

Assessing Pre-service Teachers' Attitudes and Perceptions of Using Artificial Intelligence in the Classroom

Dr. Melissa Dawn Gatlin, Ph.D.
Sam Houston State University

Abstract

Artificial Intelligence in Education (AIED) is a powerful innovative technology that has the potential to dramatically change the way we teach students. While the possibilities are promising, there is still much to learn about how PreK-12 teachers will use AI in the classroom. Current pre-service teachers are graduating with limited exposure to AI and entering a field that could possibly be dominated by AI in a few short years. To understand the role teacher preparation programs play in teaching students about AI, this study aimed to understand the current attitudes and perceptions of pre-service teachers toward AIED. Three areas of interest were uncovered, pre-service teachers' knowledge and self-efficacy in the use of AI, pre-service teachers' beliefs about using AI in their future classrooms, and pre-service teachers' views of the necessity of AI being taught in teacher preparation programs. The hope is that this article will uncover the need to prepare pre-service teachers for utilizing AI in education.

Keywords: pre-service teachers, artificial intelligence, attitudes, and perceptions

In the rapidly evolving technological landscape of the 21st century, Artificial Intelligence (AI) stands out as one of the most transformative forces today. While Artificial Intelligence in Education (AIED) is growing, according to Zawacki-Richter et al. (2019) research is very sparse in teacher perceptions of Artificial Intelligence. Even so, AI brings with it promises of personalized learning experiences and data-driven insights into student performance but risks for users exist as well (U.S. Department of Education, 2023). As AI-driven technologies become increasingly integral to classrooms, there arises an urgent need to understand and integrate them at the very foundation of our educational system: the training of our educators.

Teaching preservice teachers about AI (Artificial Intelligence) is of paramount importance in today's rapidly evolving educational landscape. By equipping preservice teachers with the knowledge and understanding of AI, we ensure that they can harness its potential to enhance teaching and learning experiences for students. Moreover, understanding AI empowers educators to prepare their students for the future workforce, where AI-driven tools

and solutions are becoming commonplace. Additionally, as AI begins to play a role in personalized learning, adaptive assessments, and educational analytics, teachers will be better positioned to utilize these tools effectively if they have a foundational grasp of AI principles. Finally, understanding AI is important for teacher candidates so that they are prepared to address the ethical considerations, biases in algorithms, and the broader societal implications of AI. In essence, introducing AI education to preservice teachers ensures not only the technological preparedness of the next generation of educators but also the cultivation of informed, ethical, and forward-thinking educators equipped to handle the challenges and opportunities presented by a rapidly evolving digital landscape.

Purpose of the Study

Historically teacher preparation courses have been dominated by many child development theories. Jean Piaget provides the starting point for a developmentally appropriate foundation for most teacher preparation programs (Ammon & Black, 1997). Because teacher preparation is rooted in the importance of developmental stages and social-emotional learning, using technology such as AI in the classroom could seem counterintuitive to

many pre-service teachers. To best equip PreK-12 students for the technological advancements they'll encounter in future classrooms, we initiated an AI survey to assess their attitudes and perceptions of the use of Artificial intelligence in the field of education. The survey was designed to uncover the following areas:

1. Pre-service teachers' knowledge and self-efficacy in the use of AI.
2. Pre-service teachers' beliefs about using AI in their future classrooms.
3. Pre-service teachers' views of the necessity of AI being taught in teacher preparation programs.

This insight will steer us in effectively preparing our preservice teachers for their future classrooms.

Participants

For this study, a convenient purposive sampling was employed. The participants of this study were education majors at a four-year university in Texas. The site was selected for the convenience of the researcher due to its location and researcher access to the target population (Merriam, 2009). Purposive sampling was utilized in this study to uncover a deeper understanding of the target population, which is teacher candidates (Dever & Frankel, 2000). The study aimed to uncover attitudes and perceptions of pre-service teachers, therefore sampling a subset of students in the teaching program currently enrolled in the researchers' courses saved time and money. All of the participants were either EC-6 or PreK-3 majors. Participants were in varying stages of their programs, ranging from junior to senior. Of the 105 participants, 102 were female and 3 were male. The participants were enrolled in one to four classes during the summer of 2023. The 105 participants all attended one of four teacher preparation courses offered by the researcher during the summer of 2023. Three students enrolled in more than one course; therefore participants were only asked to complete the survey once. No other demographic information was recorded. An exemption was given by the IRB to conduct this research as a course activity, therefore full IRB approval was not required.

