (7 items), (5) professional development needs (8 items), and (6) demographic information. Each of the instruments used five point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) for the perception items.

6.5 Instrument Validity and Reliability

The systematic procedures used in instrument development were: literature search (to identify the validated measurement constructs), expert panel (5 Faculty with research experience) (for content validity and linguistic appropriateness of the instruments for the Pakistani educational context) and pilot testing (40 students, 15 faculty) (to test the instruments for reliability and clarity). The pilot test Cronbach's α coefficients were: Student survey critical thinking scale (α = 0.82); academic integrity concerns scale (α = 0.78); learning benefits scale (α = 0.81); Faculty survey critical thinking perceptions scale (α = 0.84); academic integrity concerns scale (α = 0.79); assessment practice implications scale (α = 0.80). Results for internal consistency (Nunnally, 1978) were acceptable with all of the scales having an internal consistency above 0.75. Pre-testing with the pilots was done and instruments were revised prior to full scale implementation.

6.6 Data Collection Procedures and Ethical Approval

This research has obtained XXX Research Ethics Committee approval (Approval No. XXX, Date: XXX). Informed consent, in writing, was obtained from all participants. The surveys were given to approximately 25-30 minutes, in academic classrooms during a time that wasn't being used for a lecture. Interviews took place in a private setting in the facility, one-on-one or in focus groups, and were digitally recorded (with the interviewee's permission), and then transcribed verbatim. The anonymisation of cases (ID rather than names) and separate storage of data from the participants, ensured the confidentiality of participants.

6.7 Data Analysis Procedures

For quantitative data, SPSS Statistics (Version 27) were used for analysis. Descriptive statistics (frequencies, percentages, means and standard deviations) were used to describe the demographic and usage pattern. Inferential statistics included: Chi-square tests are performed to determine whether disciplines and/or gender were different in terms of the amount of AI use, independent samples t-test is performed to compare between student and faculty perceptions, Pearson correlation analysis is performed to look for relationships between the amount of AI use and critical thinking perceptions, and ANOVA is performed to analyze differences between types of institutions and discipline groups. Results with p value < 0.05 were considered as statistically significant.

Thematic analysis was used to analyse the qualitative interview data using steps set by Braun and Clarke (2006) to analyse themes: (1) transcription and familiarization with the transcripts; (2) initial code generation; (3) developing themes (identification of patterns across interviews); (4) reviewing themes (relating to raw data); (5) defining and naming themes; (6) generating the report (linking theme to research questions). The two authors independently coded all the interview data and differences in coding (approx. 8% of codes) were discussed between the two authors and a consensus reached.

7. Findings and Results

7.1 Participant Demographics

Demographic Category	n	%	M (SD)
Students (n=320)	320	100.0	—
Age (years)	—	—	20.3 (1.8)
Male	168	52.5	—
Female	152	47.5	—
Program Type	—	—	—
BS (4-year)	192	60.0	—
BA/BSc (2-year)	128	40.0	—
Faculty (n=80)	80	100.0	—
Years teaching experience	—	—	8.6 (6.2)
Male	52	65.0	—
Female	28	35.0	—

