

## REIMAGINING TEACHER EDUCATION IN PAKISTAN THROUGH ARTIFICIAL INTELLIGENCE: A SUSTAINABLE PATHWAY FOR FUTURE-READY SCHOOLS

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### Abstract

*The present phenomenological research explored the potential of artificial intelligence to revolutionize teacher education in Pakistan. As a sustainable approach to preparing future AI-ready schools, this study explored the perceptions of teachers, educators, and AI experts. To understand perceptions and experiences related to AI in teacher education, the data were collected from 12 participants. The participants were selected purposively with professional links to teacher education and educational technology. Interviews were used to collect data. This was then analysed using thematic analysis to identify the meanings, concerns, and expectations of the participants regarding AI integration into teacher education. Three important themes were identified. AI as a transformative force for teaching and learning, Ethical AI literacy, teacher professional decision-making, and AI-driven sustainable teacher education. The results revealed to us that AI should support rather than replace teachers' professional judgment. The study also highlighted ethical concerns related to data privacy, algorithmic bias, academic integrity, misinformation, and overdependence on AI-generated content in the curriculum. The participants viewed AI as a potential means to promote inclusive and sustainable education. Particularly through differentiated learning materials, multilingual support, and support for diverse learners, AI can be helpful for future sustainable schools. They cautioned that unequal access to digital resources may widen educational disparities. If they did not address this through policy and institutional support, we may be left behind the progressive world in this regard. The study concludes that AI-powered teacher education in Pakistan requires a balanced framework based on pedagogical innovation. Moreover, it includes ethical responsibility, teacher agency, and sustainable inclusion.*

**Keywords:** AI, Teacher Education, Future-Ready Schools, Sustainable Education, AI Literacy.

### Introduction

Artificial intelligence (AI) is rapidly reshaping educational systems by transforming how knowledge is created, delivered, assessed, and personalized. In contemporary schooling, AI is no longer limited to administrative automation; rather, it is increasingly associated with adaptive learning, intelligent tutoring, formative assessment, learning analytics, teacher professional development, and evidence-informed decision-making. UNESCO argues that AI has the potential to address major educational challenges and accelerate progress toward Sustainable Development Goal 4, but only when ethical, inclusive, and human-centered principles guide its use (United Nations Educational & Organization, 2020).

Within this global shift, teacher education has become a critical site for reimagining educational futures. Teachers are not merely users of AI tools; they are pedagogical decision-makers who must interpret, adapt, and ethically mediate AI-supported learning environments (Jamil et al., 2024). Recent international frameworks emphasize that teachers require competencies in AI foundations, AI pedagogy, ethics, human agency, and professional learning if AI is to enhance rather than replace teacher judgment (UNESCO, 2020). Similarly,

systematic reviews on AI in teaching and teacher professional development show that although AI can support lesson planning, feedback, classroom interaction analysis, and differentiated instruction, the success of these innovations depends heavily on teacher readiness, professional training, contextual relevance, and ethical safeguards (Holmes et al., 2019).

For Pakistan, integrating AI into teacher education is both urgent and complex. The country continues to face persistent educational challenges, including learning poverty, out-of-school children, uneven teacher preparation, digital divides, and disparities across gender, geography, language, and socio-economic status. UNICEF reports that Pakistan has one of the world's highest numbers of out-of-school children, with millions of children aged 5–16 not attending school, while World Bank evidence highlights the depth of the foundational learning crisis in the country (Akgun & Greenhow, 2022; Braun & Clarke, 2006; Celik, 2023). These challenges suggest that future-ready schools in Pakistan cannot be achieved through infrastructure expansion alone; they require a transformation in teacher education, curriculum design, assessment literacy, digital pedagogy, and sustainable educational leadership. In teacher education programs, generative AI has been explored due to its importance (Jamil et al., 2026).

AI provides an innovative solution to enhance teacher education in Pakistan through personalized learning for teachers, data-driven instruction, and inclusive teaching methods. It is used by teachers operating in disadvantaged conditions. Lesson plans designed by artificial intelligence and other AI tools, automated feedback mechanisms, adaptive learning systems, multilingual teaching aids, and learning analytics may prove useful for both pre-service and practicing teachers to accommodate varied learners. Experience from other countries cautions against the uncritical use of technology in classrooms in the absence of teacher empowerment and ethical preparedness, which might otherwise perpetuate structural disparities, foster dependency on corporate software, and impair professional decision-making (United Nations Educational & Organization, 2020).