Instrument

Aligning with a positivist approach toward research, the instrument used in this study was a quantitative survey. The survey included 10 questions and participants responded using a Likert scale. Likert-type scales are commonly used to assess the attitudes and perceptions of participants in social science research (Croasmun & Ostrom, 2011). The survey inquiries were presented as statements and required participants to rank their perceptions of AI and were scored as follows: (1) strongly

disagree; (2) disagree; (3) uncertain; (4) agree; and (5) strongly agree. An odd-numbered Likert scale was imposed to allow participants to respond using the neutral midpoint option when they did not have an opinion on a topic. When surveying a population regarding their opinion, providing a neutral midpoint response decreases the chance of response bias (Croasmun & Ostrom, 2011). The survey questions were organized and categorized into three areas of interest. First knowledge and self-efficacy toward AI, beliefs about AI in the classroom, and the necessity of learning AI in the teacher preparation program. The means of the participants' ratings were calculated and compared in the three areas of interest.

Procedure

In the summer of 2023, the survey was sent via email at the end of the semester during four pre-service college courses. The survey was created in Qualtrics and allowed for anonymous responses. The participants were verbally told about the research in class and then sent the survey in a class-wide email. The email reiterated the survey's purpose and provided a link where the student responses were recorded. Participation in the survey was voluntary and anonymous. The participants completed the survey at the time and in the place of their choice. One reminder email was sent out before the survey was closed. The survey was open and available to the participants for 2 weeks. Once all participants completed the survey, the researcher began the data analysis.

Data Analysis

Responses were recorded in Qualtrics and analyzed by computing the percentages and mean scores for each survey question. The raw data was transferred from Qualtrics into Excel where it was analyzed using cross-tabulation. The mean was calculated for each question and ordinal scales were used to classify data. The frequencies for each Likert scale were calculated so clusters of the participants' attitudes and perceptions were evident. The data was then transferred into tables to show the data in a more meaningful way. A discussion of the data follows in the quantitative results.

Quantitative Results

The survey focused on pre-service teachers' attitudes and perceptions of Artificial intelligence. Likert scales were used for all ten questions on the survey. The Likert scale offered 5 possible responses to each question ranging from strongly disagree, disagree, neutral (neither agree nor disagree), agree, and strongly agree. The ten areas of question were presented as statements and grouped into three themes to draw conclusions regarding the three areas of exploration.

Knowledge and Efficacy in the Use of AI

The first area of discovery was the knowledge and self-efficacy that preservice teachers have in AI. The first four questions of the survey centered on the participants' knowledge and confidence regarding AI. The responses were on a scale from strongly disagree to strongly agree. Table 1 shows that the responses move from knowledge of AI to the fourth question which asked the participants about being prepared to implement AI in their future classroom. As shown in the table, participant confidence drops dramatically as the ability to utilize AI is more thoroughly queried. While many students reported that they were aware of AI (71%) and a few reported that they were not familiar with AI (17%) even fewer reported no opinion (12%). Participants responded that they understood AI (51%), which is greater than the participants who reported that they did not understand AI (22%) with almost one-third with no opinion (27%). The next two questions

focused more on the participants' perceptions of their ability to use AI. Question 3 asked if they were comfortable using AI and 31% responded that they were at least somewhat comfortable, while 34% were not comfortable and 35% had no opinion. The lowest level of confidence was seen when participants were asked about their preparedness to integrate AI into their future classrooms. When asked if they felt ready to integrate AI into their future classrooms only 19% agreed, 29% had no opinion and more than half, 52% of participants responded negatively with disagreed (31%) or strongly disagreed (21%). The calculated means for this table also show a decline as the questions progressed from awareness to implementation. The highest mean of 3.7 reflects the participants' familiarity with AI and the lowest mean score of 2.49 represents the participants' readiness to use AI in their future classrooms.

