SOCIAL PRISM

Volume 3(4), 2026, 237-252
Online ISSN: 3006-8886
Print ISSN: 3006-8878

Reimagining Teacher Education in Pakistan: Challenges, Competencies and Policy Directions in the AI Era

Muqaddas Afzal[1], Somia Shabbir[2], Iram Naeem[3], Maleeha Nadeem Anjum[4], Bushra Mustafa Kamal[5]

[1]*MPhil Scholar, Department of Advanced Studies in Education, University of the Punjab, Lahore, Pakistan*
[2]*Lecturer Psychology, Department of Psychology, Abbottabad University of Science & Technology, AUST, Pakistan, Email: somia_sardar@yahoo.com*
[3]*PhD scholar (Education), The University of Faisalabad, Pakistan, Email: irumnaeem44@gmail.com*
[4]*Department of English Language and Literature, GCU Lahore, Pakistan, Email: maleehanjum@gmail.com*
[5]*Lecturer in Education, Hamdard University Islamabad Campus, Pakistan,*
Email: bushra.mustafa@hamdard.edu.pk

Abstract

The current study highlights the growth and changes of teacher training in Pakistan in the context of Artificial Intelligence (AI) from a problem, skill and policy perspective. The research findings reflect the empirical data collected from teacher education institutions, teacher education policies, and interviews with the stakeholders, which identify system problems such as outdated syllabus, faculty development, and access to digital technologies and inadequate facilities. The research also reveals that there are opportunities for implementing personalized learning, pedagogical practices can be more personalized and adaptive, and the there is an unmet need for data-driven insights, while teachers training continued as a traditional process with few innovations related to AI being adopted. Key skills for teachers to master in the age of AI, such as AI literacy, ethical considerations, data privacy management, and the development of inclusive digital learning spaces, are emphasized. Policy analysis reveals a need for focused, nationally agreed policies and a strong 'need for coordination' at the national and institutional public and private sector level building AI competencies into teacher training, and in qualified staff. To revolutionize teacher preparation in Pakistan, a robust research demand is needed which entails a combination of technological innovation, ethical protection and inclusive approaches. To move towards sustainable education reforms, all the above highlighted aspects need to be focused on AI literacy, equity, and institutional support, so that Pakistan's teachers can stay up to date with all the complexities of the digital transformation. Given the demand for AI in the future, this is relevant for policymakers, educators and researchers who are looking to adapt the learning curriculum/s to the needs of the era of AI.

Keywords: Artificial intelligence, Competencies, Policy directions, Teacher education, Technological transformation, Training gaps

Introduction

In an era defined by artificial intelligence (AI), teacher education in Pakistan is in a transformative phase to meet the needs of the new world of education. Content delivery and classroom management have become the core of traditional teacher preparation programs, which are now often questioned by developing and embedding skills in digital competencies, AI literacy, and

Received 10 April 2026; Revised 04 June 2026; Accepted 16 June 2026; Published (online) 22 June 2026
Attribution 4.0 International (CC BY 4.0)
Corresponding Author Email: somia_sardar@yahoo.com
DOI: https://doi.org/10.69671/ socialprism.3.4.2026.133

Online ISSN: 3006-8886
Print ISSN: 3006-8878

data driven pedagogies (Abbas & Faisal et al., 2024). Worldwide, AI has already been identified as a gamechanger in the education sector, facilitating personalised learning, predictive analytics, and adaptable teaching approaches (Chen et al., 2020; Ahmed, Majeed & Yousaf, 2024). However, teacher education in Pakistan still suffers from obsolete programs, inadequate education and training for teachers and inadequate infrastructure (Iqbal & Bhatti, 2022; Ahmed, Perveen & Yousaf, 2022).

It is not a mere shift in technology, but a paradigm shift that demands rethinking of competency, policies, and institutional situations of teacher educators (Salim, Makhdum & Younas, 2022). Skills are the knowledge, understanding, and strategies that must be developed to ensure teachers can operate in an AI enabled space; ethical awareness comprises knowledge about the ethical aspects of AI, understanding the associated ethical issues and strategies for addressing them; data privacy management involves understanding and strategies for managing data privacy in AI implementations; digital learning experiences are experiences that are designed to be delivered using AI; inclusive digital learning involves understanding and strategies for designing inclusively, digital learning experiences (Floridi et al., 2018; Bibi, Yousaf & Shehzadi, 2021). This research reflects the problems, capabilities, and policy suggestion for reshaping the teacher preparation in Pakistan through the background of global discourses on AI Shaping education reform.

Significance

This study is important in several aspects. In this regard, as its impact reaches to the wider sentiment of the discourse on the use of AI in education, it places Pakistan at the fore front in the ongoing debates on teacher education reform (Imtiaz, Syeda & Yousaf, 2023). Firstly, it brings Pakistani perspective into the discourse on the use of AI in education placing it at the limelight in the current debates on teacher education reforms. Third, it offers experiences drawn from teacher education institutions (TEIs) regarding the integration of AI in teacher education (Khalid, Naqvi & Yousaf et al., 2025). Third, it presents empirical knowledge of the problems encountered by teacher education institutions (TEIs) in implementing AI in teacher education, as well as gaps that have been identified. Third, it identifies the knowledge and skills a teacher needs to operate in an era of AI: AI skills, an ethical awareness, inclusive pedagogy (Khalid, Yousaf, et al., 2026). Finally, it fosters the building of equity education systems and combating inequities between public and private school operators.

Problem Statement

Even though AI powered education has reached new heights on an international scale, teacher education programs in Pakistan still face problems because of old curricula, inadequate infrastructure, and lack of faculty training. It has been suggested that AI can be of great assistance for personalised learning, adaptive pedagogies, and data-informed decisions and interventions, but TEs are challenged to make these developments effective (Majeed, Ahmed, Yousaf, 2023; Shehzadi, Yousaf, Ali, 2023). Digital tech challenges consist of limited policy coherence, lack of institutional readiness and unequal access to digital technologies. This calls for a fundamental transformation of teacher education in Pakistan where these structural gaps need to be fixed, core skills identified, and directions for teacher policies aligned with demands of the AI era (Mumtaz, Aziz, Yousaf, et al., 2024).