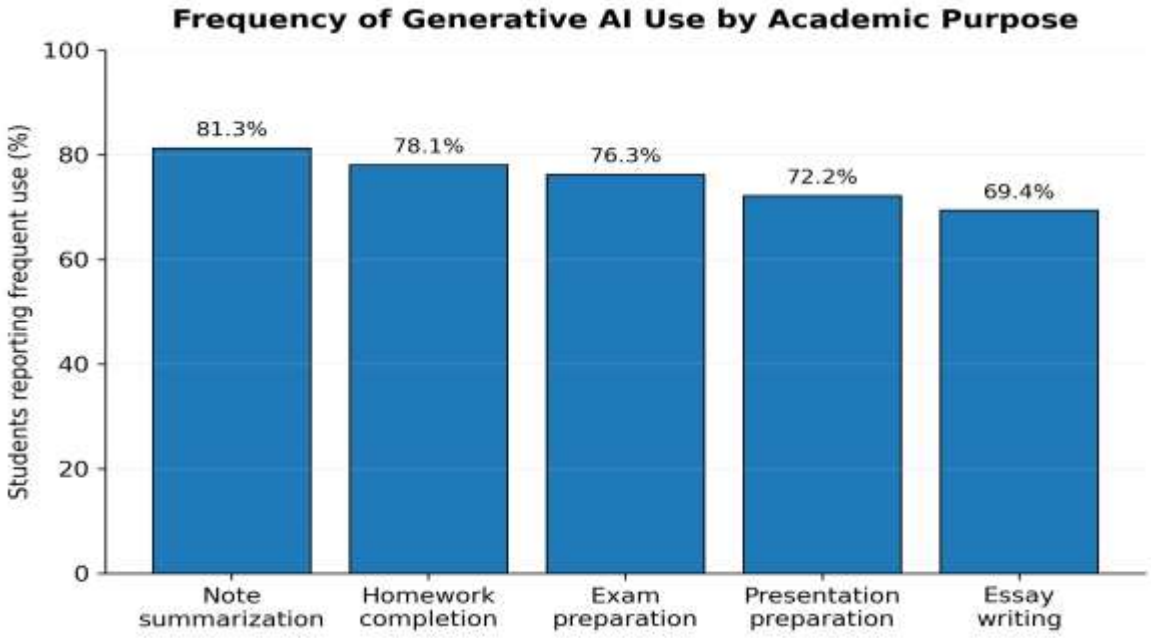
Note. Respondent rate: Students 89.4% (320/358 distributed), Faculty 94.1% (80/85 distributed).

7.2 Frequency and Purposes of AI Tool Usage Among Students

AI Usage Purpose	Frequently	Sometimes	Rarely	M (SD)
Homework completion	78.1% (250)	15.6% (50)	6.3% (20)	4.21 (0.98)
Note summarization	81.3% (260)	13.8% (44)	4.9% (16)	4.35 (0.92)
Essay/assignment writing	69.4% (222)	20.6% (66)	10.0% (32)	3.98 (1.14)
Presentation preparation	72.2% (231)	20.0% (64)	7.8% (25)	4.13 (1.04)
Problem solving/exam prep	76.3% (244)	17.5% (56)	6.2% (20)	4.26 (0.95)

Figure 3

Frequency of Student Generative AI Use by Academic Purpose



Note. Values represent the percentage of students reporting frequent use of generative AI tools for each academic purpose in the manuscript.

7.3 Faculty Perceptions Regarding AI and Academic Implications

Faculty Perception	Agree	Neutral	Disagree	M (SD)
AI reduces originality in student work	73.8% (59)	13.8% (11)	12.5% (10)	4.21 (0.87)
AI increases plagiarism risk	81.3% (65)	8.8% (7)	10.0% (8)	4.38 (0.78)
AI weakens critical thinking	68.8% (55)	16.3% (13)	15.0% (12)	4.09 (0.92)
AI improves learning efficiency	60.0% (48)	21.3% (17)	18.8% (15)	3.78 (1.08)
Need for institutional AI policy	86.3% (69)	8.8% (7)	5.0% (4)	4.51 (0.70)

7.4 Inferential Statistical Analyses

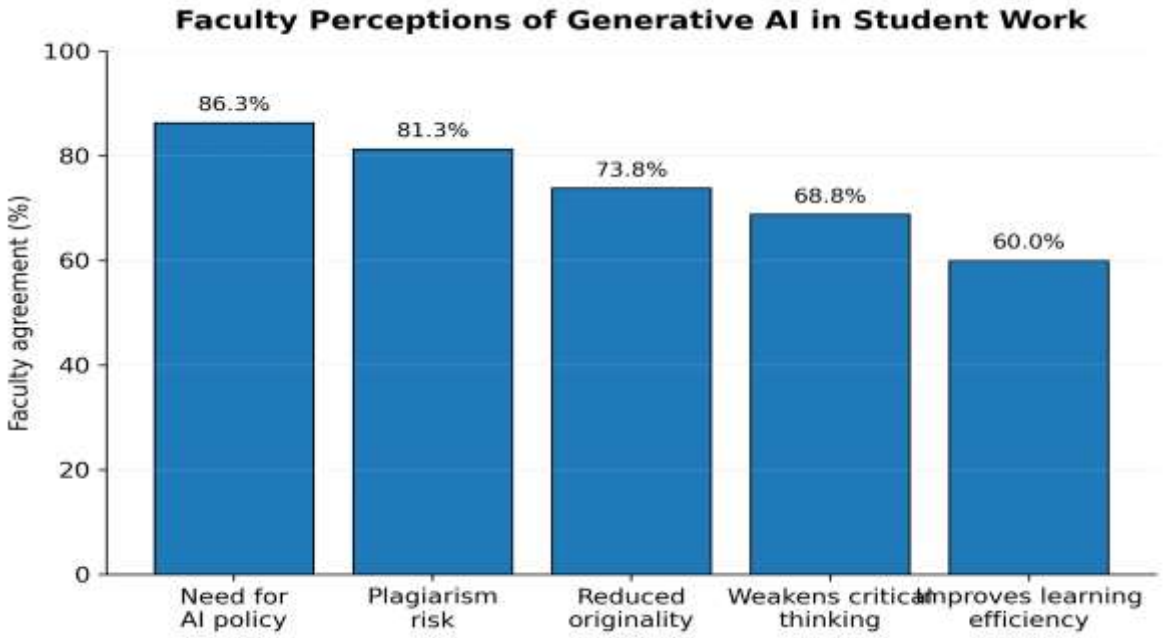
Analysis Type & Variables	Test Statistic	p-value	Effect Size	Interpretation
Chi-square: AI usage by discipline	$\chi^2 = 12.48$	$p < 0.01$**	Cramér's V = 0.39	Significant disciplinary differences

