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Generative AI in Teacher Education: Educators' Perspectives, Practices, and Challenges in Higher Education

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Abstract
The rapid development of generative artificial intelligence (GenAI) has significantly reshaped pedagogical practices in higher education, especially in teacher education programs. The qualitative phenomenological research design focuses on the views, practices, and issues of teacher educators regarding the use of GenAI in the teaching of teachers in higher education in Pakistan. For data collection, semi-structured interviews were conducted with 10 teacher educators purposively selected from public-sector universities. Thematic analysis was used to analyze the data. Five major themes were developed, including supportive role, cautious optimism, pedagogical practices, ethical concerns, and institutional gaps. The participants perceived GenAI as a supporting teaching tool that enhances instructional design, assessment, feedback, and educational work, while at the same time placing greater emphasis on the long-term significance of human judgment and moral responsibility. Regarding academic integrity, learner dependency, data privacy, and the lack of clear institutional policies, participants expressed concerns about emerging instructional uses of GenAI, despite reporting cautious optimism and instructional applications. The study also found inadequate institutional support, manifested in a lack of professional development and poor infrastructure. The results suggest that an efficient and responsible application of GenAI in teacher education requires effective policy frameworks, ongoing professional development, and implementation strategies grounded in pedagogical principles to equip future educators for AI-driven educational settings.
Keywords: generative artificial intelligence, teacher education, higher education, qualitative study

Introduction
Over the past few years, generative artificial intelligence (GenAI) has become one of the most significant technological developments in higher education. The release of large language models, which ChatGPT is an example of and took place at the end of 2022, has given rise to a flurry of experiments with AI-assisted writing, lesson planning, creating assessment designs, and generating feedback at universities around

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the globe (Celik et al., 2022; Giannakos et al., 2025). Unlike the antecedent educational technologies, generative AI systems can generate text and content with a high level of similarity to human authorship, thus raising substantial questions about the knowledge production, academic integrity, and the future role of educators (Mishra et al., 2023).

The implications of generative AI are especially high in the context of teacher education. Teacher educators take up the role of not only delivering the instructional but also defining the pedagogical beliefs, ethical orientation, and professional competencies of the future teachers. According to the existing literature, despite perceiving the opportunity provided by generative AI as an effective way to improve productivity, creativity, and the design of instruction, educators also show signs of uncertainty about it in relation to its pedagogical value and the possible long-term impact on teaching and learning (Chandrasekera et al., 2025; Sharmin et al., 2026).

Research based on Technological Pedagogical Content Knowledge (TPACK) model further emphasizes the view that successful implementation of generative AI requires an aspect beyond technical mastery, which is a pedagogically conscious and ethically accountable application to the teaching praxis (Bozkurt et al., 2024; Mishra et al., 2023).

Since 2023, numerous studies have reported a mixed perception of generative AI among educators. The systematic reviews indicate that the teachers have discovered that AI tools are useful due to lesson planning, assessment preparation, and feedback provision, but at the same time, they express their worries regarding the issue of reliability, plagiarism, student dependence, and ethical usage (Abdallah et al., 2025; Celik et al., 2022; Eddine et al., 2025). Qualitative studies in the context of a higher education environment show that teachers are inclined towards a conservative and investigative approach, balancing innovation and fears of maintaining academic quality and professional identity (Giannakos et al., 2025; Sharmin et al., 2026).

In Pakistan, particularly in the Punjab universities, generative AI integration is both an opportunity and a challenge. Recent research shows an increase in the use of ChatGPT and similar systems by students and professors at universities, particularly for academic writing and learning assistance (Ashraf et al., 2025; Majeed et al., 2025; Rasheed et al., 2025). However, colleges and universities in the area face contextual limitations, including a lack of digital infrastructure, unclear institutional policies, and limited professional training in AI technologies. Despite the growing global attention to generative AI in education, a gap persists in qualitative research on the lived experiences and practices of teacher educators and the perceived challenges in the higher education setting of Pakistan.