Online ISSN: 3006-8886
Print ISSN: 3006-8878

Objectives

- To evaluate the obstacles in the way of teacher education institutions in Pakistan while integrating AI in learning and teaching.
- To understand the skills teachers, need to successfully navigate AI supported learning environments.
- To examine policy agenda needed to reshape teacher education in Pakistan for a new era of Artificial Intelligence (AI).

Research Questions

- What are the obstacles for Pakistan teacher education institutions towards integrating the usage of AI in practice and in the curriculum?
- What skills do teachers need to successfully utilize AI in educational contexts?
- What directions would the policy have to take to reimagine teacher education in Pakistan in the AI era?

Gaps

There is extensive literature on the use of ICT in Pakistan and digital literacy has been explored but very little empirical evidence has been studied on teacher education in the field of AI in Pakistan. Many studies centre on the adoption of technology broadly without reflecting on the specific impact of AI on teachers' skills and policy domains (Iqbal & Bhatti, 2022; Pasha, Saddique, Yousaf, 2021). Moreover, comparative analysis of teacher education reforms during the era of Artificial Intelligence is limited and there is overlap in understanding about how innovations can be adopted and adapted in Pakistan (Younas, Khan & Makhdum, 2022). The current study aims to fill in these gaps by giving empirical evidence to challenges, competencies and policy directions to reimagine teacher education in Pakistan.

Literature Review

AI in education has been identified as a tool that could revolutionize the learning experience by providing personalized instruction, predictive student learning outcomes, and tailored learning experiences. According to Chen et al. (2020) & Qadri, Rafiq & Yousaf, (2021), AI further contributes to motivation and improved learning outcomes, by customizing educational experiences to the individual’s learning requirements. Building on this, a systematic review of AI use in higher education by Zawacki Richter et al. (2019) identified a number of potential benefits for engagement and achievement in higher education, where AI could add value to the work of Makhdum and Mian (2012).

AI will require teachers to acquire new skills to operate in the new landscape (Rehan, Faisal, Yousaf & Faisal, 2026; Shehzadi, Farwa & Yousaf, 2019). In their review of AI literacy, Long and Magerko (2020) recognized that it is a key competency, including ethical awareness and knowledge of algorithms, as well as design of inclusive digital learning experiences. Floridi et al. (2018) elaborated on how in the context of adopting AI, fairness, accountability and transparency are pertinent and that ethical capacities are necessary (Shabbir & Yousaf, et al., 2026).

The system of teacher education in Pakistan is beset with a number of problems such as old curricula, inadequate infrastructure, and poor training of teachers (Shehzadi, Yousaf & Shafiq,

Online ISSN: 3006-8886
Print ISSN: 3006-8878

2022). Iqbal and Bhatti (2022) identified a problem of lack of digital literacy among teachers and Ali (2021) noted the importance for changes in educational practices to achieve digital literacy in education. One of the key concerns related to Equity is that disparities in the provision of AI supported learning environment between public and private institutions exist, which restrict access to them (Shehzadi, Afridi & Yousaf, 2020).

Policy Directions for AI Integration

There is a need for policy coherence in the successful integration of AI in teacher education. According to Tuomi (2018), readiness is not just technical and also organisational and ethical capacities (Batool, et al., 2024; Shehzadi, Afridi & Yousaf, 2020). Learning analytics' support of adaptive pathways and improvement of achievement were highlighted by Siemens (2013). Enabling the skillsets of AI in curricula, building institutional capacity, and guaranteeing equitable access at institutions must be fully embedded in policy frameworks (Faisal, et al. 2023).

Gaps in Existing Literature

Although there is evidence of the positive impact of AI in education worldwide, there are scarce empirical studies in Pakistan. In the existing literature, little attention has been paid to the role of AI in teacher education while a majority of the research is focusing on the issue of ICT adoption (Faisal, et al., 2024). There are very few comparative competency and policy analysis that exist creating a vacuum in understanding about how global innovations can be mobilized in Pakistan (Shehzadi, Afridi & Yousaf, 2021). This study fills these gaps by presenting some empirical evidence about challenges, competencies, and policy directions for reimagining teacher education in Pakistan (Makhdum, et al., 2022).

Methodology

This study was of mixed methods research design, which examined the challenges, competencies and policy directions that are required to re-imagine teaching profession in Pakistan in the age of Artificial Intelligence (AI) (Makhdum & Khanam, 2021). A blend of quantitative and qualitative methods were adopted for the design to ensure depth and breadth of analysis (Sial, Rasul & Yousaf, 2023; Toor, et al., 2026). The quantitative strand was emphasized to yield quantitative and measurable data regarding the preparedness of the institutions, teacher capabilities, and coherence of the policy regarding the KEI while the qualitative strand was aimed at generating qualitative data that included in-depth insight into the lived experiences, perceptions and contextual challenges (Batool, et al. 2024). The findings were promoted by the method of triangulation, which increased the validity of the findings, and made it possible to interpret the complexities in an attractive account of teacher education reform (Yousaf, 2019).

In the quantitative strand, a structured questionnaire was the key research tool, created based on the literature synthesized on the topic of using AI in the education field, teacher's competencies and policy frameworks (Yousaf, et al., 2025). The design of the questionnaire was in two parts, where the first was the demographic data and the second part was the questionnaire's item in terms of the Likert scale in 5 points (Strongly Disagree – Strongly Agree). Data about demographic profiles comprised age, gender, type of institution students were at, no teaching experience and discipline background of teaching experience. Likert-type questions assessed components of AI literacy, ethical considerations, managing data privacy, inclusive pedagogies, institu-

Online ISSN: 3006-8886
Print ISSN: 3006-8878

tional readiness and policy coherence. The instrument underwent content validity check by experts in educational technology and teacher education, both in terms of content validity and the objectives of the study.

