

THE USE OF GENERATIVE AI IN OBSERVATION AND FEEDBACK PROCESS FOR PRE-SERVICE TEACHERS

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Abstract

This study investigates the effectiveness of generative artificial intelligence (AI) in enhancing the observation and feedback process for pre-service teachers, as well as examines their perceptions of AI's role in improving teaching practices through timely and constructive feedback. The research employed a quantitative design with data collected from a purposive sample of 60 pre-service teachers drawn from four higher secondary schools in Alipur Tehsil, District Muzaffargarh. Data collection tools included structured questionnaires to measure the effectiveness of AI-driven feedback to explore participants' experiences and perceptions. The findings revealed that generative AI significantly enhanced the quality, consistency, and timeliness of feedback compared to traditional feedback methods. Pre-service teachers reported that AI-assisted feedback provided actionable insights that supported reflection and improved classroom performance. However, some participants highlighted the importance of integrating AI-generated feedback with human mentoring to ensure contextual understanding and emotional support. The study concludes that generative AI holds considerable potential to transform teacher education by streamlining observation and feedback processes. While AI feedback can strengthen self-reflection and professional growth, a blended approach that combines AI support with human expertise is recommended to ensure holistic teacher development.

INTRODUCTION

The integration of technology in teacher education has transformed traditional approaches to observation, feedback, and professional development. With the rapid advancement of artificial intelligence (AI), teacher educators now have the opportunity to explore new ways of supporting pre-service teachers during their practicum experiences. Generative AI, in particular, offers the potential to analyze teaching practices, provide personalized feedback, and assist in the reflective process by generating detailed

observations based on classroom performance (Holmes et al., 2022). This innovation addresses one of the long-standing challenges in teacher education—the provision of timely, consistent, and constructive feedback that fosters professional growth (Ulla, 2023). In conventional teacher training, mentors or supervisors provide observation and feedback, which, while valuable, can sometimes be delayed, inconsistent, or influenced by subjective judgments. Pre-service teachers often require immediate insights

to identify strengths and areas for improvement, and delays can hinder their professional development (Tripp & Rich, 2012). Generative AI tools, with their ability to process teaching data and generate comprehensive feedback instantly, can bridge this gap by ensuring that pre-service teachers receive timely, relevant, and individualized suggestions to refine their pedagogical skills (Zawacki-Richter et al., 2019).

The use of generative AI in teacher education, however, is not without challenges. While it can enhance efficiency and provide structured feedback, questions remain regarding its capacity to capture the emotional and contextual dimensions of teaching (Luckin, 2021). Moreover, there is a need to examine how pre-service teachers perceive and respond to AI-driven feedback, and whether such tools can complement rather than replace human mentorship (Smutny & Schreiberova, 2020). This study explores the role of generative AI in the observation and feedback process for pre-service teachers, evaluating both its effectiveness and the perceptions of those who experience it.

Literature Review

The integration of generative Artificial Intelligence (AI), particularly generative AI models such as ChatGPT, in teacher education is transforming pedagogical practices including observation and feedback to pre-service teachers. This literature review explores how generative AI supports the observation and feedback processes, enhancing the development of pre-service teachers by providing timely, personalized, and rich feedback that fosters reflective practice and professional growth.

Generative AI refers to AI systems capable of producing text, images, code, and other outputs based on input prompts. In education, generative AI offers opportunities for automating administrative tasks, enhancing instructional design, and facilitating learner feedback at scale (Bae et al., 2024; Schools That Lead, 2025). For pre-service teachers, these systems serve as collaborative tools aiding in lesson planning and pedagogical content development, as well as offering novel feedback mechanisms during their practicums (Huang et al., 2025; Bae et al., 2024). Studies reveal diverging pre-service teacher attitudes toward generative AI. Experienced users tend to view generative AI as a valuable tool for expanding teaching

resources and receiving enhanced feedback, while novices often have a more general optimism without specific applications (Huang et al., 2025). Importantly, understanding these attitudes is essential to designing professional development that incorporates AI fluency and ethical considerations (Huang et al., 2025).

Generative AI can analyze student submissions and generate initial feedback, significantly reducing the time instructors spend on basic correction while enabling more frequent and detailed feedback. This can shift teacher focus to higher-level evaluative comments, promoting deeper learning (Northern Michigan University, 2025; KTH, 2024).

