

## ANALYZING HOW AI SHAPES PERSONALIZED EDUCATION AND STUDENT-CENTERED LEARNING IN HIGHER EDUCATION INSTITUTIONS OF SINDH, PAKISTAN

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### Article Info



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### Abstract

The main aim of current paper is to analyze how AI play its crucial role in developing the personalized learning and learner-centered. It focused on the advantages and the concerned issues. Moreover, quantitative research design was adopted by incorporating adopted questionnaire of likert type. The data was gathered from 300 students of higher education institutions of Sindh, Pakistan. The analysis of data was done by utilizing SPSS 28.0. The results uncovered that students at HEIs really endorse the advantages of AI in personalized learning and student-centered learning. A major portion of respondents showed agreement to the point that AI play pivotal role in personalized learning and showcased that it is very helpful in assessing learning, giving feedback, and is also considering needs and diverse educational backgrounds of learning. However, various challenge found to be hindering the process which need to be tackled before initiating AI in personalized learning. Based on the findings study recommended that higher authorities should keep in view the challenges and problems before developing policies related to it.

**Keywords:** *Artificial intelligence (AI), personalized learning, student centered learning*

## 1. Introduction

Education is considered as the foundational pillar for developing a nation and in current age of 21<sup>st</sup> century, the changing nature of education is permanently tied with technological advancement. Pakistan is playing a pivotal role in remodeling the education for rapidly growing youth population so that they could gain skill related to present environment of dynamic world (Saleem et al., 2025). It has been observed that conventional pedagogical structures including teacher-centered style of teaching are inappropriate in promoting creativity, critical thinking, and real-world problem solving which are key eligibilities of today's world (Salma & Ahmed, 2024). Such transition has made global education systems more responsive and fit to the individual needs and choices so called individualized education or personalized education (Ullah et al., 2025).

Additionally, the changing scenario of today's world requires such system of education that could emphasize self-thinking, bringing new ideas, self-centered learning, and professional attitude. Previously, teacher-centered method was recognized as a hallmark for delivering the lesson (Mladenovici et al., 2022). In this type of model, teacher acts as a primary role and only authority of knowledge (Woods & Copur-Genctruck, 2024; Murphy et al., 2021). Teacher has to do all the things like planning curriculum, deciding content and methodology to deliver the lectures, and make the students learn understand concepts. Pupils, in contrast, are passive receivers of knowledge without pushing their minds into thinking process, put themselves in problem solving situation (Kalman et al., 2020). In simple, this strategy totally depends on lectures led by teachers. But the artificial intelligence has reshaped the old-fashioned teaching method towards student-centered or personalized learning (Bhardwaj et al., 2023; Haider, 2023; Mustafa, 2023).

Individualized learning is another side of industrial age model of education that is one-size-fits-all. It refers to a system in which one can customize the learning styles as per individual needs and choices enabling them to raise questions for clarifications (Tariq, 2025). There is also philosophical related to this that is student-centered learning. This philosophy shows that learners are more passive and have many choices in terms of what and how they learn the things. It improves all the skills required for 21<sup>st</sup> century age (Qureshi et al., 2024). However, Ahmed & Meraj (2024) have shown that there are practical challenges especially in Pakistan where students' enrollment is more than the available space and where basic facilities are scarce. As the global community have switched to AI based solutions for educational affairs, personalized learning system has become prominent among educators (Tuomi et al., 2022; Zhai et al., 2021). Despite that, there is lack of awareness and understanding among local people, especially in Pakistan. They take less interest in utilizing the technological innovations (Khalid & Qureshi, 2020; Lim et al., 2022). AI has ability to facilitate pupil with unique instrument like personalized learning or student based learning through which one can easily analyze data, recognize different patterns, and adjust the response based on situation (Ullah et al., 2024). It can also determine the level of understanding at which one has mastered, propose learning activities to bridge particular gaps, and give real-time feedback that serves as a personal tutor (Afzal et al., 2024).