The proposed qualitative research is, therefore, aimed at understanding the views, experiences, and issues of educators related to the issue of generative AI use in teacher education at a university level in Punjab, Pakistan. Through recording the voices of teacher educators, the study will contribute to context-specific information that can be used to guide institutional policy formation, the professional development

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level, and the thoughtful implementation of generative AI into teacher education programs.

Research Objectives

1. To explore teacher educators' perspectives on generative AI in teacher education.
2. To examine current practices of generative AI used by teacher educators.
3. To identify challenges and support needs related to the integration of generative AI in teacher education.

Literature Review

Generative artificial intelligence (GenAI) refers to artificial intelligence systems that can generate artefacts of human form, such as text and code, by using large training corpora. With the introduction of tools like ChatGPT, GenAI has gained considerable research interest in the field of higher education, as it provides an opportunity to assist teaching, learning, and academic processes (Giannakos et al., 2025; Vassileva & Daneva, 2025). In contrast to the previous educational technologies, GenAI is studied to actively participate in the knowledge building, thus undermining the traditional pedagogical assumptions and assessment activities (Mishra et al., 2023; Vassileva & Daneva, 2025). Recent research indicates that GenAI is regularly used to generate content, plan, make formative feedback, and conduct research (Abdallah et al., 2025). However, researchers warn that its abandoned application can erase innovativeness, profound learning, and the ability of students to think critically (Celik et al., 2022).

Teacher educators play a key role in establishing the meaning of GenAI and its application in teacher-education programs. It has been found that teachers often experience uncertain attitudes, where they acknowledge pedagogical advantages and, at the same time, express worries about academic dishonesty and professional values (Giannakos et al., 2025; Sharmin et al., 2026). The positive attitudes are usually related to the ability of GenAI to improve the design of instructions and individualization of learning, and negative attitudes are connected to the fear of reliability, bias and overdependence on AI-generated materials (Mishra et al., 2023). On the basis of professional knowledge, the studies based on the Technological Pedagogical Content Knowledge (TPACK) model emphasize the need to equip teachers with not only technical skills, but pedagogical and ethical judgement in using GenAI in the classroom (Ahmad, Muhammad, et al., 2026; Lan et al., 2025).

As of 2023, there is empirical evidence to indicate an increasing level of GenAI experimentation by university educators, especially in tasks like lesson planning, assessment design, feedback provision, and research-related tasks (Xiaoyu et al., 2025). However, the integration of GenAI is often informal and at an individual initiative instead of being an institutional policy or systematic training (Wang et al., 2025). The perceived usefulness, ease of use, and personal beliefs of teachers in relation to teaching and learning can seem to influence their practices. This absence of systematic instruction is a cause of concern to teacher education since there might be

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incoherent messages about the proper and ethical use of AI as delivered by the future teachers. Academic integrity, assessment validity, data privacy, and algorithmic bias are the most common challenges brought up by literature when integrating GenAI. According to the international organizations, the key to responsible adoption of AI is institutional policies and professional development programs (UNESCO, 2023).

The current state of the Pakistani higher-education environment is one of small research, but it suggests a growing usage of ChatGPT by students and faculty, with some fears of poor regulation and training (Ashraf et al., 2025). The qualitative research also indicates that teacher educators in Pakistan are faced with context-specific challenges such as low institutional backing and mismatched policy frameworks (Ahmad et al., 2026; Rasheed et al., 2025).

Although the international literature on generative AI in higher education has rapidly increased since 2022, there is still a lack of context-sensitive qualitative studies that promote teacher educators, especially in teacher-education programs in Pakistan. Literature is more focused on technological potential or student utilization thus not considering the lived experience of educators, pedagogical justification, and institutional struggles. Therefore, this study is designed to explore views, experiences, and problems faced by teacher educators in the context of teacher education at the university level in Pakistan.

