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# Assessing Student Perceptions and Acceptance of AI-Driven Educational Tools in Quetta Balochistan

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## ABSTRACT

*The main objective of the study was to determine how students perceive the acceptance, utility, and use of AI-based tools in the education process. The growing use of artificial intelligence (AI) into pedagogical practices has provided new sources of adding value to instructional methods. Nevertheless, the tendency of the learners to accept and effectively engage with these technologies is a research question that is central. To fill this gap, this paper, therefore, attempted to offer a systematic review of the student attitude towards AI-enabled educational technologies. The study adopted a quantitative research design to achieve the study objectives. The target sample of the study included 400 students of the university, as a result of which a random sample of 200 students was selected through the process of random sampling. The data were collected using a self-constructed Likert-scale questionnaire that underwent both subject-matter validation and pilot test in order to determine the level of content validity. Reliability of the instrument was also validated by introducing the right statistical indices hence internal consistency. The next statistical proceedings have been conducted with the help of SPSS by implementing both descriptive and inferential statistics to evaluate the perceptions of the students. The findings revealed that students tended to have positive intentions towards the acceptance, usefulness, and interest with the AI-driven tools. According to these findings, the opportunities and challenges of the creation of AI in educational practice of integration can be noted. In theory, the research fills a gap in available literature on the use of educational technologies, namely, into the framework of AI integration. In practice, the results justify practical information by educators, administrators, and policymakers to choose the strategies, which will allow successfully adopting and implementing the AI-driven tools.*

*Keywords: Artificial Intelligence, Student Perceptions, Educational Technology, AI Tools, Learning Engagement*

## INTRODUCTION

It has been demonstrated that the use of artificial intelligence (AI) in learning institutions has significant potential to address the historical pedagogical shortcomings in educational systems particularly where quality education delivery is still a very challenging task. Balochistan, the largest province in the area of Pakistan allows describing such difficulties because of its vast and jagged territory and scattered population, which makes it harder to provide equitable access to education. The area faces the acute deficiency of professional teachers, the shortage of education materials, and a large percentage of people who are out of the range of formal educational opportunities (Bangulzai, Waseem, & Naz, 2024). Such aspects lead to ongoing educational non-parity especially in rural and remote regions where infrastructures are negligible and where socio-economic barriers are high.

AI presents an innovative solution to breaking these barriers through providing individual students with adaptive learning opportunities that would be personalized according to their requirements. AI systems will be able to measure the academic performance, learning styles, and preferences of students through sophisticated data analytics and, therefore, tailor the content taught to students to help them gain the most understanding and remember (Basit, Alam, and Ashraf 2024; Mohala, Anser, Iqbal, & Zeeshan, 2024). This affects especially Baluchistan where students represent different language, cultural and academic backgrounds, with some having different levels of preparedness in tertiary education. As an example, AI-implemented platforms can be adjusted to the speed and difficulty of the learning process individually to promote inclusivity and engagement (Shaheen, & Rehan, 2024).

Besides, language barriers may be overcome by using AI-based applications (including real-time translation and the ability to deliver content in multiple languages) to provide access to education to students whose native language, e.g., Urdu or English, is not the language most commonly used in educational institutions. This is important in Balochistan where the local languages such as the Balochi, Pashto and Brahui are imminently spoken and language barrier usually hampers educational achievements (Shah Masoomi, Hameed, & Rind, 2024). Also, AI can be used to support remote education in the form of virtual learning classrooms and intelligent tutoring, which will counter the problem of the province with a huge geography and insufficient physical infrastructure (Sajja et. Al, 2023).

Along with the reported advantages, the implementation of artificial intelligence in the education setting has a range of issues. Among them, the issues related to data privacy, algorithmic bias, and losing critical thinking have been expressed on the international level (Darvishi et al., 2024). Other contextual factors, including a lack of technological literacy, unstable internet connectivity, and the fear that technology will replace face-to-face pedagogies lead to these challenges in the Balochistan area (Waqar et al., 2024). As such, the perceptions that students have and will accept AI-assisted educational tools should be studied to guarantee their proper implementation (Ashraf et al., 2025). In this perspective, the current paper aims to offer detailed information on how AI could be used to improve academic performance in institutions of higher education in Balochistan and how possible obstacles to AI implementation can be overcome.

The application of the Co-technology of artificial intelligence (AI) in education in Balochistan has the potential to transform the entire process in the area of way of accessing it, customizing it, and increasing student interest in tertiary education. Nonetheless, it can be concluded that the effective use of AI-based learning resources will depend on whether these tools can be accepted by students, which has not yet been researched in the Balochistan situation (Ahmed, Mallah, and Shaheen, 2024). Although technical abilities of AI, including adaptive learning algorithms and automated feedback systems have been widely written in the global literature (Chen, Chen, and Lin, 2020; Zawacki-Richter, Marin, Bond, and Gouverneur, 2019), a considerable gap still exists in the empirical literature to investigate human aspects of adoption. In particular, the perception, attitude, and desire of students towards these technologies are under-researched especially in underdeveloped countries (Ashraf et al., 2025).