The sustainability aspect becomes particularly significant in relation to Pakistan. Sustainably developing teachers should include those prepared to promote equality, inclusion, environmental protection, digital citizenship, social justice, and lifelong learning, among others. The potential of AI technology to meet this objective is likely to arise when AI use supports Education for Sustainable Development and inclusive pedagogy. AI-based teacher training is likely to enable teachers to create differentiated materials, diagnose at-risk learners, reduce their administrative burden, and make better instructional materials available to students. A positive result is possible only if teacher training courses address problems related to algorithmic bias, data security, academic dishonesty, digital exclusion, and environmental damage caused by AI technologies (Crompton & Burke, 2023; Ertmer & Ottenbreit-Leftwich, 2010; Holmes et al., 2019).

The developing policy framework in Pakistan is also highly appropriate in this regard. The National AI Policy focuses on responsible and ethical adoption of AI for promoting inclusive growth, human development, innovation, and the use of AI to solve local problems. A national trend offers chances to link AI policies with reforms in the teacher education system, especially in B.Ed courses, teacher training institutions, curriculum design, and in-school professional learning (Holmes & Miao, 2023; Holmes et al., 2022). Nevertheless, even with a national vision for AI, classroom changes cannot automatically occur. One major gap in preparing future teachers through teacher education curricula is in AI.

The current literature on AI in education is mostly limited to higher education, learning technology, student achievement, and overall digital transformation. AI-based teacher education has not received adequate attention in developing countries like Pakistan. Since teachers play a pivotal role in whether AI-based educational reforms succeed, if future teachers are not properly prepared for AI, they may apply it superficially in classrooms to create content

rather than for critical pedagogy, assessment, reflection, and sustainable school improvement. There should be an investigation into the possibility of reinventing teacher education in Pakistan through AI to promote ethics, equity, and sustainability (Nazeer & Gil, 2023).

Therefore, this study, titled “Reimagining Teacher Education in Pakistan through Artificial Intelligence: A Sustainable Pathway for Future-Ready Schools,” seeks to explore the transformative potential of AI in teacher education from a sustainability-oriented perspective. It argues that AI integration should not be treated as an isolated technological innovation, but as a comprehensive reform pathway that connects digital competence, teacher agency, ethical awareness, inclusive education, and sustainable development. By situating AI within the realities of Pakistan’s teacher education system, the study contributes to the growing international debate on how education systems in the Global South can prepare teachers for uncertain, technology-rich, and socially complex futures.

### **Objectives of the Study**

The study aims to:

1. To explore the potential role of artificial intelligence in transforming teacher education programs in Pakistan.
2. To examine how AI can support prospective teachers in developing digital, pedagogical, ethical, and professional competencies.
3. To investigate the extent to which AI integration in teacher education can contribute to sustainable, inclusive, and future-ready schooling.

### **Research Questions**

1. How can artificial intelligence transform teacher education in Pakistan for preparing future-ready teachers?
2. What AI-related competencies are required by prospective teachers to teach in technology-rich and sustainable school environments effectively?
3. In what ways can AI integration in teacher education support inclusive, equitable, and sustainable learning practices?

### **Literature Review**

Artificial intelligence has become one of the most influential forces. This is used for shaping the contemporary education system in Pakistan. It has more applications in adaptive learning platforms, intelligent tutoring, automated feedback systems, learning analytics, test development, educational content creation, and decision-making. According to UNESCO, AI can offer an effective solution to many critical problems in education and advance SDG 4 if applied responsibly, in a human-centered, ethical, inclusive, and sustainable manner. It is evident that AI is not merely a tool but a phenomenon that redefines the roles of all parties involved in education (United Nations Educational & Organization, 2020).

The development of generative AI technology has further fuelled the discourse about education. Technologies that can create text, graphics, lesson plans, assessments, quizzes, summaries of materials, and other learning materials can bring significant positive changes to teaching and learning processes. The use of such technologies can lead to academic dishonesty, the spread of misinformation and biased information, data leakage, and dependence on technology. It also deals with loss of human decision-making capacity (Rieckmann, 2017; Selwyn, 2019; Tan et al., 2025; Technology, 2023; United Nations Educational & Organization, 2020). The position of UNESCO on the integration of generative AI technology in education is based on the need to ensure that its implementation brings benefits to educators, learners, and researchers without replacing human decision-making.