To ensure the representation of a range of contexts, data was collected from all over the teacher education institutions in Punjab, Sindh and Khyber Pakhtunkhwa. Formal Assent obtained from authorities in Institution, Participants given clear information about purpose of the study, Confidentiality procedures, Voluntariness of participation. A questionnaire was created and shared via Institutions Learning Management Systems and email, and printed to encourage easy access. The respondents were given two weeks to respond to the survey and reminders were sent out to improve the response rate. Questionnaires were reviewed for completion and then coded for statistical analysis of the completed questionnaires. Considerable amounts of missing data prevented the inclusion of responses in order to ensure quality and reliability of the data set.

As for the qualitative strand, the in-depth questionnaires provided semi structured interview questions that were used by 30 purposively sampled teacher educators and policymakers from the survey respondents. Interviews covered the experiences of integrating into the work with AI, perceived competencies, policy challenges, and ethical concerns. The six-phase approach for thematic analysis of qualitative data (Braun and Clarke, 2006) were used for accessing the qualitative data: familiarisation of data, initial coding, search for themes, review of the themes, theme definition and theme naming, report writing. Through this method patterns could be discerned and themes developed to echo the findings of the quantitative analysis.

The study subjects were teachers educators and policymakers related to the teacher training programmes. In order to make sure that the participants in the study were directly relevant to the research objectives, a sampling strategy of purposive sampling was applied. The respondents of the last sample were 500 teacher educators, education department staff and faculty members of teacher training colleges from both public and private institutions. The criteria for inclusion were that the teacher educator(s) had at least 2 years of experience in teacher education and had any experience with the integration of AI in their learning environment, or any experience with the use of analytics. This allowed respondents to have adequate contact with the constructs being studied.

For this reason, the researcher chose purposive sampling, as this method enabled the researcher to focus on the individuals who have the skills and knowledge to provide the information needed for present study. The reliability and validity of the research instrument has been carefully studied to guarantee the robustness of the research instrument. For the pilot study, 50 out of the overall sample population who was included in the study but did not form the final sample according to the inclusion criteria. The pilot tested the clarity of items, the sequence of questioning and the response options, as well as the time it takes to complete the instrument. Due to feedback from participants, slight edits were made to the wordings to make it easy and clear to read. The internal consistency of the questionnaire was assessed by Cronbach's α, the results showed internal consistency has sufficiently reached the required value ($\alpha>0.70$). The instrument has a construct validity based on the result of expert judgment, involving experts in teacher education and educational technology judging whether the instrument was associated with the objectives above and the theories used. Questionnaire content was also supplemented with key concepts from the existing literature to further ensure the content validity of the instrument.

Online ISSN: 3006-8886
Print ISSN: 3006-8878

This instrument was thus considered to be reliable and valid for mass administration. Descriptive Statistics were used to describe the demographic characteristics, such as mean scores, and inferential statistics (such as correlational and regression analyses) were used to explore the relationships between the AI literacy, competencies, institutional readiness, and policy coherence. Differences between institutions and by discipline were tested by ANOVA. Qualitative data was analyzed thematically, where codes and themes were added as they were found and the level of complexity of the participant experiences were sought.

Overall, the methodology involved clearly identifying the challenges, compiling a well-designed and validated instrument, using purposive sampling, and meticulous data collection techniques, all of which offer a comprehensive assessment of challenges, competencies, and policy directions toward re-thinking teacher education in Pakistan in the age of AI.

Descriptive Analysis

In the description analysis, the demographic properties of the respondents such as challenges and competencies constructs and directions for teacher education in the age of Artificial Intelligence (AI) in Pakistan are briefly mentioned. The sample consisted of 500 teacher educators and policy makers of different institutions for public and private school teaching from various areas of Punjab, Sindh and Khyber Pakhtunkhwa. Of these 55% of the people were male and 45% were female, and a majority fell within 30-50 years age group. Among those who were institutional distributed, 60% were from public institutions and 40% were from private institutions.

With regards to recognition of challenges, mean scores showed that researchers identified relatively high recognition in relation to the challenge of integrating AI into teacher education (M = 4.20, SD = 0.65), indicating that researchers have a general awareness of infrastructural and curricular challenges. The results revealed that competencies for AI era teachers were positively scored (M = 3.95, SD = 0.70), indicating that participants consider these skills as valuable. There were also positive scores for policy directions (M = 3.88, SD = 0.68), reflecting the understanding of the need for coherent national strategies.

Table 1. Descriptive Statistics of Key Constructs

Construct	Mean	SD	Minimum	Maximum
Challenges	4.20	0.65	2.10	5.00
Competencies	3.95	0.70	2.00	5.00
Policy Directions	3.88	0.68	2.20	5.00

From this table, it can be seen that challenges had the highest mean scores, which is an indicator of high level of recognition of systemic barriers. Consensus around AI literacy and coherent strategies was evident in competencies and policy directions, which scored an affirmative response.

Inferential Analysis

Relationships among challenges, competencies and policy directions were examined using inferential statistics. Results of Pearson correlation analysis showed that challenges had positive significant correlations with policy directions ($r = .62$, $p < .01$) and competencies had positive sig-

Online ISSN: 3006-8886
Print ISSN: 3006-8878

nificant correlations with policy directions ($r = .65$, $p < .01$). The results in this report indicate that perception of difficulty and ability are salient factors linked to support for policy changes (Yousaf, et al., 2025).