Such a difference is most pronounced in resource-limited and culturally heterogeneous groups, which is the case in Balochistan and the rates of technology acceptance can be uneven among cultural groups because of the socioeconomic inequality, infrastructural challenges, and dissimilarity that exist between the cultural perceptions of technology (Iftikhar, Shoukat, and Ahmed, 2023; Waqar, Rashid, Anis, and Muhammad, 2024). This disjunction will have to be bridged in the fair implementation of AI-driven educational solutions that can be used to leverage higher education results in the region. The main challenges to the AI implementation in Balochistan entail the lack of access to a high-quality internet connection, a scanty supply of digital technologies, low tech among the learners, and cultural fears connected to the substitution of traditional pedagogical courses by technology-driven solutions (Khan and

Qureshi, 2021). Moreover, AI implementation is also accompanied by the issue of data privacy and legal implications, where algorithms have the risk of reinforcing discrimination against a certain group of people in the future (Holmes et al., 2022). It follows that AI tools can become inefficient or unsuccessful in terms of local requirements, unless a detailed study of the perception of students, such as their trust, perceived usefulness, and perceived ease of use, is conducted.

The radical potential of artificial intelligence (AI) in higher education is the phenomenon that requires careful understanding of how a student can be perceived to create fair and efficient implementation. This is a question that is especially relevant in the situation in Balochistan where the educational differences are widely observed, an under-resourced area with complex socio-cultural interaction. Focusing on the acceptance of AI-based educational devices among students, the current study contributes both to the existing body of knowledge related to AI in education globally and, at the same time, it generates region-specific findings that cannot be overlooked when it comes to alleviating the problems on the local scale(Ahmed et al., 2024; Basit et al., 2024). The subsequent findings will provide practical information to teachers, education policy makers, and technology developers who strive to develop and teach AI-based learning systems that are culturally sensitive, affordable, and in line with Balochistan needs.

The application of Quetta, the main educational center of Balochistan, makes the study more relevant to inform scalable interventions in the rest of the province. Outlining the conditions that will result in success or dysfunction of the AI adoption, i.e., the technological infrastructure, the degree of user familiarity, and legal attitude, this study will inform the development of specific-purpose strategies designed to improve educational results in post-conflict and low-resource settings (Bangulzai et al., 2024). Besides, the research meets global educational goals, in particular, the ones proposed in the United Nations Sustainable Development Goal (4) Quality Education in that it explores the potential of AI to close gaps in access and quality of education in underserved areas (United Nations, 2015). Finally, the gained insights will be used to develop inclusive, effective, and sustainable AI-based educational systems, thus leading to better learning and education equity in Balochistan by making students feel accepted, engaged, and useful AI-based tools.

## LITERATURE REVIEW

The artificial intelligence (AI) implementation in educational contexts represents the paradigm shift in the education practices and learning strategies. The recent technological development placed AI-driven educational tools among the transformational factors that can alter the student experience in various academic settings. The worldwide education market based on AI education is estimated to increase at a compound yearly growth rate of greater than 40 per cent within the upcoming 5 years (2025-2030) because of considerable institutional investment and adoption of technology (Carnegie Learning Report, 2025)

AI-powered learning applications include computational systems that execute functions that have traditionally been done by human brains, but that have been tailored to the field of education. These technologies are typified by being able to participate in the human-like processes such as learning, adaptation, synthesis, self-correction, and complex data processing (Zawacki-Richter et al., 2019). These capabilities can be practically applied in the educational domain in terms of adaptive learning platforms that personalize the delivery of content, intelligent tutoring systems (ITS) that offer a personalized approach, and generative AI models such as ChatGPT that respond to user queries in a human-like manner (Crompton and Burke, 2023).

### Foundational Theoretical Frameworks

There are a number of theoretical models governing the concept of technology adoption in education:

**Technology Acceptance Models in Education**

**Technology Acceptance Model (TAM)**

One of the most decisive theoretical models of explaining the technology adoption is the Technology Acceptance Model (TAM) developed by Davis (1986, 1989). TAM is based on the Theory of Reasoned Action (TRA) and states that two perceptual constructs play the leading role in the intention of the people to use the technology:

- Perceived Usefulness (PU): the degree of individual development of the decision that the application of a certain technological tool is going to promote the results.
- Perceived Ease of Use (PEOU): this defines how an individual feel about the belief that he/she is use to the system without any effort.

