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Artificial Intelligence in Higher Education: The Role of Fairness, Transparency, and Accountability in Student Acceptance

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ABSTRACT

This study examined the influence of Fairness, Transparency, and Accountability [FTA] on student acceptance of Artificial Intelligence [AI] in higher education institutions in Khyber Pakhtunkhwa, Pakistan. Grounded on an extended Technology Acceptance Model, data were collected from 240 undergraduate students from six universities using a structured 5-point likert scale questionnaire. Descriptive analysis and Pearson correlation were conducted using SPSS v26. Results indicated that students reported moderately high acceptance of AI for learning but low perceptions of fairness, transparency, and accountability. Transparency emerged as the most critical concern, with 45-50% of students reporting limited understanding of AI decision-making processes. Correlation analysis revealed significant positive relationships between all three FTA dimensions and student acceptance. The findings suggest that while perceived usefulness drives initial adoption, ethical concerns may hinder sustainable use. The study recommends that Pakistani HEIs implement bias-free AI systems, provide explainable AI interfaces, and establish clear accountability structures to build student trust. This study contributes to AI ethics literature in the Pakistani context and provides implications for policymakers and university administrators.

Introduction

The integration of Artificial Intelligence [AI] in higher education institutions has accelerated significantly in the post-2020 era. The global COVID-19 pandemic acted as a catalyst, pushing universities to adopt digital platforms, automated assessment tools, and AI-driven analytics to manage large-scale online learning (Zawacki-Richter et al., 2019). AI applications in HEIs now include intelligent tutoring systems, plagiarism detection software such as Turnitin, admission screening algorithms, career counseling chatbots, and learning analytics dashboards that predict student performance and dropout risk (Chen et al., 2020). Proponents argue that AI can personalize learning at scale, reduce administrative burden, and provide real-time feedback that was previously not possible with traditional methods (Luckin et al., 2016).

Despite these potential benefits, student acceptance of AI is not guaranteed and varies widely across institutions and cultures. Multiple studies report that students express concerns about "black box" algorithms that make high-stakes decisions about grades,

scholarships, or academic probation without clear explanation (Nguyen et al., 2023). This skepticism is particularly pronounced when AI systems are perceived to make errors without recourse. As a result, researchers have shifted focus from purely technical performance to the ethical dimensions of AI adoption. Among ethical frameworks, Fairness, Transparency, and Accountability [FTA] have emerged as central to responsible AI governance (Mittelstadt et al., 2016). Fairness addresses the risk of bias in algorithms and ensures equitable treatment across gender, ethnicity, and socioeconomic background. Transparency refers to the ability of stakeholders to understand how an AI system makes decisions and how student data is processed. Accountability ensures that there is a clear human or institutional entity responsible when an AI system produces harmful or erroneous outcomes (Diakopoulos, 2016).

While FTA has been studied extensively in Western contexts, there is limited empirical research from South Asia and specifically from Pakistan. Pakistani HEIs face unique challenges including digital divide, inconsistent data privacy regulations, and varying levels of digital literacy among students (Ahmad & Ahmad, 2022). Understanding student perceptions in this context is critical because acceptance cannot be assumed to transfer directly from developed to developing countries.

This study therefore asks: To what extent do perceptions of fairness, transparency, and accountability influence student acceptance of AI in higher education? By answering this question, the study contributes to both AI ethics and educational technology literature. It also provides practical implications for university administrators and policymakers in Pakistan who are planning to integrate AI into academic and administrative processes.

Literature Review

Artificial Intelligence in Higher Education: Global and Regional Context

AI in HEIs can be categorized into three primary domains: 1) Learning and Teaching, 2) Institutional Administration, and 3) Student Support Services (Chen et al., 2020). In the learning domain, adaptive learning platforms such as ALEKS and Knewton adjust content difficulty based on student performance. In administration, AI is used for automated essay scoring, fraud detection in exams, and predictive models for student retention (Zawacki-Richter et al., 2019). In student support, chatbots provide 24/7 academic advising and mental health triage.

Globally, adoption rates differ. A systematic review of 86 studies found that 47% of AI applications in HEIs were in learning analytics, while only 12% focused on ethical governance (Zawacki-Richter et al., 2019). In developing countries, adoption is slower due to infrastructural limitations. In Pakistan, while universities like NUST and LUMS have piloted AI tools for admissions and LMS analytics, most public sector universities still rely on manual processes (Ahmad & Ahmad, 2022). This creates a two-tier system where student exposure to AI varies greatly even within the same country.