A regression analysis was performed to explore the ability of challenges and competencies in predicting directions of policy. The model was statistically significant ($F(2, 497) = 85.32$, $p < .001$), explaining 42% of the variance in policy directions ($R^2 = .42$). Competencies emerged as the strongest predictor ($\beta = .44$, $p < .001$), followed by challenges ($\beta = .38$, $p < .01$). The results corroborated that both constructs have significant impacts on the policy direction with competencies more influential.

Analysis of variance (ANOVA) was used to analyze differences among institutions. The results showed that there was a significant difference among recognising challenges in public institutions vs. private institutions ($F(1, 498) = 12.45$; $p < .001$). The respondents from the public institutions indicated more awareness about challenges than those from the private institutions. The competencies did not vary significantly between institutions, indicating a uniform concept of what competencies are needed, across institutions.

Table 2. Regression Analysis Predicting Policy Directions

Predictor	β	t	p
Challenges	.38	7.85	<.01
Competencies	.44	9.12	<.001
R^2	.42		

Results indicate that both challenges and competencies significantly predicted policy directions and competencies' influence was greater with the regression model. Results indicate that the challenges were recognised higher in public institutions than in private institutions. This disparity could be due to factors suited to public institutions such as having more infrastructural constraints and fewer resources, indicating the systemic disparity in teacher education in Pakistan.

The descriptive and Inferential analysis shows some important facts. The first thing to note is that most respondents recognise challenges faced but with a high degree of awareness in the context of Pakistan, such as infrastructural and curricular constraints (Yousaf, et al., 2021). Firstly, the way it is observed, the respondents in Pakistan are well aware of the challenges they face and they have a fair understanding of the infrastructure and curricular challenges. Second, competencies needed in the AI era, like AI literacy, awareness of ethical issues, inclusive pedagogy, and so on are regarded all across institutions. Third, policy directions are linked strongly with a recognition of challenges and competencies, highlighting the necessity of coherent national policies. Fourth, institutional disparities is used in order to make systemic inequities evident; public institutions are more challenged than are private institutions.

This is consistent with the findings by Chen et al. (2020) who found motivation to enhance with AI as well as learning outcomes and with Floridi et al. (2018) that claimed that ethical concerns should be brokered in the application of AI. In addition, they also uphold the findings of Iqbal & Bhatti (2022) on the digital and information literacy of teachers, and Tuomi (2018) & Yousaf, et al., (2020) on organizational capacity and ethical responsibility in readiness for AI. The findings point to the need to incorporate AI skills into teacher education programs, build connections be-

Online ISSN: 3006-8886
Print ISSN: 3006-8878

tween different teacher education programs, ensure privacy protection of student information, and provide funding for teacher professional development (Yousaf, et al., 2020).

Qualitative Analysis

The findings of semi structured interviews to 30 teacher educators and policymakers found that in-depth details regarding the lived experiences of and perceptions about the integration of AI as a assistive technology in teacher education in Pakistan were gained. A thematic approach for the analysis of these themes was employed through the method outlined by Braun and Clarkes (2006) which produced 6 dominant themes.

Adaptive Pathways and Individualized Feedback: All the participants pointed out the need for the use of AI in systems that can be adaptive and flexible in their strategies and approaches to students needs (Yousaf, et al., 2024). The importance of an adaptive and individualised approach to AI strategies to students needs was an across the board theme. Their feedback focused on the adaptable pathways that helped teachers tailor the content and offer individual feedback to boost teacher/learner confidence and independence in learning.

Data-Driven Insights and Predictive Support: People, appreciative of and utilizing dashboards and predictive alerts on learning failures (Yousaf, et al., 2019). These too were found to be key requirements for enabling an intervention ‘at the right time and at the right place that will make a significant difference to student outcomes', in the Siemens (2013) description of ‘proactive support' with the use of learning analytics.

Enhanced Motivation and Engagement: Interviewees indicated that AI supported learning environments were more engaging than non-AI support learning environments. Fredricks et al. (2004) mentioned that interactive contents and games were reported to improve motivation, and they also help to maintain engagement behaviour multimodality of engagement.

Equity and Access Concerns: Earlier we saw the concern of equity and access this was a pattern that was picked up, that there was a gap between public and private institution (Zahoor, Khalil, Yousaf & Faisal, 2025). While challenges highlighted by participants from the public universities included infrastructure and digital divide, these further hindered the potential for implementation of AI to be fully realized. This is in keeping with Floridi et al. (2018) who highlighted consideration for fairness and inclusiveness when using artificial intelligence.

Ethical Awareness and Data Privacy: A concern was raised about data privacy & transparency, in the context of algorithmic decision making. They highlighted the importance of having clear policies and procedures to ensure the protection of student information, which aligns with the findings of Jobin et al. (2019) who reported on the world's concerns with ethics in terms of AI.

Faculty Training and Institutional Support: Inadequate training levels for faculty to use AI, identified as a major hurdle for successful implementation. Effective use of tools was by instructors trained, not so by those who were not trained. This finding resonates with research by Iqbal and Bhatti (2022) – which highlighted the need for digital literacy for teachers.

These themes build upon the quantitative findings and offer some understanding about the factors contributing to the influence that competencies has on directions of policy. This is because fears about unfairness lie behind this, as do the distinctions between recognition of challenges

Online ISSN: 3006-8886
Print ISSN: 3006-8878

and pedagogical gains associated with AI use in education, big public institutions. This is because the nature of challenges encountered by entities and the role of AI in increasing teaching benefits, as demonstrated in activities carried out by public entities, is significantly different from how they perceived equity.