These perceptions shape users' Attitude Toward Use (ATU), which subsequently influences Behavioral Intention (BI) and Actual Use (AU).In the education field, the Technology Acceptance Model helps understand the factors that affect the adoption decision of the students and teachers in relation to learning management systems, e-learning platforms, and artificial intelligence systems, including ChatGPT and Gemini.

**Unified Theory of Acceptance and Use of Technology (UTAUT)**

According to Venkatesh et al. (2003) the Unified Theory of Acceptance and Use of Technology (UTAUT) represents a synthesis of eight antecedent models such as the Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB).

It outlines four major factors that define user intention and determine the adoption of the behavior going forward:

- Performance Expectancy (PE): this is the belief that the use of the technology will improve performance or the results.
- Effort Expectancy (EE): refers to the perceived simplicity to use the technology.
- Social Influence (SI): is the image that the important people support the usage of the technology.
- Facilitating Conditions (FC): they imply the perception of available resources and assistance needed to utilize systems.

UTAUT also includes moderating variables such as age, gender, experience, and voluntariness, which influence how these determinants affect behavior. In 2012, Unified Theory of Acceptance and Use of Technology (UTAUT2) has been further developed to include hedonic motivation, price value and habit to further extend the scope of application to consumers and educational technology context. The UTAUT model can be considered a powerful tool of assessing the preparedness of a student and a faculty to embrace online classes, artificial intelligence applications, mobile applications, and virtual classrooms in the education sector.

**AI- Driven Educational Tools: Access , Usefulness and Engagement**

Qualified network coverage and technical infrastructure are the basic factors that form the backbone of the implementation of AI-based learning applications. Many students in developing nations face uneven or nonexistent connectivity to broadband, especially in rural or marginalized areas (Andrabi et al., 2019; Kukulska-Hulme, 2019). As an example of this, a series of studies in Sub-Saharan Africa demonstrate

that despite the growing penetration of mobile, access to the internet is still discontinuous and largely urban (Dally et al., 2025). These services like Eneza Education overcome this limitation by providing AI services (SMS-based) that can be used on basic feature phones and, as such, eliminate the need to use smartphones or high-speed data (Dally et al., 2025). Similarly, Kolibri and Rumie can be used as offline first AI-driven learning apps, which do not require persistent connectivity, which is an essential aspect of low-resource environments (AI in Education Blog, 2025 ). Other infrastructural factors such as power outages also hinder normal interaction of students in online learning platforms.

The presence of socioeconomic inequalities has a significant effect on the possibility of using AI tools. Children with less fortunate and middle-income families often have no financial resources to purchase personal computers or smartphones or the data plan needed to access more advanced AI platforms (Andrabi et al., 2019)

The policy of institutional readiness and education has decisive roles in determining access to AI among students. Based on empirical studies, institutions that have strategic leadership and detailed AI integration plans, as well as teacher-training programmes, experience more successful AI integration (Zawacki - Richter et al., 2019). On the other hand, the inexistence of national-scale policies on the development of AI education or the existence of weak regulatory laws interferes with the large-scale use of AI tools (Samuel Ocen et al., 2025). The policies related to digital education at country level including AI literacy training and investment in infrastructures are associated with a greater rate of AI tools penetration (Nguyen et al., 2023). Moreover, the bureaucratic nature of decision-making and divisive nature of governance structures in developing countries usually makes the adoption of AI slow within the school level.

The proficiency of teachers in the application of AI tools directly influences access to students. In under-resourced regions, a digital gap between teachers is usually the reason behind the poor use or misuse of AI technologies (Kukulska-, Hulme, 2019). Without adequate professional growth, even teachers should not be willing to adopt new technology because they are not familiar with it or they do not have fears of being dispossessed (EdTech Blog, 2025). Effective AI implementation, therefore, requires a high level of capacity building, including the overall, steady training in digital skills, adjustment of pedagogies, and ongoing technical assistance (Lee, Kim, and Ryu, 2022).

The accessibility of AI tools to students is determined by cultural factors, such as linguistic diversity. Untrained AI systems may be lost or poorly interpreted, especially in multilingual nations or areas with a high degree of divergence between dialects (Ahmed, 2025; Kukulska-, Hulme, 2019). The algorithm to perform translation, as well as the localization of the content, continue to be key in strengthening the relevance of the tools. Lack of AI tools that are culturally sensitive would also push marginalization of substantial groups of students, thus undermining the principles of equity. Moreover, dominant social behaviors in terms of technology use and gendered roles may interfere with the access of AI by girls (Ahmed, 2025).

Making AI practices inclusive is one of the main issues in AI implementation in the educational setting. Programs like the Microsoft Seeing AI and the Google Project Euphonia provide the disabled learners with visual or speech impairments to access the digital learning settings (Dally et al., 2025). As much as such AI solutions reduce the obstacles to disabled learners, their implementation in third world settings requires more investments and realization.