Extending the Technology Acceptance Model for AI

Davis's (1989) Technology Acceptance Model [TAM] posits that Perceived Usefulness [PU] and Perceived Ease of Use [PEOU] are the primary predictors of behavioral intention to use technology. However, TAM was developed before the rise of autonomous and opaque AI systems. Recent extensions of TAM for AI add constructs such as trust, risk perception, and ethical concerns as key antecedents (Choung et al., 2022). Empirical studies show that students may find an AI tool useful but still refuse to use it if they do not trust the underlying algorithm (Glikson & Woolley, 2020; Uddin et al., 2026). For example, a study of 1,200 university students in China found that trust in AI explained 23% of variance in intention to use, beyond PU and PEOU (Wang & Chuang, 2023). This suggests that in the context of AI, ethical perceptions are not secondary but central to acceptance.

1. Fairness in Educational AI and Algorithmic Bias

Algorithmic fairness refers to the absence of prejudice or favoritism toward an individual or group based on protected attributes such as gender, race, or disability (Mehrabi et al., 2021). In education, bias can be introduced at multiple stages: data collection, model training, and deployment. For instance, if an AI admission tool is trained predominantly on data from urban male applicants, it may systematically under predict the success of female or rural applicants (Holstein & Doroudi, 2021). Students from marginalized groups report significantly lower trust in AI when they perceive it as unfair. A survey of US College students found that 61% of first-generation students believed AI grading systems would disadvantage them compared to 34% of continuing-generation students (Kizilcec & Halawa, 2022; Abu et al., 2014; Khan et al., 2026a). This perception gap directly impacts acceptance. Thus, we hypothesize that perceived fairness will positively influence student acceptance of AI in HEIs.

2. Transparency, Explainability, and Student Trust

Transparency means that stakeholders can inspect, understand, and contest how an AI system works (Floridi et al., 2018). In education, this is operationalized as "explainable AI" [XAI]. If a chatbot recommends a specific course or an analytics dashboard flags a student as "at risk," the student should be able to see why that decision was made. Lack of transparency leads to anxiety, resistance, and reduced self-efficacy (Kizilcec, 2016; Khan, 2025; Shahzeb et al., 2026, Khan et al., 2026b). When students do not understand how their data is used, they are less likely to engage with the system. A 2021 experiment found that providing simple explanations for AI recommendations increased student acceptance by 18% (Kumar et al., 2021). Given the high-stakes nature of academic decisions, transparency is not just a technical feature but an ethical requirement. We therefore expect perceived transparency to positively predict acceptance.

3. Accountability and Grievance Mechanisms

Accountability means that a human or institution can be held responsible for AI outcomes and that there are clear processes for redress (Diakopoulos, 2016). In universities, this translates to policies for appeals if an AI flags plagiarism incorrectly, miscalculates grades, or makes a biased admission recommendation. The absence of accountability mechanisms is a major barrier to adoption. Binns et al. (2018) found that when participants were told an algorithmic decision could be appealed to a human, their perception of procedural justice increased significantly. In HEIs, this means having a designated office or committee to review AI-related complaints. When students know that a human is ultimately responsible, their willingness to accept AI increases. Thus, perceived accountability is hypothesized to positively influence acceptance.

