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Exploring the Impact of Generative AI on Curriculum Design and Instruction: A Study With Preservice Teachers

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Abstract: Generative Artificial Intelligence (GenAI) is transforming education by reshaping curriculum design, individualized learning, and professional collaboration. This interpretive study examines how seventy preservice teachers engaged with GenAI through structured learning experiences focused on lesson planning, content development, and reflective practice. Participants, all fourth-year PK–Grade 5 and intervention specialist candidates at the University of Dayton, completed a co-taught seminar led by methods professors in science, social studies, language arts, and mathematics. Data sources included initial reflections on GenAI's role in education, documentation of prompt exploration, and ongoing reflections during the seminar. Thematic analysis revealed a shift in preservice teachers' understanding from viewing GenAI as a simple lesson-planning tool to recognizing its potential for differentiation, assessment, and parent communication. Participants demonstrated increasing sophistication, ethical awareness, and confidence in using GenAI to enhance instruction. Findings indicate that intentional professional development enhances preservice teachers' GenAI literacy and confidence, supporting thoughtful integration of emerging technologies into teaching practice. The study advocates for embedding GenAI training within teacher education programs to cultivate innovation, ethical practice, and inclusivity in future classrooms.

Keywords: Generative Artificial Intelligence (GenAI), preservice teachers, lesson planning, Teacher Education, professional development, literacy, educational technology, reflective practice, instructional design, educational innovation.

In an era where technology is reshaping educational landscapes, generative artificial intelligence (GenAI) has emerged as a transformative force in curriculum design and instructional practices. As educators seek innovative ways to enhance teaching effectiveness and student engagement, the integration of GenAI tools offers a promising avenue for personalized learning experiences. This study focuses on preservice teachers, who represent the future of education, and explores their interactions with GenAI as a tool for lesson planning and content knowledge development.

Despite the potential advantages of GenAI, many preservice teachers enter the profession with limited exposure to these technologies, often feeling unprepared to utilize them effectively in their classrooms. Research indicates that targeted professional development is crucial for fostering the necessary skills and confidence to leverage GenAI tools in meaningful ways (Powell & Courchesne, 2024; Watson & Rainie, 2025). Therefore, with this interpretive study we investigated

how preservice teachers engaged with GenAI in lesson planning and the impact of structured learning experiences on their proficiency and attitudes toward these technologies.

The research was guided by the question of how preservice teachers use GenAI to support lesson planning. Through a collaborative seminar designed to foster inquiry and reflection, we examined the growth in understanding, confidence, and intended use of GenAI among a cohort of preservice teachers. By analyzing data collected from pre- and postsurveys, as well as GenAI prompt submissions, we sought to illuminate the practical methods and benefits of integrating GenAI into teacher preparation programs.

Ultimately, this research supports the integration of GenAI training within teacher education programs, highlighting the critical need to prepare aspiring educators with the competencies required to effectively utilize emerging technologies while maintaining the ethical standards of the teaching profession. By promoting creativity and self-assurance, these initiatives have the potential to greatly improve the effectiveness and inclusiveness of teaching methodologies in modern educational environments.

Literature Review

A report released in January, 2025 from the American Academy of Colleges and Universities stated that the majority of college and university leaders believed their institutions were largely unprepared to effectively utilize GenAI in several key areas. Specifically, 56% felt their schools were not ready to prepare students for the future, 53% thought they were unprepared to equip faculty with the skills to use GenAI for teaching and mentoring, and 63% believed nonfaculty staff were not adequately prepared to use these tools in their work. Additionally, 59% of these leaders felt that graduates from the previous spring were not sufficiently prepared to work in environments where proficiency with GenAI tools is critical (Watson & Rainie, 2025).

However, in that same report, a majority of educators believed GenAI tools will positively impact various aspects of student learning and development. Specifically, 91% thought these tools will enhance and customize learning, with 47% expecting a significant impact. Additionally, 75% believed GenAI will improve students' research skills, including 29% who foresaw a substantial effect. Regarding writing abilities, 69% anticipated that GenAI will help students write more clearly and persuasively, with 27% predicting a strong impact. Furthermore, 66% said these tools will boost student creativity, and 21% believed the impact will be considerable (Watson & Rainie, 2025).