In many of the areas, access to AI-based learning tools is physically and digitally limited to female learners due to the socio-cultural factors present there (Ahmed, 2025). The scarcity of technological resources, the lack of training in digital skills, and the non-friendly social stigmas tend to reduce the use

of technology by girls. As a result, in eliminating gender disparities, there should be Complementary technological schemes and speculative social interventions to ensure equal opportunity.

Existing literature suggests that learning technologies based on artificial intelligence (AI) have become appreciated by learners mostly because of their ability to provide them with a personalized study experience and quick feedback, which is challenging to achieve in a traditional classroom environment with a high number of students per teacher (Holmes, Bialik, and Fadel, 2019; Lee, Kim, and Ryu, 2022). Intelligent tutoring systems, artificial intelligence systems, and engaged adaptation of their difficulty and pacing consider the progress of a particular learner, which is considered by learners as rather timely and sensitive (Azcona, Buendia, and Maestrales, 2019). As an example, tools such as ChatGPT or Grammarly offer instant and personalized feedback on academic texts thus allowing subject learners to gain a sense of autonomy and improve their self-regulation (Bation, 2024; Johnston et al., 2024).

Certain AI applications lead to academic integrity. To refer to the example, plagiarism-detecting software like Turnitin has also altered the perception of ethical principles in academic writing among students (European Journal of Research, 2025). Students who view AI as an approach to enhance fairness and honesty, through discouraging bad practices and enhancing originality, find the values in the solutions and improve trust in assessment processes (Holmes et al., 2019). However, this advantage is offset by an advanced understanding of the ethical issues, as students also indicate their fear that overconfidence in AI might destroy their critical-thinking skills (Brorsson, 2024).

The facts obtained because of empirical research carried out by Kim (2023) and studies of populations in secondary-school environments conducted by O'Connor et al. (2024) show that active AI tool users become more subtle and critical about the educational effect produced by the AI. Experienced users often admit the benefits and limitations of AI, referring to the question of the authenticity of AI-generated content and the low chances of deep learning, but frequent or non-users tend to express skepticism or concern (Chiu et al., 2022).

Students base their evaluation of AI tools on institutional encouragement, namely, access to AI tools, access to professional development, and the overall faculty endorsement (Bikanga Ada, 2024; Xu, 2024). Students who report strong institutional support of AI integration are associated with increased self-efficacy and believe that the advantages are increased in their learning careers (Wang et al., 2023). Those educational bodies which provide specific AI literacy trainings and integrate AI into the educational systems can and will always receive more positive responses among students.

**Effectiveness of AI-Driven Educational Tools**

Personalized learning systems powered by artificial intelligence, responding to inputs and adjusting the content difficulty, pacing, and sequence to ensure that learners remain at an optimal level of challenge, are associated with behavioral engagement (Lamb, Ledesma, and García, 2021; Holmes, Bialik, and Fadel, 2019). Empirical data also show that this kind of customized experience leads to longer time on task, decreased dropout rates, and developed consistent studying patterns (Ward, Bhati, Neha, & Guercio, 2017). As an example, intelligent tutoring engines powered by AI like the MATHia by Carnegie Learning evolve according to student-made mistakes to take them towards mastery, and thus, increase persistence and engagement (Ed Department, 2023).

AI applications provide comprehensive instant feedback and structure complicated processes, thus providing deeper mental activities where learners can apply, analyze, and synthesize information (Almasri, 2022; Holmes et al., 2019). Individually oriented rewards and challenges by Gamified AI systems encourage motivation (Azcona, Buendia, and Maestrales, 2019). Empirical results show that people who

use AI applications are better prepared to acquire conceptual knowledge and possess more problem-solving skills because problem solutions and prompt proposals stimulate metacognition (Ward et al., 2017; Lamb et al., 2021).

The AI chatbots and virtual assistants are also capable of emotional engagement (interest, enjoyment, and a feeling of belonging) which can be achieved by offering personalized support, empathetic support, and conversational support (Almasri, 2022; Lee, Kim, and Ryu, 2022). These tools reduce anxiety to learn since they allow asking questions anonymously and without being judged, as well as create a feeling of companionship. Research has also indicated that AI agents are able to alleviate the sense of isolation in distance education, thus maintaining an emotional attachment to course material (Holmes et al., 2019).

The benefits of AI in engagement and achievement are sustained, which have empirical motivation of longitudinal and large-scale studies. To illustrate, Ward et al. (2017) did not fail to mention a considerable GPA boost and study effectiveness in students who used AI-based assistance. Similarly, several case studies detailing the role of AI in enhancing engagement with students and academic achievement over the course of various semesters were summarized in a review published by the U.S. Department of Education, which supports the long-term educational utility of AI.

