

Exploring the Use of ChatGPT with Preservice Teachers

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In our current educational landscape, there are frequent discussions about AI technology and its impact on teaching. As mathematics educators (MTEs), it is important for us to prepare future teachers to effectively utilize technology to enhance student learning (Association of Mathematics Teacher Educators [AMTE], 2017). AI can be a powerful tool to help MTEs accomplish many tasks like sparking conversation about correct definitions of terms, constructing tables of data based on class input, and analyzing AI-generated sample proofs (Gerstenschlager & Marin, 2024). Even though there is much usefulness that can come from AI, there are significant concerns as well, such as the production of incorrect answers to questions posed (Meyer, 2024), replies that are biased (Langreo, 2023), and AI generated mathematical tasks that are not conceptually rich (Sapkota & Bondurant, 2024).

Considering the challenges uncovered in this research, it is important for college courses that focus on training future teachers to become crucial spaces for exploring and understanding AI tools, learning strategies for their application, and assessing their effectiveness for students in Grades K-8. In this article, we detail a qualitative study that examines the use of ChatGPT as a review mechanism for elementary and middle school preservice teachers (PSTs) in a combined methods and content course for Grades K-8. We also aim to investigate PSTs' opinions about ChatGPT's usefulness in their future classrooms.

Methodology

In the spring 2024 semester, the researchers decided to investigate the use of ChatGPT in two of the authors' mathematics education classes at a university in the southern United States. The classes consisted of 59 future elementary and middle school teachers who were learning methods and content in the areas of geometry, measurement, statistics, and probability for Grades K-8.

As a way to review for their final exam, the instructor asked the students to create a free ChatGPT account and then spend at least 15 minutes asking ChatGPT to help them review for their final exam. This could take the form of having ChatGPT answer questions they might have on their given list of review topics and/or having it quiz them over concepts from class. The instructor gave sample prompts, such as asking ChatGPT to "Help me understand what a rhombus is" and "I don't understand the difference between a rhombus and trapezoid." When PSTs were done, they uploaded their conversation to Canvas and completed a Google Form about the experience, which included the below four main questions:

1. From the final exam list of topics, which topics did ChatGPT help you study? Check all that apply.
2. Did you find this review helpful? Explain.
3. Did ChatGPT explain any of the concepts wrong? Explain your answer.

4. Would you use ChatGPT in your own class to help your students understand topics? Explain your reasoning.

Findings

Fifty-three PSTs completed the Google Form. We tallied the responses and found that the most reviewed topics from our list of 15 consisted of 2D shapes ($n=36$), angles ($n=31$), and data representations like box plots and bar graphs ($n=31$). Of the 53 students, 45 PSTs found the activity helpful with the most common explanations including that ChatGPT gave in-depth explanations ($n=13$), easy definitions ($n=10$), good examples ($n=10$), and a good refresher of the material ($n=10$). PSTs also mentioned the idea that they liked how they could use ChatGPT as a study partner and how it “allowed me to think differently and review topics in class rather than me just looking back at my notes.” The PST went on to further say, “it allows my brain to think and process and actually learn rather than memorizing the topics.”

Even though most PSTs enjoyed using ChatGPT as a review method, six found it only helpful sometimes, while two did not find it helpful for reviewing mathematics topics. The two most common reasons that PSTs did not like ChatGPT was because it does not provide pictures for learners, and it tends to provide very detailed answers that can be overwhelming for those who do not understand the concepts.

Pertaining to the Google Form question about ChatGPT answering questions wrong, 4 of the 53 PSTs felt that the technology responded to at least one question incorrectly. These four questions dealt with various geometry and measurement topics: shapes of figures; number of edges on solids; the relationship between circumference and diameter of a circle; and the number of lines of symmetry of an equilateral triangle. One student also mentioned that ChatGPT commented about astrology instead of angles when asked to review angles but felt that it was basing this answer off of a previous conversation that she had earlier with it about that topic.

Lastly, when discussing whether they would utilize ChatGPT in their own classrooms, 25 PSTs felt that they would use it freely in class. Twenty had reservations about using the technology and would only use it in certain situations like as a way to help explain a topic that their students were struggling to grasp. The remaining eight PSTs believed that ChatGPT was not a useful tool for their classrooms with the main ideas of creating students who just rely on AI to do their work ($n=3$) and fear of incorrect answers ($n=3$).

Discussion

Through this study, most PSTs found some usefulness of ChatGPT for reviewing for their final exam and potentially in their future classrooms, but there were many reservations about embracing its utilization all the time. We agree with that sentiment of caution when using AI-based technology in the classroom, as do other MTEs (e.g., Meyer, 2023; Sapkota & Bondurant, 2024). As MTEs, we need to expose our students to technologies to help them make better-informed decisions of how they plan to use technology tools in the future (AMTE, 2017). This is an exciting time where these “tools encourage teachers to reimagine teaching and assessment” (National Council of Teachers of Mathematics [NCTM], 2024). One PST might have summed it up best: “I had always heard that using ChatGPT was bad and now doing this assignment I actually believe it could be a good resource... I enjoyed testing this program and will consider using it in my own classroom one day.”

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