The reality is artificial intelligence (AI) is now an inherent part of society. Deep learning technologies are a part of our cars, hand-held devices, vacuum cleaners, and everyday existence. Thus, the "evolution of AI in education represents more than technological advancement; it is a paradigm shift that is revolutionizing how knowledge is imparted, received, and managed" (Jacques et al., 2024, p. 103).

Research has shown that GenAI has made substantial contributions already in regard to facilitating educators' work in developing curricula, designing lessons, and building assessments, all to support student learning. Powell and Courchesne (2024) conducted research on effectively using the GenAI chatbot ChatGPT to develop high-quality elementary science lessons using the 5E inquiry model (engagement, exploration, explanation, elaboration, and evaluation). They stated, "AI tools can support brainstorming, teachers' critical thinking about outputs, and exploration of different approaches to their lessons" (p. 2). For example, the work of Zafar et al. (2025) demonstrates that AI and machine learning can substantially enhance student learning in elementary classrooms by empowering teachers through focused professional development. The researchers engaged participants in a 6-week summer professional development experience to develop third- through fifth-grade lesson plans that integrated AI components. This collaborative model illustrates

that introducing machine learning at early grades is feasible and beneficial and also highlights how professional development can cultivate educators' knowledge and use of GenAI in lesson plans.

Additionally, GenAI is foundational in supporting new ways to conceptualize lesson development. Berry et al. (2024) identified that GenAI "serves as a valuable resource for educators, as it can reduce routine teaching burdens, offer student-specific recommendations, and provide teachers more time to interact with students" (p. 39). Educators have used AI tools for content building as well as new, engaging pedagogical applications (Trust et al., 2023). Research conducted by Kosmas et al. (2025) focused on teacher collaboration while designing lesson plans that incorporated GenAI tools. The researchers provided guidelines, sample lesson plans, and practical information on using specific GenAI tools in the classroom, scaffolding the teachers as they cocreated three integrated GenAI lesson plans to use in their classroom instruction. Specifically, in the lessons, students explored various texts from diverse sources beyond the textbook and compared them to produce their own multimodal and multimedia texts using GenAI (i.e., ChatGPT or Gemini AI). Both teachers and students documented positive learning outcomes through the development and implementation of the lessons using the GenAI tools.

Assessment instruments can also be enriched and supplemented through GenAI tools. GenAI tools can transform educational assessments by automating grading, providing personalized feedback, and enabling adaptive testing that adjusts to individual student needs (Broadfoot & Rockey, 2025; Foung et al., 2024). These tools can also enhance efficiency and support continuous assessment. This provides educators the opportunity to focus on pedagogy.

Aravantinos et al. (2024) have developed a framework that serves as a guide for educators as they design lessons incorporating GenAI that cultivates student agency and ethical awareness. This framework supports the development of curricula that build foundational AI knowledge and encourages creativity and critical thinking skills. An emphasis on ethical and human-centered use of GenAI helps teachers use AI ethically and responsibly and, in turn, prepare their students to do the same. Thus, the framework addresses complexities and opportunities presented by AI in education, with emphasis on inclusive, equitable, and sustainable learning.

GenAI and Preservice Teacher Training

With the understanding that GenAI is now a pervasive component in the workplace, higher education institutions need to think quickly and specifically about how they will prepare students to effectively use it. Education preparation programs, in particular, need to identify ways to support preservice teachers in effectively implementing GenAI tools into their own lives and into student learning experiences. Teaching is demanding, challenging work and thus, using GenAI tools in meaningful, purposeful ways can be highly advantageous for any teacher and the students.

AI will have a boundless potential for integration in classroom environments but will require teachers to be ready for that integration (Kim & Kwon, 2023; Zhang et al., 2023). However, Lucas et al. (2025) identified that preservice teachers are not fully ready or confident to integrate GenAI into their future teaching. Yet, GenAI could support teachers in writing lesson plans, evaluating work, providing feedback to learners, and supporting differentiated instruction. Successful implementation of those components requires solid understanding of the GenAI tool. For example, Özdemir (2024) used Microsoft Copilot with 24 preservice students in a reading education course. Overall, the preservice students were positive about their experience and planned to use Copilot to support their future work, but they did find complications regarding the accuracy and adequacy of the content. Abualrob (2025) explored how 20 preservice teachers might use Copilot when planning fourth-grade science lesson plans. This research found that using Copilot supported the students in "developing

cognition of new ideas, attracting attention to things that never crossed their minds, and in saving time and effort" (p. 1).