The effects of AI on engagement depend on demographic factors, namely socioeconomic level, digital skills, and the sphere of study (Nguyen, Tran, and Le, 2023). AI often enhances the engagements of STEM students more often due to the analytic nature of the material they engage with, and or helps humanities students with writing and content-summarization solutions (Woolf, 2019). AI-adapted tools culturally and linguistically have also provided better results to engage various groups (Ahmed, 2025). How teachers incorporate AI technology as an addition or a replacement greatly depends on the result of engagement. It has been shown that human-AI partnership, in which teachers make sense of AI analytics and personalize relationships, is more effective than fully automated solutions (Samuel Ocen et al., 2025; Holmes et al., 2019). Therefore, the teacher training in AI technology enhances the beneficial effects of improved engagement.

As much as AI tools create a sense of participation, too much use of the devices may reduce cognitive exertion and autonomy among students (Ward et al., 2017). AI drills or explanations should be combined with active learning items in order to make students passive receivers. The authors of literature propose the concept of intelligent approaches to the integration of AI that prevent causing the displacement of such important processes as critical thinking and learner agency (Daher, Mirchi, and Maestrales, 2023). In addition, insufficient infrastructure, including a low rate of internet connection and device access, may restrain the benefit of the engagement of AI tools (Kukulska-, Hulme, 2019; Andrabi et al., 2019). Students get frustrated by technical problems and this interrupts the learning process thus demotivating the students. One way that such challenges can be partially addressed is by using offline or low-bandwidth AI applications.

AI-driven learning analytics observe student behaviour in real time and data are collected to identify signs of disengagement, including inactivity, low rates of submitting assignments (Pliakos, Tzafilkou, and Economides, 2019). This helps to make interventions early, as this allows educators to create support which is differentiated by at-risk students and improves retention. Literature sources have validated the effectiveness of interventions created with the use of analytics in enhancing engagement and decreasing the number of dropouts (OECD, 2024). The combination of AI customization and gamification using points, badges, and leaderboard further increases competitive motivation and social learning, resulting in a positive impact on engagement (Azcona et al., 2019)

**AI-Driven Educational Tools**

Munaye et al. (2025) concluded that the students who used ChatGPT as a supportive instruction tool said that they had better mastered the complicated concepts and obtained a high engagement score. The artificial intelligence system provided direct explanation, illustrating examples and easier susceptible exposures that supported an in-depth conceptual insight. Similarly, Baig (2024) concluded that ChatGPT can complement active learning under the condition that the students were advised to use the tool critically to explore the topic and verify information.

Kasneci et al. (2023) emphasized that ChatGPT could be used to help non-native English speakers enhance fluency in writing in English and the stylistic features of their writing via real-time feedback. Dwivedi et al. (2023) also found that ChatGPT can help students with paraphrasing, summarizing, and proper citation of the sources, which makes it a beneficial tool of language learning. ChatGPT can be used to provide individuals with personalized learning and tailor explanations and feedback to the needs of the students. Using ChatGPT as a case, Zawacki-Richter and Marain (2024) showed it could be used to simulate the functionalities of an intelligent tutoring system, namely, individualized explanations, adaptive pacing, and sequential questioning. Students who showed differences in their level of prior learning enjoyed the advantage of receiving feedback that might not have been the case in the traditional classroom learning.

Khalil and Er (2023) also noted that conversational AI can make education more inclusive through audio-based explanations, text simplification, and content translation to various languages and has specific advantages in the developing world and students with reading difficulties. ChatGPT has triggered the innovative research in pedagogy and curriculum development.

Lim et al. (2023) affirm that ChatGPT has the ability to assess the writing structure, coherence, and grammar, which means that students can edit the drafts prior to submission. The artificial intelligence also assists the teachers through the automation of low stakes feedback concerning the essays, quizzes, and coding tasks. Moreover, Aljanabi (2024) discovered that the formative feedback of ChatGPT generated a stronger motivation and self-efficacy in students because they had more specific reasons explaining why something was given to them, just like a personal tutor. However, scientists also argue that feedback should be validated and enhanced by human educators in order to ensure its correctness and richness.

As shown by Rana and Singh (2024), the contextualization of instructional material in real time established by Gemini demonstrated a significant improvement in differentiated instruction. The system facilitates a more personalized learning process through the ability to dynamically modify explanations, exemplars and visuals in accordance to the learning of the learner. The authors also highlight the possibility of Gemini ensuring inclusivity, as well as increased engagement in blended learning settings.

Gemini is a tool that helps educators to save time by automatically creating lessons plans, quizzes, rubrics, and creative teaching resources. According to a study by Modi et al. (2025), Gemini 2.5 Pro in an instructional-design context was judged to be preferred by 73 per cent of teachers compared to other models due to its content-generation. The system came up with precise, creative, and contextually pertinent learning prompts and thus could be considered as a useful co-educator in online learning.