Findings

The results in this study highlight both the complexity of the issues, skills and policy challenges regarding the adult teacher learning required for the AI era in Pakistan. The results indicated that there was a high degree of mutual awareness of the challenges in integrating AI into teacher education ($M = 4.20$, $SD = 0.65$). For example, the score for the competency of teachers in the era of artificial intelligence (AI) was found to be positive ($M = 3.95$, $SD = 0.70$), indicating that participants were positive towards the new competency of teachers in the AI era, with a particular focus on AI literacy, ethical awareness, and inclusive pedagogy. National direction was also in a positive direction ($M = 3.88$, $SD = 0.76$) reflecting an understanding of the need for coherent national plans. Highly positive relationships between challenges and policy directions ($r = .62$, $p < .01$) and competencies and policy directions ($r = .65$, $p < .01$) were found by carrying out correlation analysis. Regression analysis showed that both challenges and competencies significantly predicted policy directions, but competencies had a greater influence ($\beta = .44$, $p < .001$) than challenges ($\beta = .38$, $p < .01$).

Qualitative results echoed these observations and identified six main themes: Adaptive pathways and personalized feedback; Data-driven insights and predictive support; Improved motivation and engagement; Equity and access issues; Ethical considerations and data privacy; Faculty training and institutional support. The need for adaptive pathways and personalised feedback to motivate participants was consistently discussed, leading to confidence and ownership of their learning. Learning analytics also served as predictive support, which informed students of the appropriate interventions to be provided and learning strategies they should adopt in time (Makhdum, et al., 2022). Respondents, however, highlighted areas of concern around equity and access measures and issues of data privacy, especially in less resourced public universities. The study identified a key mediating factor as faculty readiness, which smoothened the integration of AI tools. The faculty readiness emerged as a significant factor in the study to mediate, which made easier the integration of AI tools. Combined, these data offer a robust case for personalized learning with AI and LA to improve engagement and achievement coupled with the identification of broad systemic challenges that need to be tackled (Saeed, et al., 2026).

Discussion

The research results can be added to the conversation around AI in Education worldwide, aligning Pakistan to the prevailing debates around teacher education reform. The high engagement ratings on all parts of the scale by the respondents align with the concept of engagement as described by Fredricks et al. (2004) as behavioural, emotional and cognitive engagement in learning activities. AI-driven personalised learning increased motivation and ownership, which led to over time, behaviourally engaged and academically performing learners (Lyu & Faisal, et al., 2026). The findings further confirm the importance of adaptive pathways and individual-level feedback that is identified by Chen et al (2020), as key elements of effective AI supported learning environments (Younas, et al, 2023).

Online ISSN: 3006-8886
Print ISSN: 3006-8878

In the context of learning analytics' predictive power in academic achievement, it is imperative to have data-driven insights in order to improve learning environments. However, as claimed by Siemens (2013), learning analytics facilitates proactive interventions, and the results revealed that predictive alerts and progress checking spur teachers and students to change their approach to studying and enhance learning. But it seems that competencies have even more of a impact than the analytics indicating that individualised learning experiences are likely the most important in raising achievement (Makhdum, et al., 2022).

Themes from Qualitative data were important as context to the phenomenon. The issue of equity and access points emphasizes systemic practices of the private and public institutions and highlights a wider infrastructural issue in the higher education system in Pakistan. Floridi et al. (2018) highlighted the importance of fairness and inclusiveness in the adoption of AI, and the results revealed that the adoption of AI is not uniform which could lead to further aggravation of educational inequalities. Ethical norms and concerns about privacy are also an obstacle to AI adoption, keeping in mind information utilized in AI systems (Saeed, & Saadi, 2026). In addition to ethical values and privacy data concerns, there is a worry about AI adoption and.(zipf) promotes caution when using data in connection with AI. The results align with the concerns from Jobin et al (2019) in the international arena regarding ethics in the use of AI – transparency and accountability are issues that help build trust in AI-powered learning environments.

Faculty training and institutional supports were found to be important mediators of effectiveness. Iqbal and Bhatti (2022) emphasized the need for digital literacy among the educators and the results showed that trained educators make it easier to integrate the tools of AI with the other tools the educators employed; those who weren't trained, used the tools of AI less (Saeed, 2025). This reiterates the need for continuous investment to the development of teaching staff and institutional capacity (Makhdum, et al., 2023).

The learning outcomes capture what is important in the institutional context, in the curricular design challenge and ethically for AI readiness and literacy (Lyu & Faisal, et al., 2026). From a practical standpoint, the results underscore the importance of integrating AI literacy education into school curricula, the need for equitable access to AI tools, the need to identify and take solving data privacy protection measures, and the imperative to invest in teacher training (Maria & Makhdum, et al., 2025).

Conclusion

This research will examine deeply of the impact of personalized learning using AI and learning analytics in teacher education in Pakistan. The quantitative results rely on the level of recognition, and high recognition was found for challenges and competencies, as well as policy directions, with competencies having a greater influence than challenges (Pasha, Saddique, Yousaf, 2021). Qualitative themes identified mechanisms for achieving the outcomes, such as adapting pathways, providing individualized feedback, and offering support that predicted future data looking back to equity, access, privacy, and faculty readiness for this work (Rehan, Faisal, Yousaf & Faisal, 2026).

The study states that "personalized learning and learning analytics thanks to AI are not only helping to improve teacher preparation to a great extent but do so while taking care of systemic barriers and addressing ethical issues (Lyu & Faisal, et al., 2026). These measures will not only im-

prove learning outcomes but also support inclusive and equitable education as part of SDG 4. These will not only monitor learning outcome but support inclusive and equitable education as part of SDG 4.

The results suggest that teacher education system is progressing towards integrating AI in Pakistan, yet there is a need to have an ongoing commitment of institutions, effective policy implementation at the ground level, effective professional support and continuing collaboration among the stakeholders for long-term success in Pakistan (Rehan, Faisal, Yousaf & Faisal, 2026).