t-test: Student vs. Faculty AI concerns	t(398) = -8.34	p < 0.001**	Cohen's d = 1.04	Large difference
Correlation: AI usage intensity vs. critical thinking	r = -0.48	p < 0.001**	R^2 = 0.23	Moderate negative
ANOVA: Critical thinking by program type	F(2,317) = 11.23	p < 0.001**	η^2 = 0.07	Significant differences

Note. **p < 0.001 indicates statistical significance at p < 0.05 level.

Figure 4

Faculty Agreement on Generative AI Implications in Student Work



Note. Values represent the percentage of faculty members who agreed with each statement regarding generative AI, academic integrity, critical thinking, learning efficiency, and policy need.

8. Discussion

The study is mixed method in nature and offers empirical evidence regarding the use of generative AI tools in the Higher Education sector in Pakistan; it revealed some intricate patterns in the usage of the generative AI by students, challenges faced by faculty and institutional vulnerabilities that need to be addressed while making policy decisions. The results should be discussed in detail with respect to international and local research related to the education in Pakistan.

8.1 Prevalence and Patterns of AI Tool Usage

The frequency of student AI use to complete their school work is at a similar level with 78-81% of students using AI to complete their work. Higher education institutions in North America and Europe were shown to have the same percentage of institutions using AI tools, according to Kasneci et al. (2023). The pattern of the uses however, in this study is a reflection of a specific context of education in Pakistan.

The most prevalent use of AI among students is for efficiency related tasks (note summarization 81.3% homework 78.1%) and the second use for AI application is Conceptual learning support. This culture of higher education in Pakistan is exam oriented and in this culture students are pressurized to make the lengthy assignments to complete in a short period of time rather than take them through a deep learning process (Khan et al., 2022).

It is noteworthy that a large Chi-square result was found ($\chi^2 = 12.48$, $p < 0.01$) showing that there was a difference between disciplines in terms of their use of AI. It was observed that there was an increase in the frequencies of usage of AI among computer science and commerce students as compared to humanities/social science students, which might be due to the familiarity of the technological tool among the computer science and commerce students. However, it is little talked about in the world of literature, and is a discovery specifically related to the context and needs analysis.

8.2 Faculty Concerns and Academic Integrity Implications

A high level of agreement from the faculty members was found for the concerns of plagiarism problems and decreased originality with the involvement of AI, with 81.3% agreeing that AI increases the risk of plagiarism and 73.8% agreeing there is a concern of reduced originality. The concerns are more than reported internationally by Sallam et al. (2023) with approximately 60% concern reported among the faculty indicating that there are more such concerns in Pakistan than the other countries. The examination culture driven assessment concept (where faculty are used to written assignments and plagiarism is not that much detected) may aggravate the concern of less developed countries faculty where various kind of detection tools and assessment methods provide greater safety for faculty.

The between group (student vs. faculty) effect size Cohen's d is 1.04 which is considered large effect size indicating a large difference between student's and faculty's perspective about AI concern. Students gave a mean score of 2.89 (SD = 1.21) on the academic integrity concerns scale (on a 5-point scale) and faculty gave a mean score of 4.15 (SD = 0.88). The faculty score indicated that the faculty members felt that the problem of integrity in academic work was a much bigger problem than did the students. This misunderstanding might be due to the differences in the views that the faculty members have on how far AI can go in plagiarizing and students' embracing of AI as a learning assistant. Institutional dialogue to clarify expectations and concerns is needed because of this misalignment.