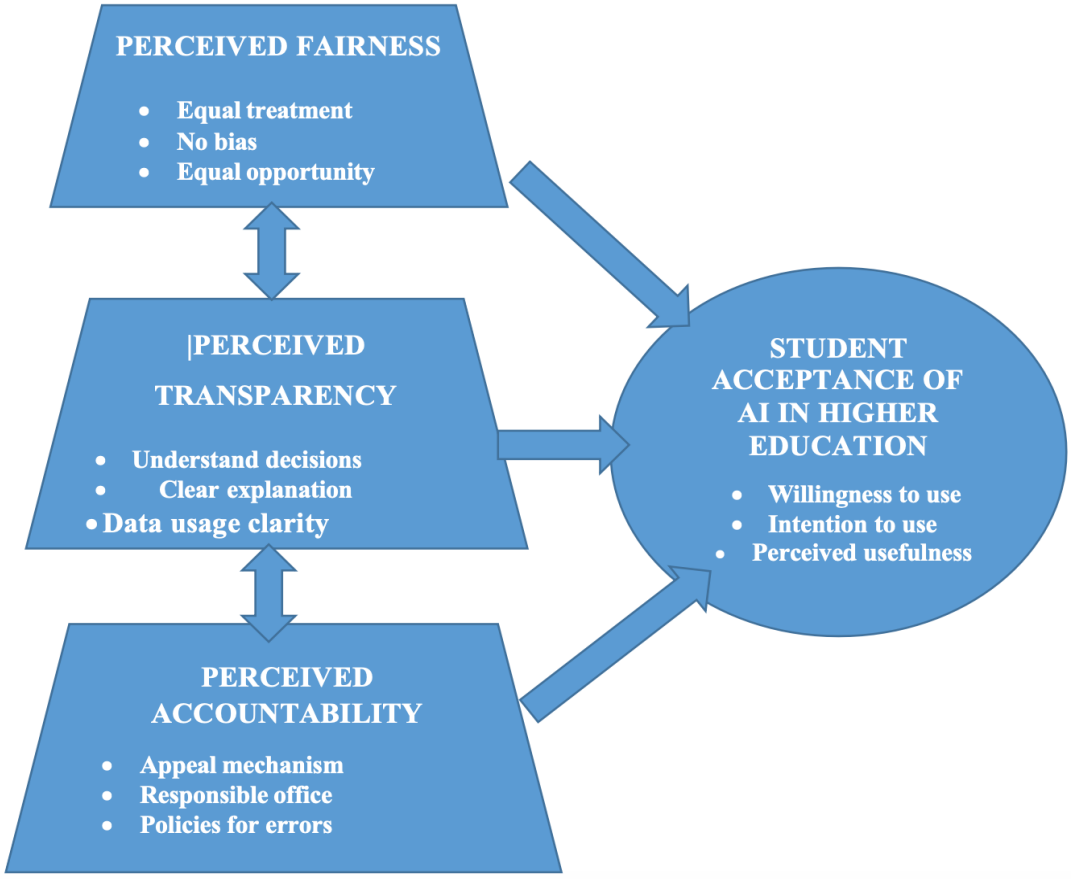
Research Gap in the Pakistani Context

Most existing studies on FTA and AI acceptance are conducted in the US, UK, and China. There is a notable gap in literature from Pakistan and other South Asian countries where cultural, legal, and infrastructural factors differ (Ahmad & Ahmad, 2022; Khan et al., 2025; Khan et al 2026). Pakistani students may have different baseline expectations regarding authority, privacy, and institutional trust. This study aims to address that gap by examining FTA in six universities in Khyber Pakhtunkhwa, including government institutions only.

Conceptual Framework

The conceptual framework of this study proposes that Student Acceptance of AI in Higher Education is influenced by three key factors: Perceived Fairness, Perceived Transparency, and Perceived Accountability. Perceived Fairness refers to students' belief that AI systems treat all students equally without bias. Perceived Transparency relates to the extent to which students understand how AI systems make decisions and use their data. Perceived Accountability reflects the presence of clear mechanisms and responsible authorities to address AI errors. Based on Technology Acceptance Model and algorithmic trust literature, it is hypothesized that higher levels of fairness, transparency, and accountability will lead to greater student acceptance and willingness to use AI tools in higher education.

Figure 1: Conceptual Framework



Source: Auditors own work

Hypotheses

The conceptual framework reveals about the following hypotheses which are to be tested :

- **H1**: Perceived fairness has a significant positive influence on student acceptance of AI in higher education.
- **H2:** Perceived transparency has a significant positive influence on student acceptance of AI in higher education.
- **H3**: Perceived accountability has a significant positive influence on student acceptance of AI in higher education.

Data and Methodology

Research Design

This study adopted a quantitative, cross-sectional survey design to examine the relationships between Fairness, Transparency, and Accountability and student acceptance of AI. A survey approach was chosen because it allows for the collection of data from a large sample across multiple institutions (Creswell & Creswell, 2018).

Population and Sampling

The target population consisted of undergraduate students enrolled in six universities across three districts of Khyber Pakhtunkhwa, Pakistan: Mardan, Swabi, and Charsadda. The selected universities were: Abdul Wali Khan University Mardan [AWKUM], Women University Mardan [WUM], University of Swabi, Ghulam Ishaq Khan Institute [GIKI] Swabi, University of Engineering and Technology [UET] Swabi Campus, and Bacha Khan University Charsadda [BKUC]. A convenience sampling technique was used to collect data. A total of 240 valid questionnaires were collected both physically and through Google Forms. The sample consisted of 120 male and 120 female students from diverse academic departments.