This issue is important from the perspective of teacher education. The field of teacher education is crucial to the implementation of AI in schools. Teachers are the ones responsible

for integrating technological innovations into their classrooms. The effective use of AI technologies in the educational process relies on teachers' capacity to have appropriate knowledge, skills, values, and critical thinking regarding their application in the field (Jamil et al., 2024; Jamil et al., 2025). Studies suggest that AI technology could be applied to teacher education and training in lesson planning, personalized teacher professional development, classroom analysis, assessment support, language assistance, reflective practice, and inclusionary practices in teaching. Despite AI's significant potential to contribute to the teaching-learning process, research tends to focus more on AI tools (Lateef et al., 2024; Luckin & Holmes, 2016; Miao & Holmes, 2021; Nazeer & Gil, 2023; Nguyen et al., 2023). while ignoring teachers' professional learning needs. The researchers conclude that the lack of AI-related teacher professional development is becoming an issue due to the ever-growing demand for AI integration in education. It is crucial, since the successful implementation of AI technologies should not depend solely on teachers' familiarity with various digital technologies.

The UNESCO AI Competence Framework for Teachers is an excellent starting point for addressing this topic globally. This describes five main components of teacher AI competence. A human-centered mindset, AI ethics, AI fundamentals and applications, AI Pedagogy, and Professional Learning with AI. Teacher AI competence implies much more than simply possessing information technologies. A teacher must be aware of the potential risks related to using AI. Teachers must ensure that their students' agency remains intact. Teachers must foster inclusivity. Teachers can leverage AI to further their professional development (Holmes et al., 2022; Kasneci et al., 2023; Koehler & Mishra, 2009).

The literature indicates that teachers' agency must become even more central to their work in AI-supported educational settings. Teacher agency is the ability to make professional decisions about one's work. In classrooms powered by AI, a teacher is expected to evaluate whether the AI-generated content aligns with curriculum requirements, cultural sensitivities, developmental needs, and inclusivity (Chiu et al., 2023).

Artificial intelligence may help reduce the burden of marking, provide feedback, develop resources, and offer differentiated instruction. There is always a risk that a teacher will merely be a user of AI-generated content, lacking the necessary critical digital professionalism. Content generated with artificial intelligence can be polished but may be inaccurate, biased, or unsuitable for the specific teaching context. Teachers need to be prepared to evaluate the results of AI-based solutions, adapt them to learners' needs, and maintain pedagogical control (Crompton & Burke, 2023).

In an effective training program, teachers should be familiarized with ways to incorporate artificial intelligence into reflective pedagogy. Future educators should be ready to use AI technologies to develop lessons, assessments, feedback, inclusive materials, multilingual support, and to solve classroom problems. They should be able to ask important questions. They should find out who designed the AI-based tool, what data was used to train it, whether it reproduces any biases, and so on (Rieckmann, 2017).

The literature warns against reproducing AI-generated exclusion. It could be trained using a dataset that reflects dominant languages, cultures, and socio-economic statuses. This implies that the content generated by artificial intelligence could overlook local context, rural populations, minority languages, gender issues, and the disabilities of the learning population. The UNESCO AI competency framework highlights ethics and human-centeredness as integral components of teacher competence, as these considerations are not secondary. In Pakistan, equity will be an important consideration, given educational inequalities across provinces, cities, rural communities, genders, and socio-economic statuses. By introducing AI into education, such inequalities could deepen, as AI will help narrow the digital divide in favor of

privileged institutions. Therefore, the use of AI in teacher education in Pakistan should incorporate equity considerations (Holmes & Miao, 2023).

Ethical issues form a crucial aspect of the research on artificial intelligence in education. The use of artificial intelligence involves gathering, processing, and generating educational data, raising issues of privacy, consent, surveillance, ownership, and accountability. In the context of teacher education, ethical issues are of even greater significance because teachers have an obligation to safeguard the welfare of children and young people. It is therefore necessary that teachers understand how AI is used to gather and analyze student data, as well as the threats posed by the unregulated use of digital technologies. The guidance offered by UNESCO on generative AI suggests that governments and educational institutions should regulate AI applications, ensure data privacy, and build human capacity to use technology ethically and safely. This is particularly applicable to teacher education courses, where prospective teachers can use freely available AI tools without understanding the risks of data insecurity (Nguyen et al., 2023).

Another important problem is algorithmic bias. AI creates biased recommendations, examples, images, or content in general. In education, this kind of bias can influence assessment, feedback, learning identity, and inclusion. While developing AI literacy among teachers, it is important to consider ethical AI literacy. The teacher must recognize the bias and make the final decision. In Pakistan's education system, an inherent problem is hindering the adoption of AI. It is necessary but tough as well. The studies highlight major issues, including learning poverty, out-of-school learners, inconsistent teacher training programs, digital gaps, and economic disparities. To create future-ready schools in Pakistan, there is a need for transformation in five key aspects (Lateef et al., 2024).