Research Methodology

This study used a 'hermeneutic phenomenological approach' (Vagle, 2018) to explore the lived experiences of the teacher educators regarding the application of generative artificial intelligence (GenAI) in teacher education at the university level. A qualitative study is suitable because of the purpose of acquiring a deep understanding of experiences and interpretations of those educators, not the statistically generalizable results (Creswell & Poth, 2016; Maxwell, 2021; Patton, 2015). Through the purposive sampling technique, 10 teacher educators were selected based on the condition that the participants worked as teacher educators at universities and had some knowledge or experience with or of generative AI tools like ChatGPT (Tajik et al., 2025).

The semi-structured interviews comprising 15 open-ended questions were used to collect the data, as the questions were designed in accordance with the objectives of the study. Interviews were conducted in two forms, face-to-face or online, depending on the availability of participants. All interviews were audio-taped and transcribed word-for-word with informed consent. Thematic analysis was applied in analyzing the data involving six steps of Braun and Clarke (2006).

Findings of the Study

The findings of the study are presented in the form of the following themes.

Supportive Role

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This theme describes the perceptions of teacher educators regarding Generative AI as a helpful and supportive technology in teacher education. The participants repeatedly pointed out that a generative AI can improve the processes of teaching and academic assignments but should not be used in place of human judgment, creativity or the professional role of an educator. In the view of P-1 (Participant 1), it was narrated in the following words:

> *Generative AI aids teacher educators by producing lesson content, assessments, and academic content, but it must be viewed as a supplementary resource since teacher educators have other roles, such as teaching, mentoring, and character building, which should never be handed over to any form of artificial intelligence.* (P-1)

According to P-4, "*Generative AI is not a substitute that teachers should be replaced because it is an instructional cognitive/pedagogical assistant, which improves the effectiveness and professional competence of instruction, but does not necessarily require human judgments, ethical reasoning, and contextual knowledge".* P-6 emphasized "*the use of generative AI is only helpful as a support system since the dependence on AI without the supervision of teachers can diminish professional responsibility and lower the role of the educator in the learning process of students".*

In the view of P-8, *"Generative AI enhances efficiency in activities related to teaching; however, successful learning remains within the scope of the expertise of the teachers, their decision-making, and direct interaction with the students in the classroom and academic environment".*

Cautious Optimism

This theme indicates positive attitudes of teacher educators towards Generative AI, but with reservations. The respondents recognized the opportunities of generative AI to improve teaching and research but highlighted the importance of carefully working with this kind of AI, ensuring ethical use, and clear guidelines within the institution. According to P-3:

> *I have a positive opinion about generative AI in general, as it can positively impact the workload and teaching quality; but overreliance on the use of AI can also have detrimental effects on the independent learning, novelty, and ability to think critically in students.*

In the view of P-5, *"Generative AI has a high potential of improving teaching, learning, and research productivity, but without an ethical framework, academic integrity policies, and appropriate training, it will be abused and cause dependency and superficial learning among learners".* P-7 narrated his perspective in the following words:

> *My perception of generative AI is not negative; it is more of a mix of being cautious, since it can be used to enhance higher education, but it needs to be implemented slowly with supervision, education, and defined regulations, particularly since most teachers and students are still getting used to the technology.*

P-8 highlighted in the following words:

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Generative AI can be useful in making academic practices more efficient and accessible, but it is important to note that without a well-organized educational practice and regulations, there is a risk of confusion and inconsistent behaviour in the application of generative AI by instructors and learners.

Pedagogical Practices

This theme is about the present application of generative artificial intelligence by teacher educators in their pedagogic and scholarly practice. The participants used AI in the primary areas of lesson planning, design of assessments, preparation of feedback and research-related assignments, even though they had teacher control and scholarly responsibilities. According to P-2:

Generative AI helps me in my teaching and research, such as curriculum mapping, instructional design, assessment preparation, and literature synthesis, but I evaluate all AI-generated content critically before using it, ensuring that the academic rigour of my work is preserved.