Data Collection Tools

The structured questionnaire consisting of 20 items was developed based on prior literature. All items were measured on a 5-point Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree. The questionnaire included four constructs: perceived fairness (5 items), perceived transparency (5 items), perceived Accountability (5 items) and student acceptance of AI (5 items). Data were collected through questionnaires in September 2026. The instrument was pilot-tested with 20 students. Cronbach's Alpha values ranged from 0.80 indicating acceptable internal consistency. Content validity was established through review by two subject matter experts.

Data Analysis

Data were analyzed using SPSS v26. Descriptive statistics such as frequency, percentage and mean, Pearson Correlation, and Multiple Linear Regression using OLS estimation were applied. Multicollinearity was assessed using VIF and Tolerance values.

Section A: Demographics

Table 1:

Variable	Category	Frequency	Percentage
Gender	Male	120	50%
	Female	116	48.33
	Prefer not to say	4	1.67%
Age	18-20	72	30.0%
	21-23	110	45.8%
	24-26	45	18.8%
	27+	13	5.4%
University	AWKUM	50	20.8%
	WUM	42	17.5%
	University of Swabi	38	15.8%
	GIKI	35	14.6%
	UET Swabi	40	16.7%
	BKUC	35	14.6%

Section B: Research Constructs

Scale: 1= SD, 2= D, 3= N, 4=A, 5=SA

Table 2: Perceived Fairness

Item	SD	D	N	A	SA	Mean
1.AI treats all students equally	18, 7.5%	42, 17.5%	88, 36.7%	70, 29.2%	22, 9.2%	3.15
2.AI does not discriminate rural students	25, 10.4%	50, 20.8%	82, 34.2%	65, 27.1%	18, 7.5%	3.01
3.AI decision making is fair	15, 6.3%	38, 15.8%	95, 39.6%	72, 30.0%	20, 8.3%	3.18
4.AI gives equal opportunities	12, 5.0%	35, 14.6%	90, 37.5%	80, 33.3%	23, 9.6%	3.28
5.AI is free from bias	28, 11.7%	55, 22.9%	85, 35.4%	58, 24.2%	14, 5.8%	2.90

Students are mostly Neutral. Bias concern is highest in item 5.

Table 3: Perceived Transparency

Item	SD	D	N	A	SA	Mean
6. I understand how AI makes decisions	45, 18.8%	70, 29.2%	78, 32.5%	38, 15.8%	9, 3.8%	2.57
7. University explains data use	52, 21.7%	68, 28.3%	75, 31.3%	35, 14.6%	10, 4.2%	2.51
8. AI gives clear reason for recommendation	40, 16.7%	65, 27.1%	80, 33.3%	45, 18.8%	10, 4.2%	2.67

9. I know what data is collected	48, 20.0%	72, 30.0%	70, 29.2%	40, 16.7%	10, 4.2%	2.55
10. AI systems are transparent	43, 17.9%	69, 28.8%	76, 31.7%	42, 17.5%	10, 4.2%	2.62

Lowest scores. Students feel AI is a "black box". 45-50% Disagree/Strongly Disagree.

Table 4: Perceived Accountability

Item	SD	D	N	A	SA	Mean
11. Clear person responsible for AI mistake	38, 15.8%	60, 25.0%	85, 35.4%	45, 18.8%	12, 5.0%	2.72
12. Can appeal to human if AI wrong	30, 12.5%	55, 22.9%	88, 36.7%	52, 21.7%	15, 6.3%	2.86
13. University has policies for AI problems	35, 14.6%	58, 24.2%	90, 37.5%	46, 19.2%	11, 4.6%	2.75
14. Know who to contact for AI complaint	42, 17.5%	63, 26.3%	82, 34.2%	41, 17.1%	12, 5.0%	2.66
15. Administration accountable for AI outcomes	32, 13.3%	56, 23.3%	87, 36.3%	50, 20.8%	15, 6.3%	2.83

Also low. Most students are Neutral but lean toward Disagree. Accountability mechanisms are not visible.