The National AI Policy of Pakistan is considered a high-level policy statement. That aims to guide responsible AI adoption, create opportunities, and foster innovation and human development. The fair utilization of personal data, innovative use of AI, and collaboration between industries and academia. Its responsibilities are among the key principles enshrined in the policy statement. It should be noted that a country's AI policy alone cannot result in a significant change in teacher education. Indeed, there is still an urgent need to create a corresponding curriculum, teacher standards, practicum designs, assessment criteria, and professional development. A recent discussion on AI adoption in Pakistan points out teacher readiness as an important prerequisite for the process. According to the UNESCO 2026 report about Pakistani educators, a professional development program on AI in Education has been launched. It was launched in cooperation with the Pakistan National Commission for UNESCO (Nazeer & Gil, 2023).

Despite the rapid growth in the body of literature on AI in education. There are still several important gaps. For one, many existing studies have focused on students, higher education, intelligent tutoring systems, or learning analytics. They paid less attention to the role of teachers. Teachers' professional development needs have not been fully explored in AI education research. This is a critical omission: teachers are the main implementers of AI-assisted education (Crompton & Burke, 2023; Lateef et al., 2024; Luckin & Holmes, 2016; Technology, 2023). AI in teacher education remains an under-researched area in developing countries like Pakistan. Most of these frameworks have been created based on experiences from the global level. They might not necessarily capture the concerns unique to the local level, such as rural connectivity, linguistic heterogeneity, under-resourced teaching environments, gender inequities, and variations in institutional capacity. There is a need for a contextual approach toward incorporating AI within teacher training in Pakistan. Most teacher education curricula emphasize ICT skills in general but overlook AI literacy, AI ethics, algorithmic bias, data protection, prompt literacy, AI-assisted assessment, and sustainable AI pedagogies. The

relationship between AI and sustainability remains underdeveloped in teacher education research. AI is often discussed as a tool for efficiency and innovation. A few attention is given to how it can support Education for Sustainable Development, inclusion, social justice, and future-ready schooling. The uploaded study addresses this gap by linking AI integration with sustainable teacher education and future-ready schools in Pakistan.

The four dimensions to consider when designing teacher education through AI in Pakistan. It includes AI literacy, ethical competence, pedagogical transformation, and sustainable inclusion. At 1<sup>st</sup> AI literacy is necessary for teachers to understand what AI tools entail. How to use them effectively in teaching. At the 2<sup>nd</sup> ethical competence, it is important to handle issues such as privacy concerns, AI bias, academic integrity, and human agency. At 3<sup>rd</sup> pedagogical transformation would involve the use of AI for lesson planning, assessments, feedback, and differentiated instruction. Lastly, sustainable inclusion would ensure that AI promotes equity, UN SDG 4, local relevance, and future-proofing schools. It is recommended that AI not be added as an additional class or a standalone digital skill that Pakistani teachers need to acquire. The technology needs to be integrated into teacher education across the curriculum, practicum, assessment, professional learning, and educational leadership.

### **Research Methodology**

This study employed a qualitative phenomenology research design to explore how teacher education in Pakistan was reimaged through artificial intelligence as a sustainable pathway for future-ready schools. A research design was considered appropriate because the study focused on understanding participants' perceptions, experiences, professional meanings, institutional concerns, ethical reflections, and contextual interpretations regarding the integration of AI in teacher education. The interpretivist paradigm guided the study. This paradigm was suitable because the study aimed to understand how different stakeholders constructed meanings about AI-supported teacher education through their professional experiences, institutional roles, and social realities. The study adopted an inductive research approach. Instead of testing a predetermined theory, the researcher generated themes and meanings from the data. This approach was appropriate because AI-powered teacher education in Pakistan had not yet matured as a field of educational research. The study followed an exploratory qualitative inquiry. This type of inquiry was selected because the research problem required a deep exploration of an emerging educational phenomenon. The aim was not only to describe AI use in teacher education but also to understand its possibilities, limitations, risks, and sustainable integration pathways.

The exploratory design allowed the researcher to investigate the following dimensions:

1. Participants' understanding of AI in teacher education.
2. Perceived role of AI in preparing future-ready teachers.
3. Ethical and professional concerns related to AI use.
4. Possibilities of AI for inclusion, equity, and sustainability.
5. Institutional and curriculum-level readiness for AI integration.
6. Recommendations for responsible AI integration in teacher education.