Clearly, GenAI holds clear pedagogical applications for preservice teachers, yet careful attention must be given to preparing future teachers to use this tool in ways that will be meaningful, helpful, and ethical, with additional careful attention to understanding how to identify inaccurate content. Zawacki-Richter et al. (2019) identified in a systematic review of GenAI in higher education that there was a need for educators to engage in critical reflection on the theoretical, ethical, and pedagogical implications. However, teachers, including novice teachers, have articulated concerns regarding the use of GenAI, particularly in elementary classrooms (Zarenasab & Jamebozorg, 2025). These concerns include the potential loss of independent and creative thinking among students, as GenAI systems may encourage overreliance on automated solutions. Additionally, teachers identified concerns regarding GenAI's limited ability to fully understand and respond to the diverse needs of students, which could reduce the quality of human interaction and personalized support in the learning environment. Teachers also identified difficulties in detecting cheating when GenAI tools are involved, as well as the challenges of ensuring GenAI-generated content is accurate and not misleading. The need for immediate, high-quality professional development is clear to provide safe and effective integration of GenAI technologies in classrooms.

Ethical challenges also extend to issues of privacy, data security, and fairness, which align with broader concerns found in the literature regarding the use of GenAI in elementary education (Yusuf, 2025). These include risks related to surveillance and tracking of students' activities that could threaten privacy, autonomy, and the safety of creating a supportive learning environment. Bias embedded within GenAI algorithms may perpetuate systemic inequities, especially affecting marginalized groups. Teachers expressed concerns about the ethical responsibility of incorporating GenAI tools that require careful oversight and professional judgment to protect students' rights and foster equitable learning opportunities. Addressing these ethical challenges involves providing sustained training, developing clear policies, and encouraging critical reflection on GenAI's role in education to ensure responsible, inclusive, and effective use of GenAI technology.

Therefore, as Chiu et al. (2023) articulated, there is a significant need for supporting teachers in learning how to effectively integrate GenAI into their pedagogy grounded in the limited understanding and opportunities to use the technology as a teaching strategy. To address this need, education preparation programs can integrate and model pedagogical practices that are useful, authentic tasks for preservice teachers to experience as they prepare to meet the needs of their future students. Specifically, teacher preparation programs can review and adjust curricula to explicitly model and use GenAI, in alignment with digital literacy expertise. They should also identify opportunities for hands-on experiences where preservice teachers actively use GenAI tools in lesson planning, assessment, and differentiated instruction. Finally, they should prioritize reflective practices and engagement in dialogue to explore ethical implications of GenAI use in their own lives and in their future classroom applications.

Incorporating and embedding GenAI pedagogy in teacher preparation curricula is crucial for future teachers to develop skill sets in personalizing learning, differentiating instruction, and enhancing student engagement. GenAI tools have the potential to support teachers in fostering creativity, addressing diverse student needs, and ensuring educators are prepared for effective, equitable, and innovative teaching. Thus, examining ways in which teacher education preparation programs can successfully engage in this work is of critical importance.

Methodology

This is a constructivist study (Creswell, 2013). The research question was open-ended and the workshop design was intentionally collaborative to foster meaning making about the use of GenAI in discussion and interactions with other preservice teachers (Creswell, 2013): How do preservice teachers use GenAI to support lesson planning? For this interpretive study (Glesne, 2016), the research question was oriented toward the practical and exploratory goals of understanding preservice teachers' existing proficiency with GenAI, as a necessary workplace skill (Watson & Rainie, 2025), and the impact of teaching and practice with best practices for harnessing the benefits of GenAI for school-based planning applications (Powell & Courchesne, 2024; Trust et al., 2023).

Method

After Institutional Review Board approval, 74 preservice teachers, in what we refer to at our institution as the "senior methods block," attended a class seminar called Using Generative AI to Support Student Teachers in Lesson Planning. Of the students in attendance at the seminar, 70 agreed to participate in the study at the professional development (PD) seminar and completed the presurvey and exit ticket. Fifty-nine students participated in the follow-up end-of-semester survey. All participants in the study were preservice teachers in the preschool to fifth grade (n = 64) or intervention specialist (n = 10) licensure programs. No self-reported participant demographics were collected in the presurvey, exit ticket, or postsurvey. However, the demographics of the participants in this study reflect the demographics of the majority of teachers in the United States: Most participants presented as White women (National Center for Education Statistics, 2023). The majority of the participants were considered traditional 4-year, liberal arts university students.