In the view of P-4 "*I use generative AI in a limited and aiding non-academic way, primarily brainstorming lesson plans, polishing language in academic text and structuring lecture notes, since I have not yet mastered the application of such tools".* P-6 explained, *"I am actively using generative AI to create learning materials that are interactive or formative assessments and research supervision, making all AI-generated outputs perceived with caution and aligned with the course goals".* P-10 indicated that "*I use generative AI to facilitate personalized feedback, learning activities, and assessment preparation, but in his opinion, teacher guidance and supervision are necessary to make the useful and ethical use".*

Ethical Concerns

This theme shows the enormous concerns of teacher educators about ethical questions of using generative artificial intelligence. Among the identified risks, the participants mentioned academic integrity, plagiarism, excessive reliance on AI, data privacy, bias, and fairness, especially where there are no specific policies within the institutions. P-3 narrated that:

Their biggest worry is that learners can easily abuse the generative AI by posting assignments generated by AI without any knowledge of the material, which influences the quality of learning, academic integrity, and assessment validity in teacher education courses used for teaching.

P-5 elaborated, "*Plagiarism, authorship ambiguity, algorithm bias, and data privacy are ethical concerns that are also critical when the institutions fail to provide clear policies to control the application of generative AI in teaching and assessment".* P-8 described, *"I also worry about accuracy and reliability of AI-generated information, as prejudiced or inaccurate information can be very misleading to students unless teachers take a closer look and pay attention to the application of AI".*

Institutional Gaps

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This theme signifies the views of the teacher educators about the insufficient institutional preparedness to incorporate generative artificial intelligence in teacher education. According to the participants, the lack of explicit policies, training, and infrastructure was repeatedly cited as the key obstacle to the successful and responsible use of AI. According to P-3:

> *Currently, there are no official guidelines or formal training on the use of generative AI at my university, and, therefore, most of the teachers do not even have institutional policies or training, but they rely on self-education and personal judgments.*

P-5 narrated, *"There is no institutional support for generative AI, as the university is not yet ready to create clear structures, ethical standards, and standard strategies to assist teachers in integrating AI"*. P-8 explained it *"AI integration is unequal because institutional policies are absent and not all faculty are ready to use AI because some teachers are comfortable with it and others hesitate and do not have the support"*.

P-9 indicated that *"There should be a robust institutional leadership and direction of policies, since without the administrative backing and set direction, the use of generative AI will not be planned and will be left to the initiative of individual teachers"*.

Discussion

The results of the research will provide valuable insights into the viewpoints, practices, and issues of teacher educators in terms of generative artificial intelligence (GenAI) integration in university-level teacher education in Pakistan. Overall, the findings show that teacher educators do not consider GenAI an educational technology that can replace face-to-face teaching but a supportive pedagogical tool, which demonstrates a moderate and critical attitude towards new educational technologies. The given perception is consistent with the recent international works, which indicate that AI augmentation is rather than a replacement of the professional judgment and teaching duties of educators (Mishra et al., 2023; Giannakos et al., 2024).

The theme supportive role shows that teacher educators view GenAI as a support tool that helps them plan their lessons, prepare assessments, create feedback, and write academic papers. The same results have been indicated in the recent qualitative and review studies, which show that educators find GenAI effective to improve efficiency and decrease workload without human supervision (Abdallah et al., 2025). It is especially relevant in the Pakistani environment, where teacher educators are often faced with enormous teaching and administrative challenges. However, the focus on human control by participants confirms the idea that successful GenAI integration is based on the pedagogical and ethical decision-making abilities of educators rather than on technology (Mishra et al., 2023).

The theme of cautious optimism shows that the attitudes of participants towards GenAI are, overall, positive, but are associated with concerns about misuse, overdependence, and uncontrolled use. Such a reserved position agrees with recent

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studies that have indicated that teachers across the globe are aware of the possible benefits of GenAI but are sceptical because of ethical/institutional issues (Sharmin, 2026; OECD, 2023). In tertiary education, and particularly in developing nations like Pakistan, this warning seems to be appropriate, since the rapid use of technology without proper training and policy implementation can cause superficial utilization and problems with academic honesty.