Furthermore, AI can be utilized for many multi-purposes like collaborating in different projects and institutional administrative tasks (Islam et al., 2025). At present the international market of educational technology is experiencing notable surge in AI based application, believing the future of education will be more inclusive, interactive, and efficient (Ullah et al., 2024). However, it is not a straightforward process for developing countries like Pakistan to adjust such a complex socio-educational process (Bali & Mughal, 2025). It includes unreliable infrastructure of internet, pricey technological tools, and lack of professional training programs for educators (Imtiaz et al., 2025; Iqbal, 2023). In addition, primary users of AI could better determine its effectiveness (Afsar & Shah, 2025). Hence, the perceptions of students should studied because they are the primary users. This study aims to analyze the learners' perceptions about the role of AI in supporting th personalized learning experience.

## **Literature review**

### **Evolution of traditional teaching towards personalized learning**

The trend of education is changing from direct method or teacher oriented method towards the indirect or learner centered that is also called the need and interest based teaching method throughout the globe (Bhardwaj et al., 2025). Personalized education refers to the modified instruction method and content that are best fit for the individuals' needs and interests. It empowers students to be more active and engage themselves in learning activities (Alam, 2023). Such teaching strategies provide more time for students' engagement, deeper comprehension, and boosted retention (Lee et al., 2021). According to the study of Zahra et al. (2025) it is challenging for the countries like Pakistan to adopt it with short resources.

### **AI as an educator**

The study Mehran et al. (2024) has mentioned that artificial intelligence in the shape of machine learning and language processing could be adopted as an influential tool to overcome barriers. It has made possible to analyze the huge number of data and detect gaps like knowledge, learning styles, and patterns of performance in just seconds (Loan, 2025). AI can manage dynamic content difficulty by facilitating students with additional and real-time material and effective feedback (Ali et al., 2025). Intelligent tutoring system (ITS), latest version of AI used for teaching, plays crucial role to teach students based on their needs and interests (Yadav, 2025).

Moreover, research has been evident that AI is getting acceptance globally in the field of education because of its advantages and efficiency of work but disclosed numerous concerns (Hussain et al. 2024; Park et al. 2012). The problems related to the privacy of data like biasness of algorithm and process of dehumanizing learning are found the most hindering (Hussain et al., 2024). Previous studies have also shown that black box nature of AI tools could create trust issues because sometimes AI algorithms give such suggestions which breach human trust (Cheng et al., 2016; Wu, 2021).

While, considering the situations in Pakistan, AI is a new discourse in education system (Zahid et al., 2025). The recommendations at policy level are trending. It has observed that there is a noticeable inequalities in digitalization educational institutions, and unacceptable changes in internet provision and technology based infrastructure based on the geographical locations of institutions are certain (Yaseen et al., 2024). It is clear from the above scenario that AI is a massive project but its execution is systematic and the expenses of pedagogy and other barriers associated with infrastructure could be overcome by taking into the perceptions of higher authorities.

Educators and researchers have long been interested in AI adoption in learning especially personalized learning through AI. The study of Graf et al. (2009) was a foundational study in this regard that disclosed the significance of adoptive learning systems. It was found in this study that such systems were developed to modify the delivery of content depending on individual's interests and background profiles, focusing on the flexibility of e-learning environment. The findings of Graf's study also put emphasize on advantages of adaptability, from enhanced student engagement to increased retention rates. Similarly, Johnson et al. (2013) mentioned that AI-supported online tutors are effective for growing learners' performance and comprehension.

However, the role of AI in personalized learning is appreciable and also underscore the significance of stabilizing technological developments with ethical considerations. The continuing discussions in this specific area grows for further exploration.

## **Methodology**

In order to investigate the perceptions of students about AI in enhancing personal learning and students-centered learning, the present study has utilized quantitative design of educational research in Pakistani context. Quantitative research is a type educational research in which data is gathered and analyzed in numbers by observing the patterns (Creswell, 2013). It helps researchers to testify the relationship between different variable like relationship between dependent and independent variables. It utilizes deductive approach of reasoning by taking into a large population (Creswell & Poth 2017). Survey questionnaire, likert type, was adopted from Nizami et al. (2025). The questionnaire included the demographic details of respondents, views of AI in personal learning and students-centered learning, and concerns related to ethics. The scores of responses were from strongly disagree (1) to strongly agree (5). The survey questionnaire is type of quantitative data gathering tool consists of close ended questionnaire with limited number of answer in the shape of options (Creswell, 2017). Responses were gathered from 300 students who were studying in higher education institution anywhere in Pakistan, academic disciplines include business, education, engineering, and computer science. This study utilized stratified sampling in order to ensure equal representation based on gender, academic discipline, and institutional type. All 300 responses were valid. Stratified sampling a probability sampling techniques in which stratum are set and each strata has equal chance of being selected (Creswell, 2013).