Table 1
Knowledge and Efficacy in the Use of AI

Survey Item	Strongly Disagree		Disagree		Neither agree nor disagree		Agree		Strongly Agree		p=105	Mean
Familiar with AI	6%	6	11%	12	12%	13	49%	51	22%	23	105	3.7
Understand AI	4%	4	18%	19	27%	28	36%	38	15%	16	105	3.41
Comfortable Using AI	9%	10	25%	26	35%	37	23%	24	8%	8	105	2.94
Ready to Integrate AI	21%	22	31%	33	29%	30	16%	17	3%	3	105	2.49

Beliefs about Using AI in Their Future Classroom

The next area for discovery was students' beliefs about the appropriateness of the use of AI in their future classrooms. Four questions made up the area regarding the pre-service teachers' beliefs about using AI in their future classrooms. The responses were on a scale from strongly disagree to strongly agree. When asked about the use of AI improving student outcomes 49% of participants responded positively with somewhat agreed (37%) and strongly agreed (12%). Participants responding that AI provided personalized experiences was slightly lower with 36% responding positively, agreed (27%), and strongly agreed (9%). The next two questions focused more on the participants' perceptions of the ethical considerations of using AI and their beliefs in general about AI being used in the classroom. Question 3 in the table (question 7 in the survey) asked if pre-service teachers have any ethical concerns about using AI in the classroom. This question

elicited the greatest number of positive responses (55%), agreed (37%), and strongly agreed (18%). Those participants that had no opinion about the ethical concerns of AI equaled 35% and 12% responded negatively, with disagrees (9%) and strongly disagrees (3%). The last inquiry asked about the teacher candidates' overall view of AI and if they thought AI should be used sparingly in their future classrooms. One-third of the participants had no opinion on their view of using AI in their future classrooms, while 31% agreed and 13% strongly agreed that AI should be sparingly used in their future classrooms. The calculated mean scores for the four questions were notably close with values of 3.4, 3.22, 3.59, and 3.35 respectively. This represents a close cluster of responses. It is interesting to note that the responses to AI providing personalized experiences to students had the highest score of participants who responded with no opinion. This brought the mean for that question to the lowest in the table.

Table 2
Beliefs about AI Use in Future Classrooms

Survey Item	Strongly Disagree		Disagree		Neither agree nor disagree		Agree		Strongly agree		p=105	Mean
AI May Improve Student Outcomes	3%	3	13%	14	35%	37	37%	39	12%	12	105	3.41
AI Provides Personalized Experiences	5%	5	14%	15	45%	47	27%	28	9%	10	105	3.22
AI Has Ethical Concerns	3%	3	9%	9	33%	35	37%	39	18%	19	105	3.59
AI Should be Used Sparingly	10%	10	13%	14	33%	35	31%	32	13%	14	105	3.35

Necessity of AI being Taught in Teacher Preparation Programs

The final area of exploration concerned participants' views on the importance of incorporating AI instruction into teacher preparation programs. Two questions were formulated to discern the attitudes of preservice teachers toward AI being taught in teacher preparation education. The first inquired about participants'

willingness to engage with AI learning, while the second probed whether they believed AI should be an integral component of the teacher preparation curriculum. While 20% and 34% reported being neutral on the subject, over half of participants reported that they would invest time to learn about AI, while 44% thought AI should be taught during teacher preparation programs.

Table 3
Necessity of AI in Teacher Preparation Programs

Survey Item	Strongly Disagree		Disagree		Neither agree nor disagree		Somewhat agree		Strongly agree		p=105	Mean
Should Invest Time in Learning AI	6%	6	11%	12	20%	21	49%	51	14%	15	105	3.54
Should have AI Training in Teacher Prep	7%	7	15%	16	34%	36	32%	34	12%	12	105	3.27

Discussion

The purpose of the survey was to understand the attitudes and perceptions regarding Artificial intelligence in the field of education. After analyzing the data, many preservice teachers do not have opinions of AI or its use in the classroom. Throughout the survey, many participants chose to remain neutral on the questions which shows a lack of experience with the topic in general. This is probably because AI is a relatively new concept to most people, and few educators have had any experience with this technology (U.S. Department of Education, 2023).

In the area of awareness, 71% of participants responded positively with 49% agreeing and 22% strongly

agreeing that they were familiar with AI. Fewer reported that they understood AI, with 51% reporting positively with agreed participants (36%) and strongly agreed (15%). This marks a 20% decline which represents the gap between knowing about AI and understanding AI. This could be due to misunderstandings of what AI really is and the many real-world applications that are referred to as AI, that are not actually AI (Luckin, et al., 2016).