Meo et al. (2025) indicated that Gemini 1.5 Pro showed similar accuracy results on 100 medical MCQs with ChatGPT-4 and DeepSeek-R1, and in both instances, more than 80% accuracy was recorded. It is based on this reliability that it is incorporated in the formative testing and in the review of the medical teaching content.

According to Zhang and Liew (2024), Gemini, with its comprehensive scoring disclosures, allowed the learners to get LUMCs more successfully as compared with conventional methods of scoring, but also

give teachers analytics of the misconceptions. Multimodal interaction (supporting text, voice, and visual input) of Gemini also makes education more accessible to students with disabilities. According to Kwon and Miller (2024), Gemini had a positive impact on learners with visual or hearing impairments due to its audio-visual adaptability. The tool reduces the barriers to learning and enhances the digital inclusion by producing descriptive imagery and giving oral feedback.

Not only ChatGPT and Gemini, but an increasingly expanding number of AI-powered educational systems such as Claude, Bard, Bing Chat, Copilot, QANDA, and Study Fetch have started transforming educational systems. The technologies enable writing assistance, content creation, personalized education, and assessment of students, meaning a broad selection of AI affordances to educators. Early research is already studying the implication of those tools in the academic participatory, creative life, and cognitive advancement (Rane and Choudhary 2024

Claude is an AI system introduced by Anthropic and it has become quite popular as a writing development and personalized learning assistant. According to Syamsara and Widiastuty (2024), undergraduates enrolled in Indonesian higher educational institutions who utilized Claude made significant improvements in presenting their text, grammatical correctness, and organizational cohesiveness. The participants described Claude as a corrective tool, also as a co-thinker in the process of academic writing. Similarly, the AI tutoring platform Study Fetch has implemented Claude to offer personalized learning opportunities, such as lecture summaries, practice quizzes and study guides, to help encourage more student engagement (Study Fetch 2025).

Google Bard and Microsoft Bing Chat are examples of AI models that have demonstrated a lot of potential in STEM education. In their article, Dos Santos et al. (2023a) studied the use of Bard, Bing Chat, and Claude in physics and chemistry education. The outcome revealed that Bard showed simplification of concepts, provision of multiple languages, and scaffolded reasoning which were beneficial to students with varied background. Simultaneously, Malladi (2023) evaluated Bard, ChatGPT, and Bing AI on finance tests and found that the former failed to perform well in quantitative reasoning but excelled in the ability to explain concepts conceptually. All these findings highlight the domain-specific performance variability and the use of hybrid deployment strategies according to which several tools are used to support learning together.

## METHODOLOGY

Using a quantitatively cross-sectional survey design to gather numeric data from a large population in a set time frame, the current study enabled the objective assessment of relationships between important variables (Creswell & Creswell, 2018). In this study, a descriptive-correlational approach was used to investigate the relationships of perceived usefulness, ease of use, facilitating condition, and student engagement in AI based learning platforms (Leedy & Ormrod, 2021). The study was conducted using 400 students from two higher education institutions in Quetta, Balochistan, Pakistan, the University of Balochistan, and Balochistan University of Information Technology Engineering and Management Sciences (BUITEMS). These institutes were selected based on their technological infrastructure and integration of AI-supported learning systems. Using Cochran formula for finite populations (Cochran, 1977) with a confidence level of 95% and margin of error 5%, the required final sample size was 196 students. Questionnaires were administrated to 220 subjects whereby simple random sampling technique was applied.

A cross-sectional questionnaire study was performed using a self-constructed questionnaire based on the Technology Acceptance Model (TAM) (Davis, 1989) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). The instrument consisted of three sections that related to

access to AI-powered tools, perceptions of usefulness and ease of use, and student engagement Each item was rated on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree), providing quantifiable assessments of participant perceptions (DeVellis, 2016). Content validity was established by having three experts in education and research methodology rate the instrument on clarity, relevance, and fit for study objectives (Polit & Beck, 2018). The reliability of a scale was established by the administration to 30 universities students from Quetta (debriefed in main study) as a pilot study. Cronbach's alpha coefficients were > 0.70 and therefore separating a high internal consistency (Nunnally & Bernstein, 1994).

To meet the vast regions to be covered, the survey was presented physically alongside electronically through Google Forms with collection of data in 4 weeks. To maintain data quality, all the filled responses were checked for completeness and accuracy before analysis and incomplete or incorrect entries were rejected. The data were analyzed by Statistical Package for the Social Sciences (SPSS, Version 26). To achieve the research objectives, both descriptive and inferential statistical techniques were utilized (Field, 2018). Frequencies, means, and standard deviations were used to summarize demographic profiles and key study variables (i.e., descriptive statistics). The data were analyzed using inferential tests for relationships and differences between variables. More specifically, students mean perceptions were compared against a neutral midpoint using one-sample t-tests, and chi-square tests were used to examine the relationship between categorical variables including gender and frequency of use of AI tools, and one-way ANOVA was used to explore differences in perceptions and engagement regarding AI tools across demographic groupings including institution and year of study. All tests were considered statistically significant at $p <. 05$.