However, the data in present study was analyzed by using a statistical data analysis software SPSS 28.0. For further interpretation of data frequencies and percentages were deployed. These assisted in summarizing the trends, perceptions, and concerns related to AI. The whole process of conducting research was executed by taking into the ethical considerations

**Table No. 01**

<b>Statement</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>
<b>Aware of AI applications</b>	2% (6)	6% (18)	25% (75)	33% (99)	34% (102)
<b>Important for Pakistan</b>	4% (12)	4% (12)	19% (57)	35% (105)	38% (114)
<b>Role in personalized learning</b>	5% (15)	2% (6)	11% (33)	38% (114)	44% (132)
<b>Enhance teaching/learning</b>	3% (9)	7% (21)	12% (36)	37% (111)	41% (123)
<b>Better academic support</b>	4% (12)	6% (18)	16% (48)	26% (78)	48% (144)
<b>Students are prepared</b>	6% (18)	2% (6)	12% (36)	45% (135)	35% (105)
<b>Reduce learning gaps</b>	1% (3)	4% (12)	15% (45)	38% (114)	42% (126)
<b>More engaging</b>	14% (42)	11% (33)	20% (60)	30% (90)	25% (75)
<b>Trust AI recommendations</b>	2% (6)	7% (21)	26% (78)	30% (90)	35% (105)
<b>Essential for future</b>	5% (15)	2% (6)	15% (45)	43% (129)	35% (105)

The findings of present study showed that overall respondents hold positive point of views about AI in education. As per the analyzed data 65% of the participants unveiled that they are aware of AI and 8% are unaware. In the same way, 73% showed that AI is important for Pakistan.

The role of AI in education hit the highest positive score as the 82% of participants reported agreement and 7% showed disagreement. Similarly, 78% of total participants agreed that AI has ability to sharpen teaching-learning process. On other hand, 74% disclosed that it supports them in academic affairs. Regarding the preparedness of learner's, in terms of using AI in their learning, 80% pupil exposed that students are prepared to adopt it.

On the brighter side, majority of participants, with 80%, agreed that AI declines gaps in learning while, 55% believed it is more engaging. As for as trust is concerned 65% of total respondents declared that AI could be trusted in terms of its advantages. However, it was strongly agreed by 78% of pupil that AI is very essential for future. In conclusion, it was recognized by majority of the respondents that AI is important for education system for enhancing student independency and personalized learning.

**Table No. 02**

<b>Statement</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>
<b>Identifying strengths/Weaknesses</b>	3% (9)	7% (21)	17% (51)	33% (99)	40% (120)
<b>Customizing learning plans</b>	2% (6)	4% (12)	18% (54)	42% (126)	34% (102)
<b>Adapt to student's pace</b>	4% (12)	5% (15)	14% (42)	35% (105)	42% (126)
<b>Providing timely feedback</b>	7% (21)	4% (12)	12% (36)	37% (111)	40% (120)
<b>Improve performance</b>	4% (12)	5% (15)	15% (45)	42% (126)	34% (102)
<b>Easier self-learning</b>	5% (15)	6% (18)	12% (36)	35% (105)	42% (126)

<b>Fairer assessments</b>	4% (12)	3% (9)	15% (45)	39% (117)	39% (117)
<b>Support different styles of learning</b>	14% (42)	11% (33)	29% (87)	24% (72)	22% (66)
<b>Enhance motivation</b>	7% (21)	19% (57)	11% (33)	30% (90)	33% (99)
<b>Ensure inclusivity</b>	4% (12)	5% (15)	10% (30)	42% (126)	39% (117)

The results of current study showed that AI is helpful for initiating personalized learning specifically in adjusting needs of learners. Majority of students, with 73% of participants, reportedly showed that it can help teachers to diagnose learner's strengths and weaknesses. It was also mentioned by 76% of respondents that AI could be utilized for customizing learning plans. Similarly, 77% of pupil in this study claimed that AI is suitable for adapting learner's pace and believed that it can facilitate students with a timely feedback and 76% agreed that it could improve their academic performance.