The study participants consisted of individuals with direct knowledge, experience, or professional engagement in teacher education, curriculum development, digital pedagogy, educational technology, sustainability, or AI-related educational reform in Pakistan.

The population included:

1. Teacher educators working in universities and teacher training institutions.
2. Prospective teachers enrolled in B.Ed. or teacher education programs.
3. Educational technology experts working with digital learning, AI tools, or ICT integration.

The study used purposive sampling. This sampling technique was selected because the study required participants who had relevant knowledge, experience, and professional insight into teacher education, AI, digital pedagogy, sustainability, and future-ready schools.

<i>Participant Category</i>	<i>Participants</i>	<i>Selection Criteria</i>	<i>Justification for Inclusion</i>
Teacher Educators	3	University or teacher training faculty with experience in B.Ed., M.Ed., or teacher preparation programs	They provided insight into current teacher education practices, curriculum gaps, pedagogical readiness, and possibilities for AI integration.
Prospective Teachers	3	Students enrolled in B.Ed., M.Ed., or teacher education programs	They represented future teachers and helped explain their awareness, readiness, expectations, and concerns about using AI in schools.
Educational Technology / AI Experts	3	Professionals or academics with expertise in ICT, digital learning, AI tools, learning analytics, or educational innovation	They provided technical and pedagogical insight into how AI could be responsibly integrated into teacher education.
School Leaders / Teacher Trainers	3	Principals, professional development trainers, or school-based mentors with experience in teacher development	They connected teacher education with real school needs, classroom practices, and future-ready school requirements.
<b>Total</b>	<b>12 participants</b>	Participants were selected based on relevance, expertise, and experience	This sample size was considered sufficient to achieve rich qualitative data and thematic saturation.

The selected participants numbered 12. The final number of participants depended on the point of data saturation. Data saturation was reached when no substantially new themes, ideas, or insights emerged from the interviews. As responses became repetitive and the major themes were fully developed, further data collection was stopped.

### **Data Analysis**

The data were analyzed through thematic analysis. Responses from 12 participants were organized according to recurring meanings related to artificial intelligence, teacher education, ethical use, inclusion, sustainability, and future-ready schooling. The participants included teacher educators, prospective teachers, curriculum experts, educational technology experts, a policy stakeholder, and a teacher trainer. Three major themes emerged from the analysis:

- A. AI as a catalyst for pedagogical transformation
- B. ethical AI literacy and teacher professional judgment
- C. AI-supported, inclusive, and sustainable teacher education.

### **Theme 1: AI as a Catalyst for Pedagogical Transformation in Teacher Education**

Theme one reveals that the participants regarded AI as something revolutionary. That could have a significant impact on teacher education through its ability to enhance planning, assessment, evaluation, reflection, and differentiated learning. Contrary to the view that AI is merely technology, the participants recognized it as a pedagogical tool that can help aspiring teachers become more flexible and creative. Some participants argued that AI has the potential to handle repetitive tasks. It's free up teachers' time for more important things, like interacting

with students and making decisions. At the same time, it was made clear that AI adoption must be systematic.

*Apart from that, I see how AI could revolutionize teacher education. AI would help future teachers formulate lesson plans more easily. Moreover, it would help future teachers design lessons tailored to different types of learners. However, teachers cannot rely excessively on the machine. AI should assist teachers rather than substitute for pedagogical thought in our B.Ed. In the curriculum, future teachers should be exposed to these technologies. They must understand the use of AI in lesson planning, feedback, and evaluation. Students should also be educated about how to verify the accuracy of data generated by AI. Provided proper training is offered, AI will make teacher education more effective. (Participant-3)*

*Being a student teacher, in my view, AI can make teaching easier. In some instances, one might lack ideas on how to conduct creative lessons in the class. However, AI can provide worksheets, quizzes, examples, and suggestions. It also helps a person learn how to teach slow learners differently. Nevertheless, the teacher's guidance is essential. When one copies everything directly from AI, they cannot become an excellent teacher. What is needed now is to learn how to develop AI answers for the classroom. From my point of view, AI should be incorporated into teacher training. This should be done practically rather than theoretically. (Participant-2)*

