

## **Editorial: Advancing Preservice Teachers' Professional Learning With AI and Digital Tools: Focus on Inclusive Environments**

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The start of a new academic year is always an exciting time, full of renewed energy and opportunities. As we embark on this new academic year, interest in AI remains robust, with educational institutions across all levels engaged in ongoing discussion about new ways of integrating AI for teaching, learning, and creative endeavors. In higher education, these discussions focus on supporting faculty in updating course syllabi to account for the use of AI, which includes setting clear expectations, re-envisioning assignments to take advantage of human capabilities (e.g., making visual representations of content), and updating academic integrity policies among others (Watkins, 2022). Similarly, data indicate that the majority of K-12 teachers are already utilizing ChatGPT to build background knowledge and perform job duties, such as lesson planning and development of creative ideas (Impact Research, 2023).

The integration of AI to support teachers has been a key topic of discussion in recent academic discourse. A report by the U.S. Department of Education (Cardona et al., 2023) highlights several AI applications that can support teachers and teaching, including (a) AI assistants designed to reduce routine administrative tasks and help teachers stay organized; (b) AI tools that recommend resources to help teachers create inclusive learning environments aligned with student needs, including those with IEPs and 504 plans; and (c) AI systems that assist teachers with planning and reflective practices. To support prospective teachers in developing these skills, Trust et al. (2023) outlined recommendations for teacher educators. They include providing opportunities for preservice and in-service teachers to interact and interrogate AI tools, reflect and rethink existing pedagogical practices that cannot be replicated by AI tools, critically examine teaching materials generated by AI, integrate AI in teaching practices, and address ethical, integrity, and privacy concerns.

In addition, as AI and related technologies continue to gain prominence in education settings, it is imperative to address and mitigate biases inherent in these tools (Perry & Lee, 2019). While AI holds promise for supporting equitable learning by more accurately assessing students' knowledge and providing individualized instruction that caters to diverse learners, we need to ensure that its use does not continue to exacerbate existing digital inequities (Perry & Lee, 2019). Importantly, as Perry and Lee pointed out, AI should not be viewed as a replacement for knowledgeable and caring teachers; rather, it should aim to improve teaching conditions and job satisfaction. To achieve this goal, we must ensure that preservice teachers are ready and well prepared to utilize AI and other emerging technologies to reduce their own workload and foster equitable and inclusive learning environments for their students. The articles in this issue explore how AI, data science, and other digital tools can support preservice teachers with their own duties (e.g., lesson planning), while learning to develop differentiated lessons and resources to support students with disabilities.

In the General section article, "[Twenty Reasons Why: Investigating Use-Related Beliefs and Reasons of Preservice Teachers for \(Not\) Using an Intent-Based Chatbot During Lesson Planning](#)," the authors examined the use of an intent-based chatbot by preservice teachers. Guided by the Technology Acceptance Model (TAM), the authors used a combination of quantitative and qualitative measures to uncover the factors that influenced the adoption or nonadoption of an intent-based chatbot by preservice teachers during lesson planning. The lesson planning focused on employing audio podcasts to enhance students' mathematics learning. Findings revealed that the main reason for using the chatbot was perceived usefulness, such as inspiration, planning, and structuring the lesson planning process. Conversely, reasons for not using the chatbot included its perceived nonusefulness, such as lack of additional information, no need for assistance, and lack of usefulness. Notably, such views remained fairly stable over time.

Although not explicitly centered on AI, in the Mathematics Education section article, "[Technology, the Wage Gap, Agency, and Identity](#)," the authors leveraged a large data set to engage students in authentic investigations of mathematics to help participants construct positive mathematics identities. Proficiency with data is foundational to AI, making it important to provide opportunities for students to build content knowledge while also recognizing the societal applications of data science. In this initiative, high school teachers implemented a lesson that examined median incomes in the U.S. based on various demographic variables such as race, education level, and occupation using graphic calculators. The lesson was implemented across three high school classrooms focusing on algebra, statistics, and computer science. Data were collected from multiple sources, including student work, description of lessons, interviews and lesson debriefs with teachers, and interviews with select students. Findings indicated that contextualizing mathematics in real world issues helped students better understand and engage with the material, provided insights into their thinking processes, and fostered a sense of agency.

In the Current Practice section article, "[Preservice Special Education Teachers Using Making for Academic Interventions: An Exploratory Multiple Case Study](#)," and the Science Education article, "[Technology-](#)

[Enhanced Differentiated Instruction in STEM Education: Teacher Candidates' Development and Curation of Learning Resources,](#)" authors examined the use of technological tools and resources to support students with learning disabilities.

Specifically, the Current Practice authors developed an academic intervention for preservice special education teachers that focused on the use of making as a pedagogical tool. Utilizing a multi-case-study design, they investigated the perceptions, conceptions, acting knowledge, and efficacy of five preservice special education teachers when using making to support students with disabilities. Rooted in constructionist learning theories, participating preservice teachers engaged in professional development for inclusive maker instruction. Data were collected and analyzed through preservice teachers' video reflections and responses to focus group questions. Findings revealed that these preservice special education teachers designed and implemented a variety of interventions, such as the use of 3D printers to print name tags and Minecraft objects as a way of learning about geometric figures and properties. Findings also indicated that preservice teachers' understanding of utilizing making for teaching students with disabilities evolved and extended in both digital and nondigital sources.

In the Science Education article, the authors focused on the role of technology to differentiate instruction in STEM by analyzing a course assignment in which preservice teachers developed multimedia curriculum resource websites suitable for use by secondary teachers of science, technology, engineering, and mathematics. Analyzing 18 websites, the authors found that preservice teachers effectively incorporated digital learning resources for various differentiation tasks. These included differentiation of content (e.g., scaffolding background knowledge and pacing of instruction), practices (e.g., culturally responsive practices and attention to academic interests), and products (e.g., diagnostic, formative, and summative assessments).

Together, these articles contribute to advancing our understanding of how AI and related technologies can enhance teacher professional learning, an area of research that has been relatively underexplored (Beyer et al., 2024). As AI continues to gain ground, equipping preservice teachers with the skills to integrate AI tools effectively to support their own development and the development of their students, with particular emphasis on personalization and differentiated instruction is paramount. Such efforts should also ensure that preservice teachers are aware of both ethical and equity considerations to ensure the design of effective learning environments, inclusive of all students.

We wish *CITE Journal* readers a productive academic year. As always, we encourage commentaries and responses.

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