The results also showed, with a clear majority of 77%, that AI is beneficial for having an easier self-learning. It also disclosed that 78% of participants agreed that AI has such assessment tools through which teachers could assess the learning of students fairly.

The concerning areas which got cautious responses are support diverse learning styles and enhances motivation. It was mentioned by 46% of total sample that AI support diverse learning techniques but it was concerning that 26% of participants disagreed to this point and is really concerning. It is also noteworthy that 29% showed neutral responses which means they have mixed perceptions about it. On other hand, 66% showed that AI increases motivation of students but 26% showed disagreement which is also a worrisome matter. However, 81% believed that AI ensures inclusivity. In conclusion, the concerning areas need to be considering at the time developing policies.

Table No. 03

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Disagree
<b>Empowers student control</b>	4% (12)	7% (21)	19% (57)	43% (129)	27% (71)
<b>Encourage collaboration</b>	5% (15)	6% (18)	20% (60)	50% (150)	19% (57)
<b>Reduces teacher dependency</b>	6% (18)	8% (24)	17% (51)	29% (87)	40% (120)
<b>Promotes critical thinking</b>	8% (24)	5% (15)	14% (42)	31% (93)	42% (126)
<b>Improves engagement</b>	2% (6)	4% (12)	16% (48)	50% (150)	28% (84)
<b>Access resources</b>	5% (15)	6% (18)	12% (36)	35% (105)	42% (126)
<b>Encourage creativity</b>	6% (18)	2% (6)	20% (60)	40% (120)	32% (96)
<b>Improves communication</b>	4% (12)	3% (9)	15% (45)	38% (104)	40% (120)
<b>Supports continuous learning</b>	3% (9)	9% (27)	33% (99)	32% (96)	23% (69)
<b>Essential for shift to SCL</b>	5% (15)	4% (12)	11% (33)	43% (129)	37% (111)

The analyzed data showed a strong positive perspective about the role of artificial intelligence in advancing student-centered learning. The results of present study disclosed that students are empowered when they use AI in their learning. In this regard 70% of the respondents exhibited agreement. Meanwhile, 69% mentioned that it also encourage collaboration and reduces teacher dependency which further enable the team work among pupil.

In addition, 73% of total participants declared that AI elevates critical thinking and 78% showed that it improves engagement. In the same way, 77% agreed that AI is capable of facilitating

learning resources to students and 72% agree that it encourage creativity. One other hand, the most distributed responses were related to the continuous learning as 55% showed that it provides continuous learning while, 12% disagreed to this point and 33% participants has neutral perception.

Additionally, 78% agreed to the point that AI improves communication skills. However, it was mentioned by 80% of the respondents that AI is very crucial for shifting traditional learning to student-centered learning. Generally the results showcased that AI is considered mot triggering factor for bringing up the student-centered learning into the classroom.

**Table no. 04**

<b>Statement</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Disagree</b>
<b>Lack of infrastructure</b>	1% (3)	3% (9)	11% (33)	35% (105)	50% (150)
<b>Teachers need training</b>	2% (6)	4% (12)	18% (54)	29% (87)	47% (141)
<b>High cost</b>	8% (24)	6% (18)	13% (39)	30% (90)	43% (129)
<b>Ethical concerns</b>	3% (9)	5% (15)	20% (60)	33% (99)	39% (117)
<b>Data privacy risk</b>	6% (18)	4% (12)	13% (39)	44% (132)	33% (99)
<b>Increase urban-rural inequality</b>	3% (9)	6% (18)	45% (135)	26% (78)	20% (60)
<b>Reduce critical thinking</b>	38% (114)	20% (60)	17% (51)	15% (45)	10% (30)
<b>Limited awareness</b>	2% (6)	3% (9)	25% (75)	38% (114)	32% (96)

<b>Replace teachers</b>	7% (21)	6% (18)	28% (84)	32% (96)	27% (81)
<b>Need government policies</b>	5% (15)	4% (12)	11% (33)	43% (129)	37% (111)

The findings unveiled that a major portion of respondents agree that AI is very important for successfully integrating personalized learning but it is not a problem free process and possess various challenges. The most concerning barriers are lack of infrastructure and need for government policies. In this regard 85% that there lack of concerned infrastructure at educational institutes and 80% agreeing that government need to revisit the policies.