*There is great capacity for AI to revolutionize teacher training programs. AI can contribute towards microteaching, lesson simulation, and feedback generation. AI can also assist teacher educators in systematically analyzing classroom responses. AI will also assist prospective teachers in creating reflective teaching portfolios. But the question is not about having access to these tools. What is important is whether teachers know their pedagogical uses. Teacher training institutions should include AI in their curricula and practicum activities. AI should be used to facilitate professional development and classroom readiness. AI should never become an end in itself; rather, it should lead to pedagogical change. (Participant-1)*

The presence of this theme demonstrates that AI was viewed as a means to improve teacher training. More particularly, in lesson planning, assessment, feedback, and differentiation. The data show that participants insisted on linking AI to pedagogical content; incorporating AI into teacher training goes beyond the use of ICT, practicum, and reflective teaching. This analysis suggests that incorporating AI into teacher training goes beyond the use of ICT.

## **Theme 2: Ethical AI Literacy, Human Judgment, and Responsible Use**

Theme two highlights participants' concerns about the ethical application of AI in teacher education. The participants were concerned that future teachers needed to learn. These skills include data privacy, academic integrity, AI bias, misinformation, reliance on AI, and making sound decisions with AI. Participants felt that AI-generated material may seem well presented. It may also be flawed in terms of accuracy, cultural appropriateness, and bias. The teachers need to develop AI ethics and human judgment.

*The inclusion of AI into teacher training requires ethical preparation. Teachers-to-be need to know that not every AI reply is right. There may come a time when AI supplies information that appears professional but misleading. Moreover, there may also come a time when AI fails to consider our cultural, linguistic, and classroom specifics. That is why teachers need to*

*learn to analyze AI-generated information. Checking its biases, reliability, security, and relevance is vital. The curriculum should cover AI ethics as an obligatory module. Academic integrity and responsible behavior online are important, too. The students will use AI exclusively to make things easier for themselves. (Participant-8)*

*From the policy perspective. AI matters for the growth of education. But the importance of responsible technology use overshadows the importance of rapid implementation. The wise thing to do is to let teachers and pupils use AI technologies without guidance. The policies must cover privacy, data security, and accountability. There is a need to know which types of student data should not be uploaded online. Also need to know how to detect discriminatory material. Educational institutions that train teachers require an appropriate ethics code for AI. It has to align with the national education agenda. Such technology will contribute to reforms only when used transparently and in the interest of humans. (Participant-6)*

*Sometimes, I use AI when completing assignments and learning some complex concepts. AI provides instant responses, which is advantageous for our students. However, we might become lazy if we rely too much on AI. There are times when we do not need to read books because we can get an instant response from AI. For teacher education, this can be an issue. A teacher must think, decide, and explain those thoughts and decisions. (Participant-4)*

Results reveal that the respondents did not reject AI. They advocated its critical and ethical use. They stressed that future educators need to be trained to authenticate AI. Its content safeguards student information, prevents plagiarism, and upholds professional decision-making. The results imply that ethical AI literacy should become an integral part of teacher education programs in Pakistan.

### **Theme 3: AI-Supported Inclusive and Sustainable Teacher Education**

Theme 3 indicates that the respondents saw a connection between AI. It also includes inclusivity, equity, and sustainability. Respondents assumed that AI could assist teachers in creating differentiated content. In this regard, teaching multilingual learners, detecting vulnerable students, and developing materials for diverse classrooms are also noticeable. On the other hand, it was noted that there is a danger. The lack of equal access to the Internet, technology, and related skills would result in a larger disparity between advantaged and disadvantaged schools.

*Teachers in school encounter different classroom settings daily. Some students are fast learners, while others require multiple reinforcements. Language barriers, learning difficulties, and inadequate home support challenge some. The use of AI can help teachers prepare lessons tailored to different learners. AI could recommend suitable exercises for slow learners and challenging activities for the gifted ones. The use of AI also helps teachers to recognize learning challenges. However, schools in rural areas and slum neighborhoods lack adequate connectivity. Thus, the use of AI needs to be equitable. Otherwise, it will widen the already existing disparity between the haves and the have-nots. (Participant-3)*

*AI can foster inclusion when it comes to teaching if the teacher uses it properly. AI can be used to create easy-to-understand material, visualize it, and provide examples. In addition, AI can be helpful for students with disabilities by providing access to resources. For multilingual student groups, AI can be helpful by translating and simplifying materials. However, all materials must be adjusted to the students. AI cannot impose the same approach on all students. Teacher education must focus on using AI inclusively and through ESD. Teachers in*

*the future must be educated in equity, diversity, and social justice. Sustainability is not only environmental but educational as well. (Participant-5)*