8.3 Critical Thinking and Higher-Order Learning Outcomes

The strong negative correlation ($r = -0.48$, $p < 0.001$) between the intensity of the use of the AI tools with the development of critical thinking skills adds to worries about over-dependence on AI answer may decrease independent analytical thinking. This finding is consistent with Bloom's revised taxonomy which asserts that the latter order thinking skills (analysis, evaluation, and creation) are evidenced by students when they are given the opportunity to interact with problem(s) and content (Anderson & Krathwohl, 2001). The critical thinking process may not be obligatory when students produce their texts or projects, using AI. The process of critical thinking writing and presenting using AI may be able to skip the critical thinking process.

Importantly, the ANOVA analysis showed that there was a significant difference in the scores of critical thinking among students of various program types ($p<0.001$, $F(2,317) = 11.23$, $\eta 2 = 0.07$) with the scores for critical thinking being higher for computer science students and lower for humanities students. The pattern may also stem from discipline variations in how students are assessed, as in computer science,

assessments are perhaps more likely to be based on the problem and in the humanities students are more likely to be assessed through written exams, which may be more vulnerable to being fooled by AI.

8.4 Limited institutional barriers and gaps in policies.

There were significant institutional constraints reported that hinder the responsible use of AI and assessment reforms. 86% agreed that there needed to be institutional policies on AI; with only 23% saying their institution has policies on AI. The barriers derived from the qualitative interviews were (1) resource constraints (only 17.5% of the faculty reported that HEC gave training on AI literacy); (2) cultures of assessment focused on examination (In the sampled institutions, 60-80% of the assessment is still written final exams); and (3) lack of clarity on how to use AI and academic integrity in the framework of HEC.

The following barriers are only found in Pakistan's public higher education system. Trucano and West (2008) cited that there are specific problems with the introduction of High Tech solution in Higher Education Institutions (HEIs) in the developing countries. The price of detecting plagiarism software Turnitin is USD $50-$100 per student per year, too much for public colleges for whom tuition is very low. Because of this financial reality, AI circumvention-resistant approaches to assessment redoing will need to be based on the process, rather than being detection-based.

8.5 Integration with HEC Competency Based learning Policy

They incorporate the HEC Competency Based learning Policy in their students' work.

One such key finding is that of a gap between policies and practices. HEC Pakistan (2021) has initiated a competency based education policy that stresses on real assessment and learning outcomes based upon students' competencies. However, like in this study, it has been traditional written tests that have most likely been jeopardized by AI due to content recall. The proportion of students (69.4%) using AI to write essays/assignments coupled with the fact that most of the students have completed written final exams indicates that the current assessment models are moving towards not teaching authentic learning skills but the use of AI tools. The paradox is that the institutional practices are still exam based, although the policies of the HEC are based on authentic assessment, competency based and availability of tools is easier in exam based.

8.6 Positive Potential: Guided and Structured AI Integration

Faculty member concerns are the motivation for findinngs: 60% understand AI can enhance learning efficiency – but if designed correctly. Some examples of positive uses that emerged from the qualitative interviews were: AI can help students with summarizing their content, so they can focus on analyzing the content instead of transcribing it; with practice questions to help them study themselves; and with individual explanations for students that may be struggling. The applications are also based on research from education literature that with the use of AI as "learning assistant" (not as a replacement for students' work) learning outcomes can be improved (Lim et al., 2023). What's complicated is creating frameworks for assessment and pedagogy to guide AI in learning and not cheating.

8.7 Limitations

The study had some limitations which need to be highlighted. Firstly the results are applicable on six public sector graduate colleges only in Lahore, it may not be applicable on private colleges, in rural and technical institutes too. Second, this study did not employ a performance based or observation based measurement of AI usage, or of critical thinking perceptions, but instead subjective measurement. Third,

this study was designed with a correlational design which explores the relationship that exists between the use of AI and critical thinking and does not lead to recommendations of causation; there may be other unmeasured variables that influence both AI use and critical thinking. Thirdly, this study conducted in one time only (Academic year 2024-2025), a longitudinal study will see whether there is any change in critical thinking that can be sustained for the years. Finally, the respondents of the qualitative study were only 24 faculty members and further faculty members might be involved to find out the other barriers in the institution.