Similarly, 72% respondents showed that there are ethical concerns and 77% mentioned that there is risk of data privacy. While, 76% of respondents showed their views that teacher are technically untrained thus they need training to update their skills and 70% of educators are unaware about the importance of AI and personalize learning especially the old fashioned. the responses related to urban rural inequality were most distributed as 46% showed agreement, 9% showed disagreement, and 45% showed neutral perceptions which means almost half of the respondents are still undecided whether it increases urban rural inequality or not. Moreover, it was also shown by 73% of participants that it is expensive and is not manageable with limited budget and 69% respondents claimed that it could replace the teachers because there are many self-paced courses in which there is no need of teachers.

However, there was a distributed answer related to the lessening critical thinking as 25% agreed to this point, 58% disagreed, and 17% showed neutral responses. In conclusion, the findings of current study showed there are challenges like lack of infrastructure, teachers training, ethical concerns, limited awareness among teacher and so on which need to be considered while developing the policies.

## Discussion

The major aim of current was to analyze how AI play its role in developing personalized learning. The analyzed data unveiled that students perceive AI in their learning as optimistic and theoretical. It was found in this study that teachers are aware about the advantages of AI in developing student-centered classrooms. Similarly, the study of Afzal et al. (2025) showed that AI is a powerful tool for support learner centered classroom. This study also revealed that AI is helpful for fostering soft skills of students such as critical thinking and creativity by providing them with access to the learning resources. In this regard it was mentioned by Ahmed & Meraj (2024) that AI assist pupil to access learning vast material within their fingertips.

AI is not only limited to provide easier learning but also help educators in giving timely feedback. As exposed in the findings of present study that AI is helpful in diagnosing the strengths and weaknesses, customizing learning plans for students, and give feedback by considering the needs and diverse educational backgrounds of learners. Ali et al. (2025) has shown that AI is recognized as a best tool for the need-based assessment. It assesses students based on their backgrounds and provide them a proper timely suggestions to improve their learning. Further, Bali & Mughal (2025) have also added into it that technological tools like AI and ChatBots are capable of identifying the areas of improvements and suggest plans for learning.

Nonetheless, the results has uncovered that AI is truly helpful when it comes to increase motivation and reduce teacher dependency, polish communication and engagement, boost critical thinking and creativity, and support continuous learning. Hussain, Satti, and Khan (2024) has also found that successful integration of personalized could be ensure by incorporating AI because AI is such a tool which is beneficial in terms of increasing critical thinking, creativity, and reduces dependency of students on teacher. Further, it was also identified that it creates an engaging environment in classroom where pupils could participate in different activities.

However, the intersection AI and personalized could be an easy going process rather a troublesome because the study found various factors that were hindering its integration. The challenges were lack of concerned infrastructure, need for professional training of teachers, ethical concerns and data privacy risks, and high cost. The study of Imtiaz et al. (2025) also had similar findings like integrating AI in personal learning could encounter numerous challenges such as unavailability of AI based infrastructure, high cost, ethical problems, and less trained teachers. However, the government needs to consider the challenges found in this study before initiating AI in personalized learning.

## **Conclusion**

The present study aimed to analyze how AI triggers personalized learning and uncovered that AI could be very helpful for executing personalized learning. It has many benefits too but the challenges are very important those need to considered when developing any policy related to technology especially AI. To sum up the results of current study the study recommends that educational institutions should be equipped with infrastructure which could support the AI and personalized learning. Authorities should arrange professional development training programs so that educators could update their skills with respect to the advancement in techno-pedagogy. The training programs will to only advance their skills but these will also aware them about the ethical concerns and enable them to tackle them.

In addition, technology is too expensive so separate funds should be sanctioned for the AI and personal execution. Moreover, there should awareness campaign related to the AI and personalized learning so that the old fashioned teachers could be made aware about AI and personalized

learning. Or the teachers who undergo professional training should also share the learnt skills with them. Nonetheless, the government policies should be revisited and amended time to time because technology is day by day getting advance.

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