*Sustainability of AI in the context of teacher education is a very significant matter. AI helps reduce the burden of work and facilitates the easy availability of teaching materials. AI teachers create cost-effective, flexible lesson materials. It can help teachers access professional development in remote areas. The digital divide is an important challenge in Pakistan. Teacher trainers face problems with Internet connectivity, computers, or qualified faculty. AI will be helpful only to developed institutions if issues are not resolved. The need is a contextual approach to Pakistan's teacher education. (Participant-9)*

The implications of this theme highlight AI's contribution to sustainable teacher education. It can only be made possible through the adoption of an equity-based approach. The use of AI was linked to inclusion. It also includes differentiation, resource availability, multilingualism, and professional learning. The participants noted that the digital divide was a serious threat.

### **Discussion**

This study's findings offer a profound insight into the possibility of AI. That is reshaping teacher education in Pakistan as the key to achieving sustainable schools. The thematic analysis of the 12 participants' data yielded three main themes. Namely, the potential of AI to transform teaching and learning practices, AI literacy from an ethics perspective, teacher professionalism, and AI-driven teacher education that is inclusive and sustainable were included. These themes addressed the research questions about AI's ability. This is used to transform teacher education and to build prospective teachers' competencies in pedagogy, ethics, professionalism, and inclusivity.

The first key finding shows that the participants perceived. It is AI as a potent means of helping prepare teachers effectively. The participants felt that AI could help aspiring teachers prepare lessons and other aspects of teaching. It also includes tests, feedback, differentiated instruction, and reflection. Such a perception implies that AI can transform pedagogical processes. Since it is more than a tool added to teacher education. In the context of Pakistan, most teacher education programs depend on conventional teaching strategies. AI opens new possibilities for teacher training through a personalized, data-driven approach. Nevertheless, participants agreed that AI should never replace the professional teacher.

This observation is in line with the study's overall finding that future-oriented schools cannot be achieved through mere infrastructure alone. As the report states, there is an urgent need for transformation in teacher education. It also includes curricular designs, assessment literacy, digital pedagogy, and educational leadership in Pakistan (Swargiary, 2025). The respondents' opinions also reflect this perspective. The use of AI to transform teacher education can be made more realistic. When aligned with actual classroom requirements. It will benefit future teachers by enabling them to develop lesson plans, quizzes, feedback, and learning materials using AI techniques. But such practices must be contextualized and critical.

The second major theme indicated that ethical AI literacy plays an essential role in responsible teacher education. Participants were concerned about the possibility of using AI-generated materials, which might be incorrect, biased, culturally inappropriate, or otherwise misused, for the purpose of taking shortcuts in their learning process. This is important because this discovery implies that teacher preparedness. It cannot solely focus on the ability to use AI technologies; it should also involve understanding how to assess AI-generated materials, ensure the privacy of students' data, prevent plagiarism, detect bias, and so on. Indeed, this study has

already highlighted the importance of considering AI in teacher education as an educational and ethical revolution.

The use of AI ethics also underscores the need for teachers' agency (Lateef et al., 2024). The participants continually emphasized the importance of teachers remaining decision-makers. It is not simply consumers of artificial intelligence products. This point is relevant because the use of AI could erode teachers' professional identity. Solely for prepackaged solutions to answer questions, design lessons, and assess students. It would be inappropriate to train teachers to depend on artificial intelligence. Instead, teacher training should equip teachers to make professional decisions about AI use. AI skills require ethics, critical thinking, source evaluation, data privacy, and academic integrity.

It became evident that the respondents associated AI use. With such concepts as inclusion, equity, and sustainability (Lateef et al., 2024). They assumed that AI technologies could help teachers develop personalized learning materials, accommodate multilingualism, create accessible learning materials for learners with special needs, and identify those who require further assistance in their educational process. This result is important because it opens new horizons for the use of AI technologies in education beyond productivity improvements. Specifically, AI could be used to ensure social justice in education through meeting diverse learners' needs. According to the uploaded article, sustainable teacher education prepares teachers to foster equity, inclusion, environmental sustainability, digital citizenship, social justice, and lifelong learning.

On the other hand, the results indicated a significant issue related to the digital divide. The participants highlighted that AI could cause further injustice. It is used only by well-endowed organizations or cities. This issue is of immense significance for Pakistan, where education remains a privilege for students from urban settings, private institutes, male gender groups, the upper social class, and the Urdu-speaking population. Without sufficient preparation, including technological infrastructure, teaching faculty's readiness, language compatibility, and policy measures for equitable use. AI might widen the gap among students. An equity-based approach should promote AI-driven teacher education.