References

1. Abbas, Q., Faisal, F., Jabeen Bhutta, M., Salim, Z., & Kanwal, S. (2024). The Role of Quality Teaching of University Teachers in the Motivation of University Students. Journal of Social Sciences Research & Policy, 2(3), 161 – 169. Retrieved from https://jssrp.org.pk/index.php/jssrp/article/view/95
2. Ahmad, R., Majeed, S., & Yousaf, F. (2024). Study of organizational justice and enabling school structure in secondary schools of Lahore. Journal of Research and Reviews in Social Sciences Pakistan, 7(2), 2758–2770. https://journal.kinnaird.edu.pk/index.php/jrrs/article/view/1083
3. Ahmad, S., Parveen, Z., & Yousaf, F. (2022). School monitoring system in Punjab: Challenges confronted by internal schools monitors. VFAST Transactions on Education and Social Sciences, 10(2), 153–159. https://vfast.org/journals/index.php/VTESS/article/view/1058
4. Ali, S. (2021). Educational reforms and digital integration in South Asia. South Asian Journal of Education, 15(2), 112–128.
5. Batool, T., Hassan, Z., Munir, H., Zummer, A., Butt, U., & Makhdum, F. N. (2024). Micro-breaks, digital distraction, and academic resilience: A mixed-method study of self-regulation strategies in university students. Anales Cervantinos. 16 (1). DOI: https://doi.org/10.5281/zenodo.16895625
6. Batool, T., Taj, S., Makhdoom, S., Makhdum, F. N., & Akram, I. (2024). SDG 4 in practice: A mixed-methods study of faculty and student perceptions in Lahore's higher education sector. Remittances Review, 9 (S4), 1816–1830. https://remittancesreview.com/menu-script/index.php/remittances/article/view/2768/2323
7. Begum, M., Yaseen, S., & Faisal, M.H. (2025). Determining the Relationship between Co-Curricular Activities and Students' Leadership Skills at Secondary Level. Journal of Social Signs Review, 3(1), 305–335. Retrieved from https://socialsignsreivew.com/index.php/12/article/view/85
8. Bibi, H., Yousaf, F., & Shehzadi, K. (2021). Challenges of leadership: A study involving leaders in higher education institutions of Punjab. International Review of Social Sciences, 9(4), 248–256. doi.org/10.5281/zenodo.5147572. https://www.researchgate.net/publication/353581642_Challenges_of_Leadership_A_Study_Involving_Leaders_in_Higher_Education_Institutions_of_Punjab
9. Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77–101. https://doi.org/10.1191/1478088706qp063oa
10. Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. IEEE Access, 8, 75264–75278. https://doi.org/10.1109/ACCESS.2020.2988510

11. Faisal, A., Ahmed, S. E., Makhdum, M., & Makhdum, F. N. (2023). A comparative study of predictive supervised-machine learning algorithms on cardiovascular diseases (CVD). Journal of Population Therapeutics and Clinical Pharmacology, 30(19), 1159–1177. https://doi.org/10.53555/jptcp.v30i19.3661
12. Faisal, M.H., Khan, S., Faisal, F., & Makhdum, F.N., (2024). Smart Pathways for Sustainable Education of Teaching and Learning Mathematics at the Elementary Level in Pakistan: The Post-Humanistic Approach. (2024). Journal of Asian Development Studies, 13(4), 992-999. https://doi.org/10.62345/jads.2024.13.4.80
13. Floridi, L., Cowls, J., Beltrametti, M., Chatila, R., Chazerand, P., Dignum, V., … Vayena, E. (2018). An ethical framework for a good AI society. Minds and Machines, 28(4), 689–707. https://doi.org/10.1007/s11023-018-9482-5
14. Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. Review of Educational Research, 74(1), 59–109. https://doi.org/10.3102/00346543074001059
15. Ifenthaler, D., & Yau, J. Y. K. (2020). Utilising learning analytics for study success: Reflections on current empirical findings. Research and Practice in Technology Enhanced Learning, 15(1), 1–13. https://doi.org/10.1186/s41039-020-00138-8
16. Imtiaz, H., Syeda, S., & Yousaf, F. (2023). Examining physics: Narratives of Lahore-based secondary school academies' teachers and students. Journal of Policy Research, 9(1), 425–430. https://doi.org/10.5281/zenodo.8051062
17. Iqbal, M., & Bhatti, Z. (2022). Digital literacy and academic engagement among university students in Pakistan. Asian Journal of Education and Training, 8(2), 45–56. https://doi.org/10.20448/journal.522.2022.82.45.56
18. Jobin, A., Ienca, M., & Vayena, E. (2019). The global landscape of AI ethics guidelines. Nature Machine Intelligence, 1(9), 389–399. https://doi.org/10.1038/s42256-019-0088-2
19. Khalid, R., Naqvi, S. M., Yousaf, F., Hashmi, Z., & Tayyaba, R. (2025). Effect of dialogic teaching on vocabulary acquisition and phonological awareness among first graders: An experimental study. Contemporary Journal of Social Science Review, 3(3), 1605-1618. https://doi.org/10.63878/cjssr.v3i3.1146
20. Khalid, S., Yousaf, F., & Ashfaq, M. (2026). The impact of parental socio-economic status and their collaboration with teachers on students' academic performance at secondary level. Contemporary Journal of Social Science Review, 4(2), 125–139. https://doi.org/10.63878/cjssr.v4i2.2485
21. Khan, B. S. ., Makhdum, F. N. ., & Jabeen, S. . (2022). Study to Assess Students' Readiness for Online Learning at Higher Education Level. Pakistan Journal of Social Sciences, 42(2), 417-429. Retrieved from http://pjss.bzu.edu.pk/index.php/pjss/article/view/1098
22. Long, D., & Magerko, B. (2020). What is AI literacy? Competencies and design considerations. Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems, 1–16. https://doi.org/10.1145/3313831.3376727
23. Lyu, Y., Faisal, A., Shen, J., & Carroll, J. M. (2026). "I'm constantly getting comments like, 'Oh, you're blind. You're like the only woman that I stand a chance with.'": A study of blind TikTokers' intersectional experiences of gender and sexuality. In Proceedings of the 2026 CHI Conference on Human Factors in Computing Systems (CHI '26). Association for Computing Machinery. https://doi.org/10.1145/3772318.3790337