## DATA ANALYSIS

### Reliability Analysis

Internal consistency reliability was measured using Cronbach alpha of all three major parts of the questionnaire: Acceptance (Items 1 -10), Usefulness (Items 11 -20), and Engagement (Items 21 -30). The results (Table 4.1) reveal that all the scales are very reliable.

**Table 4.1**
**Reliability of Major Constructs**

| Scale | Cronbach's α | Interpretation |
|---|---|---|
| Acceptance | 0.934 | Excellent |
| Usefulness | 0.871 | Very Good |
| Engagement | 0.759 | Acceptable |

All three of the construct coefficient alpha exceeded the 0.70 threshold, which Nunnally and Bernstein (1994) asserted; hence, verifying internal consistency and reliability of the measures.

### Descriptive Statistics

The three major constructs were then computed using descriptive statistics to clarify how the students generally tend towards AI-powered teaching aids. A five-point Likert scale was used to measure each construct (1 = Strongly Disagree, 5 = Strongly Agree). The standard deviations and the resulting composite mean scores are available in Table 4.2

**Table 4.2**
**Descriptive Statistics of Main Variables (N = 199)**

| Construct | Mean (M) | Standard Deviation (SD) |
|---|---|---|
| Acceptance | 3.76 | 0.80 |
| Usefulness | 3.87 | 0.52 |
| Engagement | 3.77 | 0.63 |

Results of the study indicate that students find AI tools useful (M = 3.87), their acceptability is moderately high (M = 3.76), and they are positively engaged (M = 3.77). These are the indicators of widely positive attitude toward AI-based educational innovations in the milieu of higher education in Quetta.

**Analysis by Constructs**

**Students' Acceptance of AI Tools (Items 1–10)**

The construct of acceptance was used to determine the level of receptiveness by students in regards to the adoption and maintenance of the use of learning technologies based on AI. The means of items were within 3.52 to 4.17, which represents good attitude in general. The Cronbach's 0.934 coefficient of α was a testimonial of high internal consistency. Most of the respondents supported some questions like the following: AI tools improve my academic performance, and I would like to use AI tools in doing academic work. Such findings indicate that students have largely recognized the importance of AI as a tool in aiding academic performance and intend to continue using it in their studying process. This pro-adoption tendency is also in line with Technology Acceptance Model (TAM) where behavioral intention is supported by ease of use and usefulness perceptions.

**Perceived Usefulness of AI Tools**

This dimension described the perceptions of students of the functional and academic advantages of AI tools. The scores have mean of 3.87 indicating high perceived usefulness by the respondents. Most of the students were unanimous that AI apps are helpful in gaining knowledge about complicated topics and save time studying. The statistically significant difference between the neutral midpoint was observed in a one-sample t-test ($t(197) = 23.60$, $p<.001$), and this actually confirms that AI tools are perceived as helpful to the learning process by the students. The scale reliability had been confirmed as the internal consistency was very good (= 0.871). The chi-square test ( 2= 0.62, p=.73) did not reveal any differences between the genders, which may indicate that there were not any differences in the perception of male and female respondents. Such findings are in line with the Technology Acceptance Model proposed by Davis (1989) which constructs that perceptions about usefulness as a predictor about technology adoption are very critical.

**Students' Engagement with AI Tools**

The construct of engagement was even formulated as the level of active participation, motivation, and involvement of the students in using the AI tools. The scale demonstrated a satisfactory internal consistency ( 0.759) following the reverse-coding of the negatively phrased version of the item, AI tools discourage me to study more. The mean score of 3.77 means that AI tools have a positive impact on engagement and motivation although a minor percentage of the respondents expressed neutral positions. A one sample T-test showed that there was indeed a significant increase beyond the neutral point ($t(197) = 17.03$, $p<.001$), which means that AI-based learning stimulates the student involvement. The results of an analysis of variance of sex showed that there are no statistically significant differences in this

case (F (1,196) =.20, p =.66) as both male and female students equally gain in relation to AI interaction. These results also support the educational engagement theories which argue the ability of digital tools to trigger student motivation, autonomy and collaborative learning activities.

**Comparative Analysis Between Universities**

To test the hypothesis of the presence of the difference in perception in the different institutions, one-way analysis of variance was utilized to test the responses of the University of Balochistan and BUITEMS on each construct. The results are discussed in Table 4.3.