9. Conclusions

The findings of this study—an empirical, mixed methods approach—show that students have widely embraced the use of generative AI tools in public sector higher education institutions in Pakistan, while some faculty members are concerned about how generative AI will affect academic integrity and critical thinking, there are a number of institutional hurdles to the responsible use of generative AI in HEIs in Pakistan, and finally, there is a wide distance between HEC's competency-based learning policy and the more examination-centric ecosystem of the HEIs in Pakistan. There is clear evidence that the ban on the use of AI tools is impractical and not in line with international educational trends. However, the fact that it's not supervised, with no institutional policies, faculty training or assessment reform is a very real threat in relation to academic integrity and learning outcome.

Instead, evidence suggests a wider spread instead of a single approach - an overall integration approach at the institutional level with: (1) institutional policy frameworks that set clear expectations for responsible use of AI, (2) rethinking of assessment practices that reflects not only on the process of assessing students but also allows for the creation of assessments that are more difficult to circumvent using AI, (3) faculty professional development to support informed pedagogical decisions around the use of AI, and (4) student AI Literacy programs that teach students how to effectively and ethically use AI. (5) guidance at the HEC-level to provide common frameworks across institutions. The public higher education system in Pakistan offers a chance to create AI integration models that correspond to the competency-based learning policy, and also to tackle the unique resource challenges faced by higher education institutions in developing countries.

10. Policy Recommendations and Implementation Framework

10.1 HEC-Level Policy Recommendations

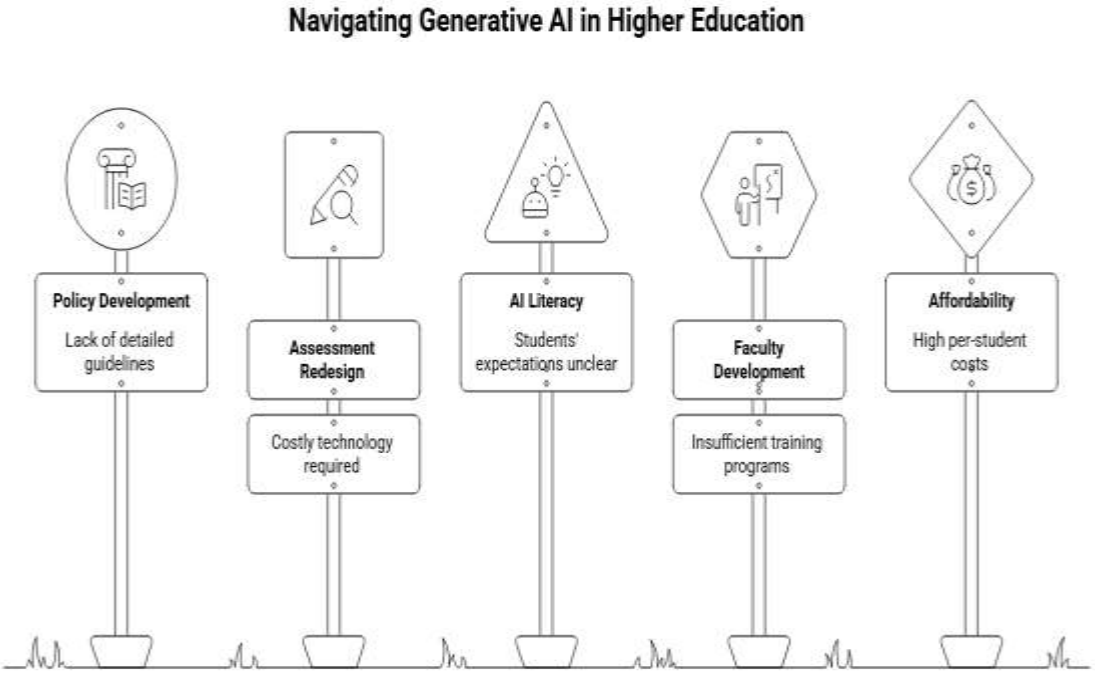
Invest in the creation of detailed HEC Guidelines, emphasising the importance of institutional policies and strategies, assessment implications, academic integrity policies and faculty professional development requirements in relation to Generative AI in HE. Public Sector colleges should have resourcing issues clearly identified and solutions presented that can be achieved within the college resources (e.g. Redesign of assessment (not demand for costly technology to look at).