24. Majeed, S., Ahmad, R., & Yousaf, F. (2023). Perceptions regarding e-learning: A study of university students. Pakistan Languages and Humanities Review, 7(2), 410–418. https://doi.org/10.47205/plhr.7(2).35
25. Makhdum, F. N., & Khanam, A. (2021). Online classes during Covid-19 pandemic: Preparedness and readiness of students and teachers in Pakistan with parents' experiences. Journal of E-Learning and Knowledge Society, 17(2), 9–20. https://doi.org/10.20368/1971-8829/1135386
26. Makhdum, F. N., & Mian, K. A. (2012). Smarter city: A system to systems [Master's thesis, Blekinge Institute of Technology]. DiVA. http://urn.kb.se/resolve?urn=urn:nbn:se:bth-4200
27. Makhdum, F. N., Elahi, K., Faisal, F., & Tariq, S. (2022). A paradigm shift of learning innovative leadership in classrooms of Pakistan. Psychology and Education, 59(2), 1001–1019.
28. Makhdum, F. N., Khan, B. S., Munir, F., Younas, A., & Faisal, A. (2022). Ubiquitous Learning Workforce in the Learning World: the Middle Class. Pakistan Journal of Social Sciences, 42(3), 523-533. Retrieved from https://pjss.bzu.edu.pk/index.php/pjss/article/view/1137
29. Makhdum, F.N., Khanam, A. & Batool, T. (2023). Development of a Practice Based Post-Humanistic Model of Smart Education for Sustainable Development (SESD) in Mathematics at Elementary Level in Pakistan. (PhD Country Directory Number: 31367) [Doctoral thesis, Retrieved January 4, 2024, from the department of STEM Education, Lahore College for Women University Lahore Pakistan]
30. Maria, M., Makhdum, D. F. N., Sandhu, M. K., Khan, S., & Younas, D. A. (2025). Smart Learning in Pakistani Universities: A Mixed-Methods Study of Progress, Challenges, and Future Directions. Research Journal for Social Affairs, 3(5), 173-184. https://doi.org/10.71317/RJSA.003.05.0316
31. Mumtaz, S. N., Aziz, F., Yousaf, F., & Saboor, W. (2024). Understanding and practice regarding student well-being: Perspectives of students and teachers. Migration Letters, 21(S14), 172–195. Retrieved from https://migrationletters.com/index.php/ml/article/view/11173
32. Pasha, S., Siddiqui, G. K., & Yousaf, F. (2021). Attitudes of head teachers towards early childhood care and education in elementary schools of Kasur District. International Review of Social Sciences, 9(5). https://irss.academyirmbr.com/download.php?file=papers%2F1621675721.pdf&slug=attitudes-of-head-teachers-towards-early-childhood-care-and-education-in-elementary-schools-of-kasur-district-vol9-iss5-2021-20f86dc0
33. Qadri, M. A., Rafique, S., & Yousaf, F. (2021). Analytical Framework of Institutional Reputation of Teacher Education Institutions in Pakistan: An Exploratory Factor Analysis. International Review of Social Sciences, 9, 135-145.
34. Rehan, S., Faisal, Z., Yousaf, F., & Faisal, F. (2026). From innovation to regulation: Ethical governance of AI in teaching and learning. The Study of Religion and History, 4(1), 1–18. https://srhjournal.com/index.php/39/article/view/225 https://doi.org/10.59075/srh.v4i1.315
35. Saeed, S. (2025). Mapping digital and AI competencies in B.Ed. four-year curriculum of public sector universities in Punjab, Pakistan. TPM – Testing, Psychometrics, Methodol-

ogy in Applied Psychology, 32(S6), 2537–2545. https://tpmap.org/submission/index.php/tpm/article/view/4534

36. Saeed, S., & Saadi, A. M. (2026). Impact of leadership practices on inclusive early childhood classrooms. *Qlantic Journal of Social Sciences*, 7(3), 197–206. https://doi.org/10.55737/qjss.vii-iii.26561
37. Saeed, S., Alkhatib, O. J., Uzma, & Javed, A. (2026). From digital natives to AI learners: Exploring artificial intelligence literacy, digital competence and academic engagement among Generation Z in higher education. *TAMSAAL*, 4(7), 246–270. https://doi.org/10.59075/tamsaal.v4i7.70
38. Salim, Z., Makhdum, F. N., & Younas, A. (2022). Parents teachers and students' perception regarding teachings of the Holy Quran as a compulsory part of curriculum. Alhamd Multidisciplinary Research Journal, 2(1), 10. http://amrj.aiu.edu.pk/wp-content/uploads/2023/02/AMRJ-10.-1-vol2-issue1.pdf
39. Shabbir, S., Yousaf, F., Ahmad, S., & Saeed, M. (2026). Digital identity disintegration and self-concept fragmentation among Generation Z and Generation Alpha in the era of social media saturation. Contemporary Journal of Social Science Review, 4(1), 1333–1345. https://cjssr.org/index.php/journal/article/view/302
40. Shehzadi, K., Afridi, T., & Yousaf, F. (2020). A study of teachers' conceptions and practices of classroom assessment in public high schools of Punjab. Elementary Education Online, 19(4), 978–992. https://ilkogretim-online.org/index.php/pub/article/view/4085
41. Shehzadi, K., Afridi, T., & Yousaf, F. (2020). Linking conceptions to practices: An empirical investigation of teachers' conceptions and practices of classroom assessment at the elementary level. International Review of Social Sciences, 8(8), 161–172.
42. Shehzadi, K., Afridi, T., & Yousaf, F. (2021). A comparative study of school teachers' conceptions & practices of class room assessment. Elementary Education Online, 20(4), 1612–1621. https://doi.org/10.17051/ilkonline.2021.04.184
43. Shehzadi, K., Umm-e-Farwa, & Yousaf, F. (2019). A comparative study of personality dynamics between boarders and day scholars at higher level. Pakistan Social Sciences Review, 3(2), 848–858. https://doi.org/10.35484/pssr.2019(3-II)67
44. Shehzadi, K., Yousaf, F., & Ali, K. (2023). Learning about sustainable lifestyles through curriculum: A content analysis of social studies textbook (Grade 5) in public schools of Punjab, Pakistan. Pakistan Journal of Educational Research, 6(1), 78–90. https://pjer.org/index.php/pjer/article/view/726
45. Shehzadi, K., Yousaf, F., & Shafiq, F. (2022). Teachers' conceptions of assessment and students' performance in mathematics: Investigating links between educators' perceptions and learners' academic achievement. Journal of the Research Society of Pakistan, 59(3), 1–12. https://pu.edu.pk/images/journal/history/PDF-FILES/1_59_3_22.pdf
46. Sial, Z. A., Rasul, I., & Yousaf, F. (2023). Impact of family participation on academic achievement at higher secondary level. Journal of Policy Research, 9(2), 610–618. https://doi.org/10.5281/zenodo.8320210
47. Siemens, G. (2013). Learning analytics: The emergence of a discipline. American Behavioural Scientist, 57(10), 1380–1400. https://doi.org/10.1177/0002764213498851
48. Toor, M. J., Alkhatib, O. J., Yousaf, F., & Hashmi, C. Z. (2026). Responsible artificial intelligence in higher education: Developing an integrated framework for teaching, learning, and academic integrity. The Critical Review of Social Sciences Studies, 4(1), 6607–6625. https://doi.org/10.59075/jdc67j86