The workshop was cofacilitated by four full-time faculty members at the University of Dayton. The four faculty members' methods courses include science, social studies, mathematics, and literacy disciplines. The preservice teachers were in the last coordinated methods courses prior to the student teaching semester (senior methods block).

Prior to participation in the seminar, students completed a presurvey. In alignment with our research question, the presurvey included questions about about GenAI use in teaching, rules of exclusion or when they would never use GenAI in teaching, and questions about the potential use of GenAI for lesson planning and teacher support. In fall 2024, we were unsure about any level of background knowledge or experience with GenAI. Therefore, the prompts were very broad:

Presurvey Questions

- How do you use AI?
- If you do use AI, what do you use it for? If you don't use AI, what is your reasoning behind not using it?
- List at least 3 things you think you could use AI for in teaching.
- Can you identify anything you would never use AI for in teaching?
- Do you see any potential for using AI for lesson planning, and if so, how?
- In what other ways can AI help a teacher?

For context, in fall 2024, the University of Dayton was beginning to have their first conversations about using GenAI in the university classroom. It was not until fall 2025 that the university established a preferred GenAI tool for campus use and required statements about GenAI use in course syllabi, and the Center for Teaching and Learning developed an inaugural GenAI

fellows program. Developers and users of GenAI had been impacting work in exponential ways (Maslej et al., 2025) such that these basic questions were important, and applicable, benchmarks in fall 2024. At the conclusion of the seminar, students completed the first of two postsurveys (the exit ticket) and submitted the chat history from the GenAI platforms they used throughout the seminar. The exit ticket solicited feedback on students' experience with GenAI, particularly probing their metacognitive reflection on the seminar, and contained theoretical questions about whether they would consider using GenAI in their teaching, or not, and why. Students were also asked to share their skill learning as a result of the seminar, and ongoing questions and wonderings about GenAI not covered in the seminar content.

Exit Ticket Questions

- What different emotions or thoughts come to mind when you think about using AI?
- After this session, do you think you will use AI in your teaching? Why or why not?
- Make a list of what you now know about AI that you didn't know before this session.
- What do you know about AI that we didn't address today?
- What do you still wonder about AI?

We used the findings from the exit ticket to inform the development of additional GenAI seminars and from student feedback when GenAI was used throughout the semester in coursework lesson planning and in field site applications. We understood that there would be no change in authentic application of GenAI in 90 min, but we were curious about how participants conceptualized their relationship to GenAI and how they predicted they might change or alter their use in the future.

The second and final postsurvey was administered at the end of the senior methods block semester and after approximately 150 hr of field work in classroom settings with cooperating educators and students. The final survey was designed to gather data on how GenAI was functionally implemented in both planning and classroom duties. Fifty-nine participants responded to each query in the final survey.

Final Survey Questions

- How did you use AI this semester?
- Did you use AI for lesson planning and if so, how often?
- Do you feel that using AI benefitted your learning or creating lesson plans? Why or why not?
- What specific programs/sites did you access to use AI?
- If you used AI for lesson planning, how did you refine your prompts when creating lesson plans?
- If you used AI for lesson planning, do you see more potential for using AI, and if so, how?
- In what other ways can AI help a teacher?
- Did you find the initial AI PD session useful and if so, how?
- What other questions do you now have about using AI for teaching?

The research design was inductive and broad to determine how we could best support preservice teacher candidates in GenAI use. Of course, the literature review established and supports current best practices. And we brought our disciplinary expertise to the prompts and engagement, but as

practitioners we ultimately wanted to know about how students applied our seminar teaching in real-world applications in the classroom.

The PD Seminar: Using GenAI to Support Student Teachers in Lesson Planning

The PD seminar design was modeled after the 5E inquiry model. We found that the constructivist, inductive design of an inquiry (Berube, 2008) was compatible with the constructivist nature of our research question. The workshop began with an open-ended exploration (Berube, 2008) of open GenAI platforms. After open exploration and shared experience, faculty members prompted students to share and capture their early learning.