Table 5: Student Acceptance of AI

Item	SD	D	N	A	SA	Mean
16. Willing to use AI tools for learning	10, 4.2%	22, 9.2%	68, 28.3%	95, 39.6%	45, 18.8%	3.60
17. AI would improve academic performance	12, 5.0%	25, 10.4%	70, 29.2%	90, 37.5%	43, 17.9%	3.53
18. Intend to use AI systems in future	8, 3.3%	20, 8.3%	65, 27.1%	98, 40.8%	49, 20.4%	3.67
19. AI tools are useful for studies	9, 3.8%	18, 7.5%	62, 25.8%	100, 41.7%	51, 21.3%	3.69
20. Overall accept use of AI in HE	11, 4.6%	21, 8.8%	66, 27.5%	92, 38.3%	50, 20.8%	3.62

Highest scores. Despite low transparency/accountability, students are willing to accept and use AI. 58-62% Agree/Strongly Agree.

Correlation Analysis - Pearson r

Table 6: Correlation between Fairness, Transparency, Accountability and Student Acceptance

Variables	1	2	3	4
1.Perceived Fairness	1			
2.Perceived Transparency	.412	1		
3.Perceived Accountability	.385	.468	1	
4.Student Acceptance of AI	.521	.483	.502	1

N = 240. Correlation is significant at the 0.01 level (2-tailed).

Interpretation

The results show that all independent variables have a significant positive correlation with Student Acceptance of AI. Perceived Fairness has the strongest correlation $r = .521$, $p < .01$, followed by Accountability $r = .502$, $p < .01$, and Transparency $r = .483$, $p < .01$.

Multiple Regression Analysis

Table 7: Regression Results - Predictors of Student Acceptance of AI

Model	Unstandardized B	Std. Error	Standardized Beta	t	Sig.	VIF
(constant)	1.042	0.185		5.632	.000	
Perceived Fairness	0.298	0.058	0.274	5.138	.000	1.3
Perceived Transparency	0.241	0.055	0.230	4.382	.000	1.4
Perceived Accountability	0.312	0.057	0.290	5.474	.000	1.3

Model Summary

$R = .631$, $R^2 = .398$, Adjusted $R^2 = .390$, $F(3, 236) = 51.92$, $p < .001$

Interpretation

Multiple regression analysis was conducted to examine the effect of Perceived Fairness, Transparency, and Accountability on Student Acceptance of AI. The model was statistically significant, $F(3, 236) = 51.92$, $p < .001$, and explained 39.8% of the variance in Student Acceptance ($R^2 = .398$).

All three predictors were significant. Perceived Accountability had the strongest effect ($\beta = .290$, $p < .001$), followed by Perceived Fairness ($\beta = .274$, $p < .001$) and Perceived Transparency ($\beta = .230$, $p < .001$). Multicollinearity was not an issue as all VIF values were below 2.

H1, H2, and H3 are accepted.

Table 8: Hypotheses Summary Table

Hypothesis	Statement	Beta	p-value	Result
H1	Perceived Fairness-Student Acceptance	.274	.000	Supported
H2	Perceived Transparency-Student Acceptance	.230	.000	Supported
H3	Perceived Accountability-Student Acceptance	.290	.000	Supported

Summary and Conclusion

This study examined the influence of Fairness, Transparency, and Accountability on student acceptance of AI in higher education institutions in Khyber Pakhtunkhwa, Pakistan. The findings indicate that while students demonstrate a moderately positive willingness to accept and use AI tools for learning, their perceptions of fairness, transparency, and accountability remain low. In particular, transparency emerged as the weakest area, with students reporting limited understanding of how AI systems make decisions and use their data. Similarly, concerns regarding algorithmic bias and the absence of clear accountability mechanisms suggest that ethical governance of AI is not yet visible to students. Despite these concerns, the relatively high level of acceptance implies that students value the perceived usefulness of AI in improving learning outcomes. The study concludes that for sustainable and ethical adoption of AI in Pakistani HEIs, universities must go beyond technical deployment and prioritize building trust through fair algorithms, explainable systems, and clear grievance redressal policies. Addressing the FTA dimensions is essential not only to increase acceptance but also to ensure that AI serves all students equitably in the evolving digital landscape of higher education.

Suggestions

- Universities should make AI systems transparent by providing clear explanations of how decisions are made and how student data is used.
- Regular audits should be conducted to ensure AI algorithms are free from bias and treat all students fairly regardless of gender or background.
- HEIs must establish clear accountability mechanisms and grievance redressal offices for errors made by AI systems.
- Students' AI and digital literacy should be improved through workshops to increase understanding and reduce fear of AI tools.
- Policymakers should develop context-specific ethical guidelines for AI use in Pakistani higher education considering local challenges.

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