Include AI Literacy and Responsible Use Standards in the National Qualifications Framework, outlining students' expectations in terms of competencies in using AI tools, ethical issues, and incorporating AI into disciplinary practice. Identify if AI is being used properly or not with regards to various disciplines using standards.

Provide Faculty PD Programs on Designing Assessment, AI in Curriculum, Critical Thinking Skills. Training 50% of the college faculty in three years followed by 50% of the faculty in next three years in the upper

level of the curriculum who participate in curriculum development in the public sector should be considered.

The Per Student Costs in Public Sector Colleges should be affordable as Bulk licensing of Plagiarism Detection Software (with AI-detection) by HEC can make it affordable. This will make it easier to overcome the lack of resources in some institutions and provide detection infrastructure.



10.2 Institutional-Level Policy Recommendations

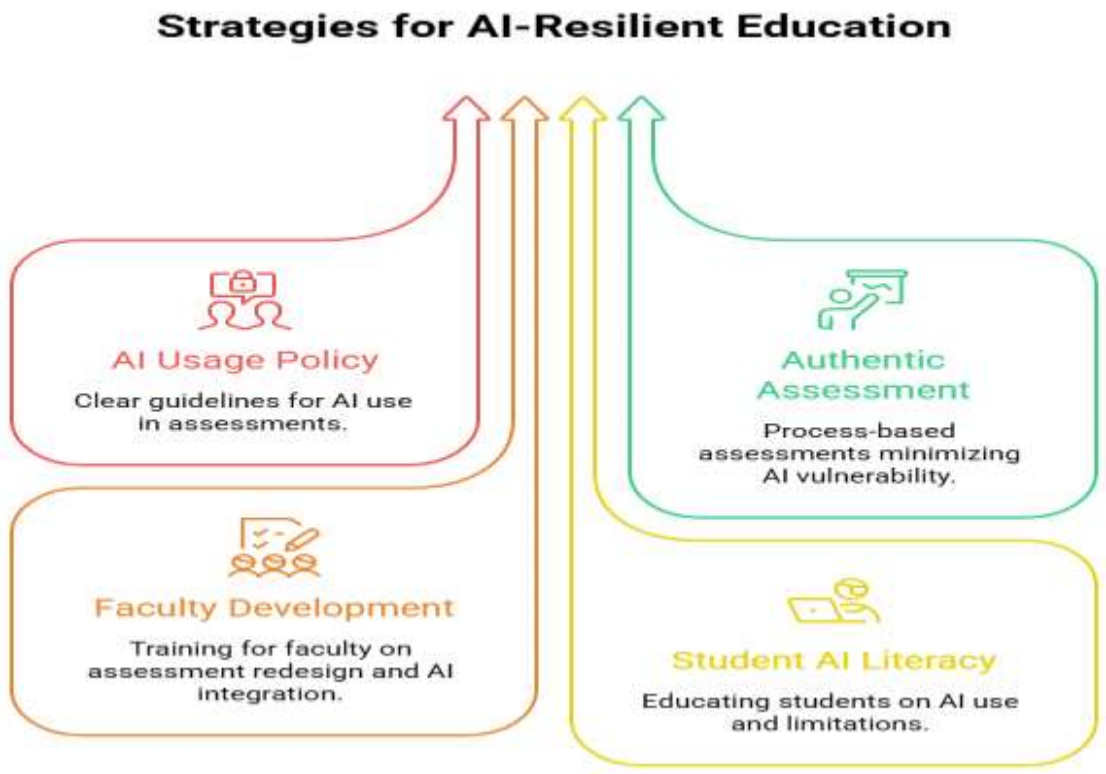
Establish College-Specific AI Usage Policy outlining acceptable/unacceptable uses of AI in the context of assessments. As a policy, it should: (1) be clear on what constitutes academic dishonesty in the use of an AI tool, (2) indicate which aspects of the assessment the student is allowed to use (or not use) an AI tool, (3) specify the consequences of unauthorized use of an AI tool, and (4) have a student signature acknowledging understanding. Model policies to be developed by HEC to be adapted by individual colleges.