The decline continues as the questions target the efficacy of the participants with regard to AI. When asked about their comfort levels with AI, many participants (34%) reported that they were not comfortable with AI disagreed (25%) and strongly disagreed (9%) responses. It follows that participants disagreed (31%) and strongly

disagreed (21%) that they were comfortable implementing AI in their future classrooms. The participants responding positively equals 19% with 16% agreeing and 3% strongly agreeing that they are prepared to implement AI in their future classrooms. The gap between awareness of AI and comfort in implementing AI in their future classroom equals 52% of participants. With a high percentage of participants who reported being neutral on the first three questions, it is not surprising that over half of participants strongly disagree or disagree that they feel comfortable integrating AI into their classrooms. This data suggests that most teacher candidates recognize that while they believe that they are familiar with AI (71%) understanding AI requires further knowledge because only 51% reported an understanding of AI. As AI progresses, educators need to be very comfortable with using AI with their students to ensure that the models put in place improve outcomes for both teachers and students. According to the U.S. Department of Education (2023) one of three urgencies is to prepare educators to assist in the development of AI tools, otherwise, the risk of unintended consequences exists. If educators are to be charged with the tasks of developing AI tools for the classroom, then teacher preparation programs must teach AI concepts to their graduates.

In the second area of the survey, the participants' beliefs about AI in the classroom were uncovered. Do future teachers believe AI will help improve future student experiences and do they have concerns? As with the previous section, many of the participants answered with neutral responses (33%-45%) on all questions in this area, which suggests that about one-third of participants are not completely aware of AI's capabilities. The first question asked if AI has the potential to improve student outcomes, almost 50% responded in a favorable way, 37% agreed and 12% strongly agreed, which is promising, but according to their own reports above, pre-service teachers do not know how to utilize AI to achieve improved outcomes. AI is being touted by experts to personalize instruction, assessments, and feedback (Luckin et al., 2016; U.S. Department of Education, 2013), however when questioned about the personalization of AI, only 36% of participants agreed or strongly agreed. When comparing the 51% of participants reporting they understand AI, to the 36% who agree or strongly agree that AI can personalize instruction, the 21% difference suggests a disconnect. When it comes to ethical concerns 57% of participants have concerns, by responding agree (37%) and strongly agree (18%) these pre-service teachers are much like current teachers who also report their two most important concerns are algorithmic transparency and user control of data, both ethical concerns (U.S. Department of Education, 2023). The last question asks if AI should be used sparingly in the

classroom to which 44% agreed or strongly agreed. This is not surprising since people are uncomfortable with activities in which they have little experience (Albion, 2010). The idea of less AI in the classroom goes against leading advice from the Department of Education (2023) which encourages the use of AI and the Walton Family Foundation (2023) research which found that educators are using AI to provide individualized instruction to meet student needs.

In the last area of the survey participants were asked their attitudes toward learning AI. In terms of willingness to take individual responsibility and invest the time to learn about AI, over half of the participants responded positively, agreed (49%), and strongly agreed (19%). But when asked if teacher programs should teach AI only 44% responded positively, with agree (32%) and strongly agree (12%). On the opposite of the spectrum, some participants responded negatively toward learning AI 17% responded that they disagreed or strongly disagreed with investing time in learning AI and 22% responding disagreed or strongly disagreed with learning AI in the teacher preparation program. While this is a relatively low number, as mentioned in the purpose of this study, it is not surprising due to the emphasis teacher preparation programs, especially in early childhood, put on the importance of the stages of cognitive development of children (Piaget & Inhelder, 1969) and the importance of social learning (Vygotsky, 1962).

Recommendations for Pre-Service Education Preparation Programs

Preparing pre-service teachers for 21st-century learners involves equipping them with the skills and knowledge to incorporate advanced technologies like Artificial Intelligence (AI) effectively into the classroom. Here are some recommendations to enhance pre-service knowledge and efficacy of AI usage in educational settings:

1. Ensure that students understand the foundation of AI. Create a module that students can complete online that includes the basic AI concepts such as how AI works, appropriate uses for AI, and ethical considerations. Single courses improve self-efficacy (Albion, 2001).
2. Imbed the use of AI into course assignments. Models such as ChatGPT can be used as a tool to help students navigate creating lesson plans and designing curricula. Integrating technology training with content-based training provides the opportunity to increase targeted efficacy that prepares teachers for their future classroom (Coyne, et al., 2017).
3. Provide workshops that allow students to interact with AI models in real time to learn

how AI works by utilizing hands-on activities. Using AI to solve daily problems increases creativity and engagement in content (Wang, et al., 2023).

4. Collaborate with local schools to create unique ways to incorporate AI in the classrooms to serve the specific needs of the students. Through collaboration, ensure that AI meets the needs of students (U.S. Department of Education, 2023).
5. Work with local schools to provide observation hours to pre-service teachers in classrooms where AI is currently being utilized. Understanding how AI is currently used in the classroom will help prepare future teachers for using AI in their classrooms (U.S. Department of Education, 2023).