Next, faculty members shared research-based best practices for using GenAI to scaffold students' experiences, including a description of what GenAI is, how teachers currently engage with platforms, and specific guidelines for generating high-quality prompts for lesson planning with GenAI. Preservice teachers then returned to exploration based on best practices, considering both the input needed for GenAI and what GenAI assistance could provide. Preservice teachers practiced multiple iterations of work with the open GenAI platforms to develop lesson plans and classroom materials.

Extension prompts included considerations of content learning from GenAI, cultural and contextual relevance of the lessons, extending learning, real-world applications, incorporating technology, and assessment and evaluation support. The workshop ended with challenges and ongoing considerations for GenAI use, as established in the literature (Aravantinos et al., 2024; Chiu et al., 2023).

Thematic Analysis

We analyzed the data from the presurvey, the exit ticket, and the follow-up postsurvey, as well as the GenAI chat prompt and result histories. The data analysis strategies included identifying codes, reducing codes to themes, and counting frequencies of codes in the pre- and postsurvey data (Creswell, 2013). The salient codes and their frequencies are shown in Figure 1 as a snapshot of how preservice teachers used GenAI and planned to use GenAI in their instructional planning. The prompt data were analyzed using focused coding (Saldaña, 2013).

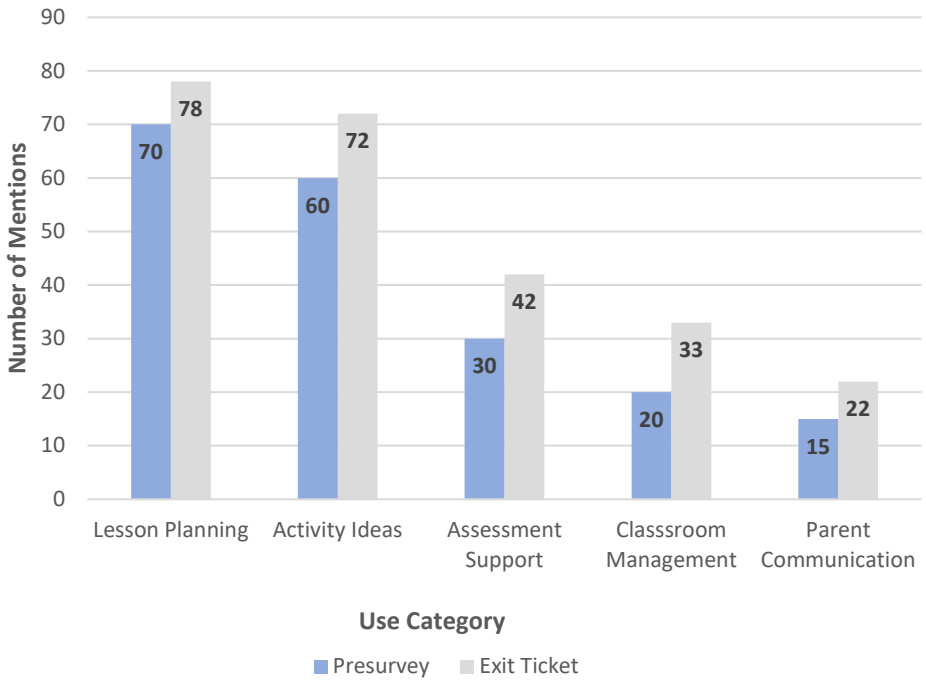

Figure 1. Comparison between presurvey and exit ticket responses on generative artificial intelligence use in teaching contexts.

Categories for focused coding were drawn from the literature, the PD seminar, and the student teachers themselves. Focused codes from the literature were institutional readiness and perceptions, pedagogical applications of GenAI, PD and teacher learning, ethics, equity, and safety, and implementation strategies in teacher education. Codes from the PD seminar included attention to how many prompts and refined prompts were used per query, the complexity and content of refined prompts, and the alignment of the final prompt results with high-quality instructional plans. Finally, in a commitment to the constructivist learning environment, the researchers attended to student knowledge with in vivo codes for preservice teachers' own words to identify their own conceptions of GenAI.

Results

Presurvey and Exit Ticket Data

The comparison between the presurvey and exit ticket data reveals significant growth in student teachers' understanding, confidence, and intended use of GenAI tools in educational contexts. Prior to the instructional session, the most frequently cited uses for GenAI (see Figure 1) included lesson planning and generating activity ideas. These categories remained dominant in the exit ticket responses but with noticeable increases. This suggests that the session reinforced and expanded on participants' initial ideas of how GenAI could support their instructional planning, transforming tentative familiarity into actionable strategies.