Shift the nature of the assessment system towards authentic assessment, not easily gameable, that is based on process. Assessment techniques are encouraged such as: (1) oral presentations and oral exams, (2) timed tests with in-class feedback, (3) in-class opportunities to write about one's thinking and building learning portfolios, (4) opportunities for students to self-gauge their work based on feedback from peers, and (5) projects that have multiple opportunities for feedback and require students to revise their work. These strategies are in line with the competency-based learning policy of the HEC and minimize the vulnerability to AI.

Launch Faculty Professional Development geared towards assessment redesign and integration of AI. There need to be interdisciplinary faculty teams to develop course specific assessment strategies; Peer

learning, joint problem solving. Development should be done monthly, during the school year and should be related to professional development.

Create Student AI Literacy Programs like orientation lectures, workshops or include in information literacy courses. Students need to be aware of: (1) how AI tools work, and weaknesses, (2) their own expectations of the use of AI, (3) how to use AI to support learning without compromising academic integrity, and (4) applications and limitations of AI in their field.



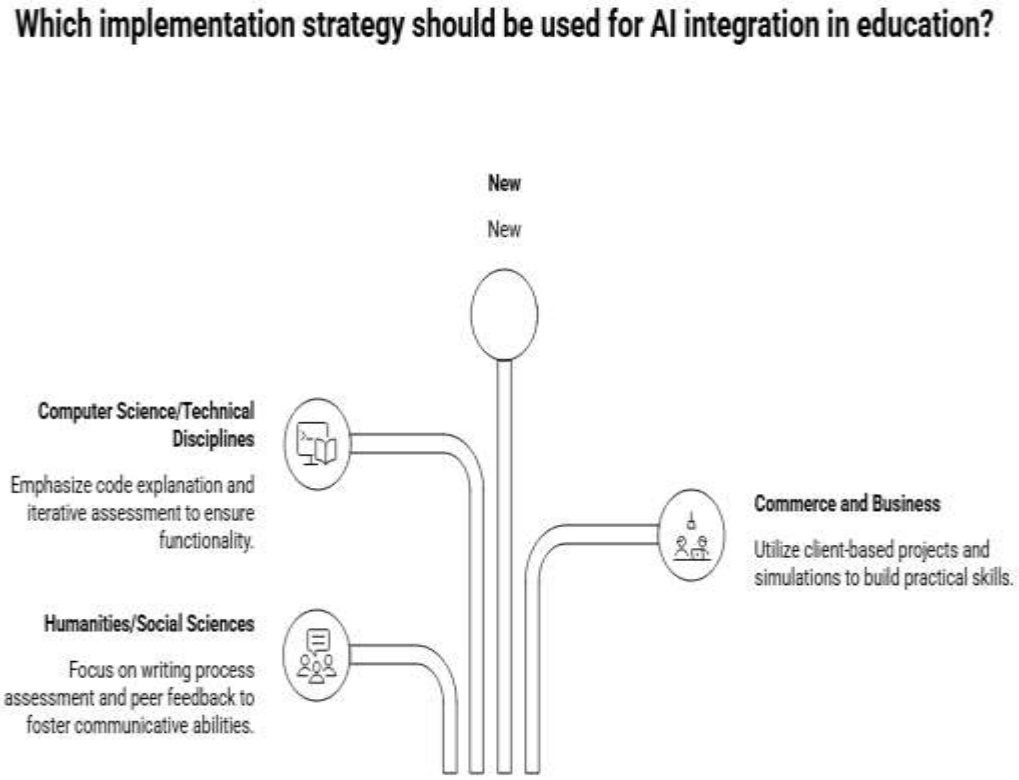
10.3 Discipline-Specific Implementation Considerations

Humanities/Social Sciences: Emphasis – assess the writing process with a writing portfolio, reflect upon the writing process in writing tasks and oral presentations that include live presentation of arguments, incorporate peer feedback. These tools assist reduce the motivating force to practice what is often referred to as “shortcut” writing and foster communicative abilities.

For Computer Science and Technical Disciplines, apply the following: Structures of programming coursework in which the code functions are required to be explained by debugging and, code and project-based learning in which iterative assessment takes place, in which the student has to show the

functionality of the code in a practical examination, through live problem solving. In this case the student contribution will be regarded as an intrinsic part of the inherent.

Commerce and Business: utilize key based project handling based on client and get feedback from clients, undertake business simulation project based on real time decision making, utilize use case study analysis, use oral presentation. These practices build up the skills used without AI taking the place of this.



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