Conclusion

This study explored pre-service attitudes and perceptions of the use of Artificial Intelligence in the field of education. The survey focused on the participants' knowledge and comfort level of AI, their beliefs of using AI in the classroom, and their attitudes toward learning AI. The survey results indicate that about one-third of students have not developed opinions regarding AI. For those that have awareness many do not feel equipped to utilize AI in their future classrooms, nor are they convinced that AI will improve student outcomes. This result coincides with Albion's (2001) deduction that the lack of time spent with technology is a major factor in the lack of efficacy for pre-service teachers. Many teacher candidates thought computer use was important but lacked the confidence to use computers in their future classrooms, which Albion concluded resulted from a lack of computer experience in the typical teacher preparation program. When questioned

about learning AI pre-service teachers are open to learning AI and 41% agree that AI learning should be part of teacher preparation programs. This mirrors Albion's claim in 2001 that the best way to integrate computer usage into education is through teacher preparation programs. Educators in pre-service programs can utilize the results of this study to create paths to improve understanding and teach practical applications for using AI in their future classrooms. Developing a curriculum specifically in AI education would be a start and should be implemented across all coursework, which is aligned with the recommendation from the U.S. Department of Education. According to the U.S. Department of Education (2023), AI should not be taught as a stand-alone subject, but instead be integrated across disciplines. As teacher candidates gain more experience with the technology of AI, their confidence will improve (Albion, 2001). Therefore, providing integrating AI into multiple courses within the teaching program is the most beneficial.

Limitations

The focus of this study was on pre-service teaching students at a four-year university in Texas. Pre-service students at other universities or in other states might have different experiences that lead them to have different beliefs and perspectives regarding the use of AI in education. Also, the participants for this study were all EC-6 and PreK-3 majors, therefore the study might have different results with pre-service teachers majoring in secondary education. Very little personal demographic data was collected so the study could be expanded to include demographics to look for compelling data around AI awareness as it relates to socioeconomic status or cultural groups.

References

- Albion, P.R. (2001). Some Factors in the Development of Self-Efficacy Beliefs for Computer Use Among Teacher Education Students. *Journal of Technology and Teacher Education*, 9(3), 321-347. Norfolk, VA: Society for Information Technology & Teacher Education. Retrieved September 2, 2023 from <https://www.learntechlib.org/primary/p/8368/>
- Ammon, P., & Black, A. (1998). *Developmental psychology as a guide for teaching and teacher preparation*. In N. M.
- Bryant, J., Heitz, C., Sanghvi, S., & Wagle, D. (2020). *How artificial intelligence will impact K-12 teachers*. Retrieved Sept, 01, 2023.
- Coyne, J., Lane, M., Nickson, L., Hollas, T., & Potter, J. P. (2017). Assessing pre-service teachers' attitudes and self-efficacy in using technology in the classroom. *Teacher Education and Practice* 30(4), 637-652.
- Croasmun, J.T., Ostom, L. (2011). Using Likert-type scales in social sciences. *Journal of Adult Education* 40, November 1, 2011.
- Devers, K. J., & Frankel, R. M. (2000). Study design in qualitative research 2: Sampling and data collection strategies. *Education for Health*, 13(2), 263-271.
- Lambert & B. L. McCombs (Eds.). *How students learn: Reforming schools through learner-centered education* (pp. 409–448). American Psychological Association. <https://doi.org/10.1037/10258-015>
- Luckin, R., Holmes, W., Griffiths, M. & Forcier, L. B. (2016). *Intelligence Unleashed. An argument for AI in Education*. London: Pearson
- Piaget, J., & Inhelder, B. (1969). *The psychology of the child*. Basic Books
- U.S. Department of Education, Office of Educational Technology, *Artificial Intelligence and Future of Teaching and Learning: Insights and Recommendations*, Washington DC., 2023.
- Vygotsky, L. (1962). *Thought and language*. (E. Hanfmann & G. Vakar, Eds.). MIT Press
- Walton Family Foundation (March, 1, 2023). *Teachers and students embrace ChatGPT for education*. <https://www.waltonfamilyfoundation.org/learning/teachers-and-students-embrace-chatgpt-for-education>
- Wang, S., Sun, Z., & Chen, Y. (2023). Effects of higher education institutes' artificial intelligence capability on students' self-efficacy, creativity and learning performance. *Education and Information Technologies*, 28(5), 4919-4939.
- Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education—where are the educators?. *International Journal of Educational Technology in Higher Education*, 16(1), 1-27.