More notably, areas that were previously underutilized saw noticeable improvement (see, for example, assessment support in Figure 1). Participants acknowledged the importance of both assessing students and evaluating lesson planning. As one student noted, "It can be used to assess a

lesson plan's efficiency and efficacy." This perspective reflects a shift beyond traditional student assessment toward examining the effectiveness of instructional design itself.

Similarly, an increase in the use of GenAI for classroom management indicated an emerging awareness of GenAI's broader functionality, such as drafting behavior plans, generating reinforcement systems, or supporting communication during challenging classroom moments (Figure 1). Participants recognized multiple ways GenAI could enhance instructional practice. One participant explained, "I know that I can turn lesson plans into SMART goals, ask specific prompts, and add classroom management techniques into lesson plans." Another emphasized the breadth of its applications, stating, "You can use AI to respond to parents' emails and classroom management. AI can be used for anything honestly." These comments highlight both targeted pedagogical uses and a perception of GenAI's expansive potential. Such findings align with emerging research suggesting that GenAI not only streamlines administrative tasks but also supports instructional efficiency and teacher workload management (Berry et al., 2024).

Parent communication, though less common overall, still showed a meaningful increase (Figure 1) reflecting a growing confidence in using GenAI to assist with writing newsletters, simplifying language, or translating information for families. One participant remarked that GenAI "can be used to communicate with students and parents (create letters, emails, etc.)." This perspective underscores the perceived value of GenAI in streamlining routine communication, a theme consistent with research highlighting GenAI's potential to reduce teacher workload and improve home–school connections (Berry et al., 2024).

Perhaps most importantly, the number of student teachers who reported no or limited use of GenAI dropped nearly in half, from 15 to 8. This reduction suggests that even those who were previously skeptical or unsure found valuable and appropriate ways to incorporate GenAI into their teaching practice after the PD seminar. Collectively, these shifts indicate that targeted PD can significantly broaden both the understanding and perceived usefulness of GenAI tools. Student teachers not only expanded their knowledge of GenAI applications but also demonstrated a clearer sense of how GenAI can enhance creativity, efficiency, and differentiation in the classroom.

Prompt-Submission Data

Analysis of GenAI prompt submissions provided by the participants reveals rich insight into how preservice educators engaged with GenAI tools, particularly ChatGPT, to develop standards-aligned lesson plans. The prompt histories, submitted through shared links, demonstrated a consistent pattern of repetitive refinement. Most participants (n = 67) employed two to four rounds of prompting per lesson, beginning with broad requests (e.g., "Create a 4th grade science lesson") and gradually incorporating more specific elements such as instructional models, differentiation strategies, and technology integration. Examples of refined prompts include "Incorporate the 5E model with animal adaptations," "Add group work with student roles," and "Modify the lesson for English language learners or students with IEPs [individualized education programs]."

The lesson topics most frequently targeted core content areas, with the majority of subject requests (n = 60) falling in science, math, and literacy. Within these categories, the participants explored complex instructional tasks including read-aloud comprehension, place value operations, and ecosystem modeling. Prompts often specified pedagogical frameworks such as inquiry-based learning or the use of manipulatives and educational technology, reflecting the alignment of GenAI use with best practices in lesson design.

Additionally, some participants documented their transfer of GenAI-generated text into personal Google Docs, where further editing occurred, indicating that GenAI was not treated as a final product but rather as a collaborative planning tool. While a small number of students reported

early difficulty with limited GenAI platforms (e.g., mobile apps or restricted tools), the majority successfully navigated ChatGPT and other interfaces to produce high-quality instructional plans. These patterns suggest an increasing comfort level and sophistication with prompt manipulation. The ability to refine questions and respond to GenAI outputs with professional judgment demonstrated a meaningful level of GenAI literacy among the student teachers.

Application of GenAI in the Field-Site Classroom

The end-of-the-semester follow-up provided additional data from participants regarding their use of GenAI during their field and classroom experience. Student teachers reported using GenAI most frequently for lesson planning, though applications extended to professional communication and resource creation. As one participant explained, "I used AI to generate ideas for lesson plans and write professional emails," and another shared that by using GenAI, "This can save time for teachers to spend more time with students." These reflections highlight lesson design as the primary entry point, while also pointing to GenAI's broader relevance in supporting the professional responsibilities of novice teachers.