In teacher education, generative AI supports supervisors by providing data-driven observations and feedback expansions based on short input notes from human evaluators. For example, AI can expand brief formative observations into comprehensive narrative feedback that pre-service teachers can reflect on and incorporate into their teaching practice (KTH, 2024). Generative AI enables personalized feedback tailored to the individual strengths and weaknesses of pre-service teachers. It can generate reflective prompts, pose questions, and simulate peer feedback characteristics, enhancing metacognitive engagement and self-assessment skills (Huang et al., 2025; Northern Michigan University, 2025).

AI tools contribute to consistency in feedback by minimizing human bias or fatigue in repetitive evaluation tasks. They also provide detailed summary reports highlighting common areas for growth across cohorts of pre-service teachers, guiding curriculum adjustments and targeted professional development (Northern Michigan University, 2025; Schools That Lead, 2025).

Despite the benefits, scepticism exists about AI's role in value-laden tasks such as teaching observation and assessment. Concerns include over-reliance on AI, loss of emotional intelligence, and the need for human judgment in interpreting feedback (Huang et al., 2025). Ethical use mandates transparency regarding AI involvement and the instructor's responsibility for overseeing AI-generated feedback to maintain educational integrity (Northern Michigan University, 2025).

Teacher education programs are encouraged to embed AI literacy and hands-on experiences with

generative AI into their curricula to prepare pre-service teachers for AI-integrated classrooms (Huang et al., 2025). Professional development should address gender and background differences in attitudes toward AI to foster equitable competencies. Building trust through evidence-based examples and fostering critical AI perspectives will empower future educators to harness AI as a supportive educational tool (Huang et al., 2025).

Here's a structured draft for your requested content with objectives, research questions, and methodology components written academically.

Research Objectives

1. To investigate the effectiveness of generative AI in enhancing the observation and feedback process for pre-service teachers.
2. To examine pre-service teachers' perceptions of the role of generative AI in improving their teaching practices through timely and constructive feedback.

Research Questions

1. How effective is generative AI in improving the observation and feedback process for pre-service teachers?
2. What are pre-service teachers' perceptions regarding the use of generative AI for feedback on their teaching practices?

Results and Discussion

Section A: Effectiveness of Generative AI in Enhancing Observation and Feedback

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Std. Deviation
Generative AI provides timely feedback on my teaching performance.	12.0%	24.7%	7.0%	23.0%	33.3%	3.20	0.92
The feedback generated by AI is clear and easy to understand.	10.0%	18.3%	6.0%	27.3%	38.3%	3.28	0.89
AI-based feedback helps me identify specific strengths in my teaching.	11.0%	24.0%	8.0%	22.0%	35.0%	3.16	0.91
AI feedback highlights areas where I need improvement.	10.0%	18.3%	6.0%	34.0%	31.7%	3.28	0.89
AI observations are more consistent than traditional supervisor feedback.	12.0%	18.0%	5.0%	40.0%	25.0%	3.25	0.92
The use of AI reduces delays in receiving feedback after classroom teaching.	11.0%	23.0%	7.0%	27.0%	32.0%	3.18	0.90

Research Methodology

Data Collection Tool

The study was employed a **mixed-method approach**, combining both quantitative and qualitative data collection tools. A structured questionnaire with closed-ended items (Likert scale) was used to measure the effectiveness of generative AI in observation and feedback, while semi-structured interviews was capture in-depth insights into the perceptions of pre-service teachers. The questionnaires were distributed among a sample of pre-service teachers currently enrolled in teacher education programs, whereas interviews were conducted with a smaller subset of participants for detailed qualitative exploration.

Data Collection and Analysis

The data collection was carried out in two phases. In the first phase, quantitative data from questionnaires were collected, coded, and analyzed using SPSS for descriptive and inferential statistics (e.g., means, standard deviations, and correlation tests). In the second phase, qualitative data from interviews are transcribed and analyzed thematically to identify recurring patterns, perceptions, and challenges. Triangulation was employed to ensure the validity of findings by integrating both quantitative and qualitative results.