The pedagogical practices related findings suggest that teachers and educators are already trying out GenAI in such spheres as lesson planning, assessment design, feedback generation, and research support. The practices resemble the tendencies observed in the international literature where educators are starting to use GenAI to design instructions and complete academic tasks, but they still have the responsibility of evaluation and contextualization (Giannakos et al., 2024; Abdallah et al., 2025). Nevertheless, the strongly informal and self-organized character of such practices confirms the previous statements that GenAI integration in institutions is frequently done without a well-organized institutional direction (OECD, 2023). This brings the issue of teacher education because future teachers might get contradictory information regarding the proper and ethical use of AI.

The theme of ethical concerns was widely apparent in the responses of the participants, especially in the context of plagiarism, academic integrity, student dependency, bias, and data privacy. These issues are substantially reflected throughout current literature on the topic globally, where ethical governance and assessment validity are listed among the critical concerns related to the adoption of GenAI in education (Celik et al., 2022; UNESCO, 2023, 2025). These issues are especially serious in Pakistan, with an examination-based education system, as the unclear guidelines can undermine the credibility of the assessment and the learning outcomes. The findings also demonstrate the urgency and need for educators not only to learn GenAI tools but also to devise methods of instructing students in ethical and responsible AI application in the future.

Lastly, the theme of institutional gaps shows that there are severe constraints of the institutional preparedness such as the lack of formal policies, systematic professional development, and proper digital infrastructure. The fact is consistent with the reports by UNESCO (2023, 2025) and OECD (2023, 2025), which point out that a significant number of higher education institutions, especially those in the Global South, are lagging in the development of coherent strategies of GenAI integration. The institutional void leaves the ethical decision-making process and the integration of pedagogy to individual teachers, which may result in the imbalance of practices and resistance to change.

The above results indicate that although teacher educators in Pakistan are demonstrating their consciousness, intention, and emerging practices regarding GenAI, sustainable and responsible integration would need stronger institutional leadership, policy formulation and ongoing professional growth. These gaps can be addressed to provide higher education institutions with an opportunity to address the

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needs of teacher educators and ensure that future educators are ready to work in AI-enabled learning settings in an effective and ethical way.

Conclusion

The present qualitative research explored the views, practices, and issues of teacher educators related to the use of generative artificial intelligence in university-level teacher education in Pakistan. These results indicate that teacher educators generally perceive generative AI as a helpful pedagogical tool that can help to improve the efficiency of teaching, the design of instruction, and academic activity, but still see the role of human judgment and moral responsibility. Though the participants had optimistic reservations and noted that there were new pedagogical applications of generative AI, there were important ethical issues and institutional gaps, especially when it comes to academic integrity, policy clarity, professional development, and infrastructure. The paper finds that successful and accountable implementation of generative AI in teacher education needs institutional policies, continuous professional education, and pedagogically oriented implementation to guarantee meaningful and ethical application in the academic sphere.

Recommendations

1. To maintain academic integrity and ethical practice, universities should develop clear and detailed policies to identify what can be done or cannot be done in acceptable and unacceptable ways using generative AI in teaching, assessment, and research.
2. Regular practical training based on AI literacy, the integration of AI in pedagogy, evaluation development, and the ethical application of generative AI to teacher education should be provided to teacher educators.
3. Proper utilization of generative AI in aspects of plagiarism, bias, economic privacy and accountable digital citizenship should be explicitly integrated in teacher education curricula.
4. To facilitate equitable and effective use of generative AI, institutions of higher education should invest in reliable internet connections, licensed AI systems, and technical support systems.
5. Teacher educators should promote the reflective and critical use of generative AI in students, focusing more on the learning support practice than the dependence and shortcut practice.
6. The practices of assessments should be redesigned, focusing on the importance of critical thinking, reflection, and situational application, which will decrease the possibility of unethical use of AI-generated materials.

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