Across responses, participants emphasized the benefits of GenAI in enhancing creativity, efficiency, and differentiation. One participant noted, "Yes, it actually helped me so much with the creativity of lesson planning and the differentiation aspect of my original lesson plans," while another described how GenAI supported "incorporating the necessary components and pacing." Participants also underscored the importance of refining prompts to achieve meaningful results, with one remarking, "I refined as I went," and another adding, "I used specific vocabulary." These findings suggest that student teachers are learning to approach GenAI critically, recognizing the need to adapt outputs rather than rely on them uncritically.

Looking ahead, respondents expressed optimism about the expanded potential of GenAI in teaching practice, citing its usefulness for "anything" from lesson planning to administrative communication. One noted, "Yes, it is very helpful when you need a push for lesson planning or certain areas of your lesson plan or activities," and others highlighted applications in "creating rubrics and worksheets" or generating classroom management ideas. Reactions to the original PD session were generally positive, where some found it clarifying, but others felt it covered material they already knew, suggesting a need for differentiated PD. Overall, the findings align with current scholarship, reinforcing the view that GenAI functions as a supportive scaffold for preservice teachers, reducing workload and enhancing instructional design while preserving the centrality of teacher expertise.

Conclusion

The data from the presurvey, exit ticket, and follow-up responses provide compelling evidence that targeted professional development on GenAI has a significant and positive impact on student teachers' understanding, confidence, and instructional planning. Like respondents on recent executive surveys that documented readiness gaps for students, faculty, and staff (Watson & Rainie, 2025), the participants began with uneven experience and mixed emotions. Yet, after targeted, hands-on practice, they reported concrete, standards-aligned applications that echo evidence of GenAI's value for lesson design, workload reduction, and creative planning (Berry et al., 2024; Powell & Courchesne, 2024). The prominence of multiround prompt refinement in our data also mirrors recommendations that effective use depends on iterative, critically framed prompting rather than one-shot queries.

At the same time, participants developed a more critical lens regarding the limitations and responsibilities associated with GenAI use. Concerns about student misuse, accuracy of GenAI-generated content, and overreliance on digital tools were common themes in the exit ticket responses. This growing awareness directly reflects the ethical cautions raised in the literature (Chiu et al., 2023; Zawacki-Richter et al., 2019), including privacy, bias, and equity concerns highlighted for elementary education settings (Yusuf, 2025). These findings reinforce the need for GenAI literacy as a foundational component of teacher education programs. By emphasizing not just what GenAI can do, but when and how it should be used, teacher preparation programs can support the development of reflective, ethical, and technology-savvy educators.

The analysis of prompt submission histories confirms that student teachers are capable of leveraging GenAI in meaningful and pedagogically sound ways when given guided instruction and opportunities for practice. Through multiple rounds of prompt refinement, participants were able to coconstruct lessons that met academic standards, included differentiation, and reflected contemporary instructional models. This iterative process not only demonstrates growing fluency with GenAI tools but also reflects a deeper understanding of instructional design principles. The submitted prompts and resulting lesson plans reveal that student teachers moved beyond surface-level use of GenAI to engage in thoughtful planning that prioritized student needs, engagement strategies, and curricular goals. Notably, the student teachers did not treat GenAI outputs as complete or flawless. Instead, they functioned as coeditors, using their professional judgment to adjust and personalize materials generated by the GenAI. This behavior is a strong indicator of ethical and effective GenAI integration in educational practice.

Overall, this research converges with studies showing that when GenAI is introduced with thoughtful scaffolding and pedagogical framing, teachers are well-equipped to integrate it into their practice (Kosmas et al., 2025; Zafar et al., 2025). They emerge with not only an expanded toolkit, but also a deeper sense of professional judgment. Our analysis advocates for continued and expanded inclusion of GenAI instruction in teacher education curricula, ensuring that future educators can both harness the potential of emerging technologies and uphold the integrity of the teaching profession. The findings also reinforce the conclusion that incorporating GenAI-focused learning experiences into teacher preparation programs can foster innovation, confidence, and instructional depth. With appropriate scaffolding, student teachers can use GenAI tools not just to save time, but to enhance the quality and inclusivity of their teaching.

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