**Table 4.3**
**ANOVA Results Comparing Universities**

| Variable | F | p-value | Interpretation |
|---|---|---|---|
| Acceptance | 7.117 | 0.008 | Significant difference (p < .05) |
| Usefulness | 0.893 | 0.346 | No significant difference |
| Engagement | 1.127 | 0.290 | No significant difference |

The statistical results showed that the construct of Acceptance was significantly different with students admitted at BUITEMS having a higher degree of approval of AI-driven tools as compared to those in the University of Balochistan. In its turn, no statistically significant differences were found as compared to the constructs of Usefulness or Engagement, which means that the respondents of both institutions share the similar views on the practical benefits and other engaging capabilities of AI technologies.

**FINDINGS**

Descriptive statistical analysis has shown that the participants were mostly in a favorable disposition towards AI-driven education tools. The average scores of Acceptance (M 3.76), Usefulness ( M 3.90), and Engagement ( M 3.79) support the assumption that students see AI tools as useful, helpful, and motivating in their studies.

Additional insight was obtained into patterned student perceptions because of inferential analyses. A one-sample t -test demonstrated that the mean of perceived usefulness and engagement were more than the neutral score (p <.001), which supports a positive attitude towards AI integration. Moreover, an ANOVA has revealed a statistically significant difference in the Acceptance of the two universities (F 7.117, p 0.008), which highlights institutional differences in the willingness of students in the two universities to accept AI. By contrast, neither perceived usefulness nor engagement demonstrated significant differences between the two institutions, indicating that the two institutions have similar perceptions regarding the usefulness of AI in education.

**CONCLUSION**

The present research has several salient conclusions. The trend among students of both universities is an acute willingness to use AI-based teaching instruments, and it indicates the growing level of awareness and willingness to use technologically supported learning. A significantly high difference between the rates of acceptance between the University of Balochistan ( UoB ) and BUITEMS Technological expertise highlights the central role of an organizational culture, management support, and exposure to technological tools in driving student adoption behavior.

The aspect of perceived usefulness can be viewed as a key decision factor predetermining the AI implementation in the educational sector. When the students realize that AI can advance their understanding, academic effectiveness, and performance, they will incorporate them in their education more often. The present finding supports the fundamental premises of the Technology Acceptance Model (TAM), and the Unified Theory of Acceptance and Use of Technology (UTAUT) when the perceived usefulness has a direct effect on an intention to use technology with the technology.

The use of AI tools also seems to increase the interaction of the students which makes it more engaging, motivational and curious. Whereas most of the respondents were found to be more engaged, some of them said that there was neutrality, indicating that durability to engagement could depend on the contextual and cultural flexibility of AI tools. Those institutions that implement locally specific, interactive AI systems will be better able to incur better engagement outcomes. The institutional differences are shown in terms of the level of acceptance as organizational readiness and infrastructure are vital factors that enable successful implementation. University of Balochistan also made somewhat more favorable dent, which may be explained by a greater institutional focus on the use of AI, whilst BUITEMS featured high perceived usefulness, which could be destined by its technical focus and access to resources.

On the whole, the results indicate that students have a positive, prospective attitude to the introduction of AI in the educational process. Instead of looking at AI as a threat to traditional paradigms of learning, students view it as the source of efficiency, individualization, and comprehension. Such an attitude indicates good environment to the growth of AI-based educational applications to the higher education environment in Balochistan.

**Implications of the Study**

In practice, the results emphasize the need of educational establishments to develop an AI-conducive learning environment. The researchers recommend that educators that incorporate AI applications in the delivery of instruction employ the use of the apps in enhancing the level of classroom interactivity, flexibility as well as individualized instructional experiences. Faculty development efforts are inevitable in order to make sure that AI can be utilized successfully and ethically as a part of pedagogies. In addition, AI literacy should be encouraged by policymakers to make sure that students and teachers are ready to change the educational landscape driven by technology.

On the institutional scale, universities in Balochistan could use these lessons to devise specific strategies to implement AI. University of Balochistan may use its high levels of acceptance by organizing the digital education programs and working on AI-based courses. On the other hand, BUITEMS can focus on the increase in engagement by using project-based AI-education and collaborative research activities, and student-led innovations.

**RECOMMENDATIONS**

- The AI literacy elements should be added to the curricula to create a more profound understanding and greater awareness of ethical issues.
- Colleges and universities should provide continuous professional education and training of faculty in AI.
- The institutes will have to modernize the digital infrastructure, including high-speed Wi-Fi, new computing tools, and special AI laboratories.
- The involvement of students must be induced through AI focused seminars, competitions and innovation hubs.

- Specialized AI applications, adjusted to the local and educational environment of particular regions with language-related needs, ought to be built.
- There should be clear national and institutional AI policy frameworks that are based on ethical considerations and inclusive practices.
- The areas of research need to measure longitudinal effects and to compare the relevant effects between regions in future.

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