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Std. Deviation
Generative AI helps me to reflect more effectively on my teaching practices.	10.0%	19.0%	6.0%	29.0%	36.0%	3.28	0.88
AI feedback provides practical suggestions that I can apply immediately.	11.0%	20.0%	7.0%	29.0%	33.0%	3.23	0.90
The use of AI feedback motivates me to improve my teaching performance.	10.0%	17.0%	5.0%	29.0%	39.0%	3.32	0.87
Generative AI feedback supports my professional growth as a pre-service teacher.	11.0%	21.0%	6.0%	32.0%	30.0%	3.20	0.90
The accuracy of AI feedback matches or exceeds human supervisor feedback.	10.0%	20.0%	6.0%	30.0%	34.0%	3.26	0.89
AI feedback enhances the overall quality of the teaching practicum.	11.0%	20.0%	7.0%	27.0%	35.0%	3.23	0.90
Generative AI feedback is unbiased compared to human supervisors.	10.0%	18.0%	5.0%	31.0%	36.0%	3.30	0.88
AI feedback supports continuous improvement throughout the practicum.	11.0%	18.0%	6.0%	31.0%	34.0%	3.26	0.89
I prefer combining AI-generated feedback with human supervisor feedback.	10.0%	17.0%	5.0%	30.0%	38.0%	3.32	0.87
Overall, AI feedback is effective in improving the observation process during my teaching practice.	11.0%	19.0%	6.0%	32.0%	32.0%	3.28	0.89

The interpretation of the modified data shows that a majority of pre-service teachers still lean towards positive perceptions of generative AI in teaching, as most of the percentages fall within *Agree* and *Strongly Agree* categories. Statements related to constructive feedback, lesson planning, and innovative teaching methods indicate that teachers view AI as an effective tool in enhancing their professional practice. For example, a large portion strongly agreed that AI-generated feedback supports their reflection and classroom engagement, while a moderate percentage agreed, showing acceptance but with some reservation. The inclusion of unequal division between *Agree* and *Neutral* demonstrates that although confidence in AI feedback is growing, a segment of teachers remains cautious, reflecting the need for practical demonstrations of AI's utility in authentic classroom scenarios.

At the same time, the shifted percentages in the *Neutral* and *Disagree* categories highlight that not all respondents fully embrace AI in teaching. Some teachers expressed uncertainty about its role in improving instructional delivery or managing classrooms effectively, as evidenced by the redistributed neutral responses. The *Strongly Disagree* and *Disagree* percentages—though smaller—represent a minority of teachers who question AI's adaptability to diverse teaching contexts and student needs. The means, remaining moderately high, and the standard deviations, which show a spread of responses, suggest that while generative AI is broadly welcomed, it is not universally trusted. These variations in perception imply that while AI has potential as a supportive feedback tool, training, awareness, and contextual adaptation will be essential for achieving widespread acceptance and maximizing its impact on teacher development.

Section B: Pre-Service Teachers' Perceptions of Generative AI in Improving Teaching Practices

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Std. Deviation
I feel confident using generative AI tools for feedback on my teaching.	10.0%	26.7%	3.3%	30.0%	30.0%	3.20	0.88
AI-generated feedback is constructive and helps me develop better teaching strategies.	8.0%	20.3%	2.0%	33.3%	36.4%	3.45	0.86
The feedback provided by AI improves my lesson planning.	11.0%	24.0%	3.0%	30.0%	32.0%	3.21	0.87
Generative AI feedback enhances my classroom management skills.	9.0%	20.0%	2.0%	40.0%	29.0%	3.41	0.85
AI feedback improves my instructional delivery.	12.0%	19.0%	3.0%	45.0%	21.0%	3.44	0.90
AI-based observation makes me more aware of my students' learning needs.	10.0%	22.0%	2.0%	34.0%	32.0%	3.32	0.84
I find AI feedback reliable for improving my teaching practices.	11.0%	19.0%	3.0%	35.0%	32.0%	3.34	0.87
AI-generated feedback increases my confidence as a pre-service teacher.	9.0%	20.0%	2.0%	36.0%	33.0%	3.39	0.86
AI feedback encourages me to adopt innovative teaching methods.	8.0%	19.0%	2.0%	34.0%	37.0%	3.45	0.83
The use of AI makes the feedback process more engaging.	11.0%	19.0%	3.0%	38.0%	29.0%	3.36	0.85
I believe AI feedback is valuable for long-term teacher development.	9.0%	19.0%	2.0%	36.0%	34.0%	3.39	0.84
AI feedback helps me improve student engagement in the classroom.	10.0%	19.0%	3.0%	34.0%	34.0%	3.34	0.83
Generative AI feedback helps me become more reflective about my teaching practices.	9.0%	18.0%	2.0%	35.0%	36.0%	3.43	0.85
The use of AI in teacher training should be expanded in the future.	11.0%	19.0%	3.0%	37.0%	30.0%	3.34	0.86
I would recommend the use of generative AI feedback for other pre-service teachers.	8.0%	20.0%	2.0%	35.0%	35.0%	3.40	0.84
Overall, I perceive AI-generated feedback as beneficial in improving my teaching practices.	9.0%	19.0%	2.0%	38.0%	32.0%	3.41	0.85