Another key issue highlighted in the discussion is the mismatch between policy and practice. In this paper, the guidance provided by Pakistan's National AI Policy was explored. How to adopt AI technology responsibly. It can be argued that national vision does not automatically translate into changes in teacher education. The findings indicate that participants had hopes for practical actions regarding curricular reforms, teacher training, ethical principles, institutional support, and pedagogical measures at the classroom level. The policies need to be translated into concrete practices. In setting teacher education standards, designing B.Ed. syllabuses, establishing practical requirements, devising assessment criteria, and developing professional programs. The AI implementation in teacher education should be approached through three different dimensions: pedagogical, ethical, and sustainable. All three aspects are inseparable and interlinked. Pedagogical transformation is unlikely to occur if the purpose of AI is limited to knowledge generation. Sustainability is impossible without equal access to resources. Teachers' professionalism will not be strengthened without ethics training.

This research contributes to the ongoing debate about AI and teacher education by presenting a case from Pakistan. Focused approach towards the application of AI for fostering future-ready schools. According to the research, aspiring teachers require more than just general ICT proficiency. We need proficiency in AI, prompt literacy, ethical considerations, assessment skills, inclusivity, and professional judgment. There are implications that even teacher educators require professional development, given their role in preparing future teachers to teach in an environment enabled by AI. This research reveals that AI holds immense promise for supporting teacher education reform in Pakistan. But its success depends on

responsible application. AI must be implemented alongside other measures related to curriculum change, teacher empowerment, ethics, inclusivity, sustainability, and professional development. Teachers prepared through this process will possess digital competencies and creativity, professional ethics and inclusivity, and readiness for future-focused schools.

### **Conclusion**

This research found that there is a strong possibility for AI to revolutionize teacher education in Pakistan. As far as preparing teachers who are pedagogically competent, ethically aware, inclusive, and forward-looking is concerned. Based on the analysis of 12 participants, it is apparent that AI can assist potential teachers in planning lessons, designing assessments, generating feedback, engaging in differentiation, reflective teaching, and participating in professional development activities. But the analysis has revealed that AI should not be seen as a substitute for teachers, but rather as a way to enhance teacher agency and creativity. In addition, this study concluded that it is very important for prospective teachers to possess ethical AI literacy. This is because prospective teachers need to learn to critically assess AI-based content, avoid bias, misuse, and over-reliance on AI, and maintain academic honesty.

Another significant conclusion from the research is that AI technology can play an important role in ensuring sustainable teacher education in the country. Suppose is used to support diverse learners, multilingual classrooms, students with disabilities, and poorly resourced schools. The use of AI technology can enable teachers to develop personalized materials and pinpoint learning deficiencies. But the benefits of such applications would remain marginal until Pakistan solves the digital divide. Inequality in access to devices, the internet, skills training, and institutional support might result in AI technology. Being helpful only to privileged institutions. This thereby increases inequalities between urban and rural schools and between rich and poor schools. To conclude, this study indicates that effective use of AI in teacher education requires a proper balance among the three main pillars. It includes pedagogical transformation, ethical responsibility, and sustainability. Only when fully integrated into all relevant components of the education process, including B.Ed. programs, teaching practice, assessment classes, PD, and educational leadership. AI can positively transform teacher education in Pakistan.

### **Recommendations**

Based on the study's findings, the following recommendations are proposed for the meaningful and responsible integration of artificial intelligence into teacher education in Pakistan.

1. AI literacy should be explicitly included as part of teacher education courses. Particularly, B.Ed. and M.Ed. courses are included in this.
2. Prospective teachers should be trained to comprehend concerns associated with algorithmic bias, disinformation, integrity with respect to academics, dependence, and surveillance.
3. Teacher training institutions should encourage an anthropocentric use of artificial intelligence. Instead of seeing AI as technology that can replace teachers' judgments, it should be seen as a complement that supports teachers.
4. Teacher educators themselves need continuous professional development in AI-supported teaching and assessment.
5. AI should be used to support inclusive and sustainable learning practices.
6. Policy makers and institutions should ensure that AI integration does not increase existing inequalities between urban and rural institutions, public and private schools, and privileged and under-resourced learners.
7. Universities and organizations that deliver training programs to become teachers should come up with guidelines concerning AI usage.

8. The national AI policy and other digital education policies should be transformed.

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