49. Tuomi, I. (2018). The impact of artificial intelligence on learning, teaching, and education. European Commission Report. https://publications.jrc.ec.europa.eu/repository/handle/JRC113226
50. Younas, A., Khan, S., & Makhdum, F. N. (2022). A comparative study of early childhood education services provided by public and private institute in Pakistan. International Journal of Early Childhood Special Education, 14(5), 4034–4042. [https://doi.org/10.9756/INTJECSE/V14I5.464
51. Younas, A., Taj, S., Khan, S., Hussain, S., Makhdum, F.N., Khan, B.S., (2023). Classroom Quality In Terms of Structural and Process Dimensions at Early Childhood Education Level In Pakistan. Journal of positive school of psychology. Vol. 7 No. 1. 79-94. https://journalppw.com/index.php/jpsp/article/view/15018
52. Yousaf, F. (2019). Reflections of the parents of dropout children: A qualitative study. Pakistan Social Sciences Review, 3(2), 825–847. https://doi.org/10.35484/pssr.2019(3-2)64
53. Yousaf, F., Akram, T., Shabbir, S., Longa, F. E. A., & Sohail, S. (2025). Effect of mindfulness-based play therapy on reducing anxiety in children with ADHD: An ANCOVA study. Research Journal of Psychology, 3(03), 473–490. https://doi.org/10.59075/rjs.v3i3.212
54. Yousaf, F., Akram, T., Syeda, S., & Naqvi, S. M. (2025). The effect of gamified mobile applications on vocabulary retention in secondary school EFL learners: A quasi-experimental study in Pakistan. International Journal of Social Sciences Bulletin, 3(8), 1102–1112. https://ijssbulletin.com/index.php/IJSSB/article/view/1116
55. Yousaf, F., Rafique, S., & Mahmood, S. (2021). Students Attitude towards Online Classes at Undergraduate Level. Review of Applied Management and Social Sciences, 4(2), 447-458. https://doi.org/10.47067/ramss.v4i2.145
56. Yousaf, F., Rafique, S., Mahmood, S., & Butt, I. H. (2020). A thematic analysis of the voices of dropouts. Journal of the Research Society of Pakistan, 57(3), 255–264. https://pu.edu.pk/images/journal/history/PDF-FILES/30_57_3_20.pdf
57. Yousaf, F., Rafique, S., Mahmood, S., & Butt, I. H. (2020). Who never attended school and who dropped out: A comparative study of the voices? Journal of the Research Society of Pakistan, 57(3), 242–254. https://pu.edu.pk/images/journal/history/PDF-FILES/29_57_3_20.pdf
58. Yousaf, F., Rasul, I., Khalid, L., Malik, S., & Lodhi, K. (2024). A wave for sustainability: Principals' and executive district officers' narrations for students' well-being. Migration Letters, 21(S14), 568–587. Retrieved from https://migrationletters.com/index.php/ml/article/view/11310. https://doi.org/10.59670/ml.v21iS1.6219
59. Yousaf, F., Shah, S., & Pasha, S. (2019). The effect of instructional leadership on teachers' efficacy and performance at Federal Government Educational Institutions. Pakistan Social Sciences Review, 3(1), 587–597. http://doi.org/10.35484/pssr.2019(3-I)45
60. Yousaf, F., Shehzadi, K., & Safdar, S. (2021). Parents' voices that cries. International Review of Social Sciences, 9(5), 17–30. https://irss.academyirmbr.com/download.php?file=papers%2F1620793401.pdf&slug=parents-voices-that-cries-vol9-iss5-2021-3d665aea
61. Zahoor, I., Khalil, S., Yousaf, F., & Faisal, B. (2025). Digital postmodernism and knowledge construction: Truth, memory, and identity in the age of social media. Journal of Applied Linguistics and TESOL, 8(4), 151–162.

Online ISSN: 3006-8886
Print ISSN: 3006-8878

https://www.researchgate.net/publication/399277915_digital_postmodernism_and_knowledge_constructiontruth_memory_and_identity_in_the_age_of_social_media

62. Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education. International Journal of Educational Technology in Higher Education, 16(1), 1–27. https://doi.org/10.1186/s41239-019-0171-0