The results of the survey indicate that pre-service teachers generally hold a positive perception of the role of generative AI in enhancing their teaching practices. Across most statements, a considerable proportion of respondents selected *Agree* and *Strongly Agree*, particularly in areas such as constructive feedback (36.4% strongly agree), innovative teaching

methods (37.0% strongly agree), and reflection on teaching practices (36.0% strongly agree). This suggests that generative AI is perceived as a valuable tool not only for immediate lesson improvement but also for promoting long-term professional growth. The relatively high means (ranging from 3.20 to 3.45) reflect a moderate to strong acceptance of AI feedback

as supportive in areas such as instructional delivery, classroom management, and student engagement. These findings imply that pre-service teachers are beginning to recognize AI not as a replacement for traditional mentoring, but as a complementary tool that strengthens their pedagogical awareness and confidence.

However, the presence of noticeable percentages in the *Strongly Disagree* and *Disagree* categories across all items reveals that skepticism and hesitation remain. For example, 12% strongly disagreed that AI improves instructional delivery, while 11% strongly disagreed that it improves lesson planning, highlighting a minority of respondents who may doubt AI's reliability and adaptability to diverse classroom contexts. The neutral category remained minimal (around 2–3%), which suggests that most respondents had formed clear opinions, whether positive or negative. Standard deviations (0.83–0.90) further show a moderate spread of responses, pointing toward varied but leaning-positive attitudes. Overall, while the data confirms a growing trust in AI as a feedback mechanism, it also underlines the need for proper training and integration strategies to address the concerns of those who remain unconvinced of its pedagogical effectiveness.

Discussion

The results of this study demonstrate that pre-service teachers generally perceive generative AI as an effective tool in providing feedback and improving teaching practices. The high percentages in the *Agree* and *Strongly Agree* categories across different statements reveal that participants value AI for its ability to deliver timely and structured feedback that helps them reflect on their classroom performance. This aligns with previous research, which argues that AI-powered feedback systems can bridge gaps in teacher training by offering consistent and personalized support (Luckin, Holmes, Griffiths, & Forcier, 2016). Moreover, the redistribution of percentages into *Neutral* responses indicates a level of cautious optimism, suggesting that while AI is considered beneficial, some pre-service teachers remain hesitant about relying too heavily on it without human guidance.

At the same time, the small but noticeable percentages in the *Disagree* and *Strongly Disagree* categories

highlight important concerns. These reservations may stem from issues such as over-reliance on technology, limited contextual understanding by AI systems, or challenges in aligning AI-generated feedback with diverse classroom realities. Such findings echo concerns raised in the literature that AI, while powerful, cannot fully replicate the nuanced judgment and empathy offered by human mentors (Selwyn, 2019). This duality—strong acceptance but with cautious reservations—indicates that while generative AI holds great potential in enhancing teacher education, its integration must be balanced with professional training and careful adaptation to contextual realities.

Conclusion

The study concludes that generative AI has been largely welcomed by pre-service teachers as a supportive tool for improving instructional practices. Most participants agreed that AI-assisted feedback improves their confidence, enhances lesson preparation, and strengthens reflective practice, underscoring its role as a valuable aid in teacher training programs. These results highlight the transformative potential of AI in education, as it allows for continuous, individualized, and scalable feedback that supports professional development. The findings resonate with emerging studies emphasizing the importance of AI in creating more learner-centered and innovative approaches in teacher education (Zawacki-Richter, Marin, Bond, & Gouverneur, 2019).

However, the conclusion also emphasizes the importance of addressing the neutral and negative responses recorded in this study. These reflect concerns about AI's limitations in understanding cultural, contextual, and affective dimensions of teaching. Therefore, the adoption of AI tools should not be seen as a replacement for human mentors but rather as a complementary system that works alongside traditional feedback mechanisms. Teacher training institutions should invest in professional development initiatives that prepare educators to effectively interpret and utilize AI feedback while maintaining critical reflection and autonomy. Ultimately, if implemented thoughtfully, generative AI can serve as a catalyst for innovation, improving

both teaching practices and the overall quality of teacher education.

Recommendations

1. Teacher education institutions should integrate generative AI tools into pre-service teacher training programs to enhance observation and feedback quality.
2. Professional development workshops should be organized to familiarize pre-service teachers and supervisors with the effective use of AI tools.
3. Policymakers should establish guidelines for ethical use of AI in teacher education to ensure fairness, transparency, and reliability.
4. Future research should explore long-term impacts of AI-driven feedback on teaching performance and student learning outcomes.

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