



# Integrating Artificial Intelligence In B.Ed Curriculum

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## Abstract:

This systematic review explores the integration of artificial intelligence (AI) within pre-service teacher education curricula. As AI technologies continue to advance rapidly, their potential to transform teaching and learning practices is increasingly recognized. This review synthesizes existing research and literature to examine the various ways in which AI is being utilized in pre-service teacher education programs. Key areas of focus include the use of AI for personalized learning, data analytics, lesson planning, virtual teaching assistants, classroom management, professional development, and the exploration of ethical and social implications. The study highlights the vital role of teacher educators in preparing future educators to effectively utilize AI technologies in their teaching practice. Their responsibilities include curriculum development, instruction and facilitation, professional development, modeling best practices, research and scholarship, collaboration and partnerships, and advocacy and policy development. The benefits of diverse applications of AI in pre-service teacher education, ranges from enhancing teaching effectiveness to supporting ongoing professional development. However, challenges such as ethical considerations, algorithmic bias, and the need for pedagogical integration remain important considerations. This review underscores the importance of thoughtful implementation strategies and ongoing research to harness the full potential of AI in preparing future educators for the complexities of 21st-century classrooms.

**Keywords:** Artificial Intelligence; Pre-Service Teacher Education; Curriculum Integration; Personalized Learning; Data Analytics; Lesson Planning

## Introduction

The integration of artificial intelligence (AI) into pre-service teacher education programs has gained significant attention in recent years. Here are several ways in which AI is being utilized in pre-service teacher curricula:

- **AI in Teaching and Learning:** Pre-service teacher education programs are incorporating AI tools and platforms to enhance teaching and learning experiences. AI-powered tutoring systems can provide personalized learning experiences for pre-service teachers, helping them to grasp difficult concepts more effectively.
- **Data Analytics for Personalized Learning:** AI algorithms can analyze data on pre-service teachers' learning behaviors and performance to provide insights into their strengths and weaknesses. This data analysis enables educators to identify trends, patterns, and areas for improvement, facilitating data-driven decision-making in pre-service teacher training programs. These systems can offer personalized instruction, remediation, and enrichment activities to support pre-service teachers' learning and professional development. This data-driven approach enables instructors to tailor instruction to meet individual needs, ultimately improving learning outcomes.
- **AI in Lesson Planning and Curriculum Development:** AI technologies can assist pre-service teachers in developing lesson plans and designing curricula. For example, AI algorithms can analyze educational standards, student learning objectives, and assessment data to generate customized lesson plans that align with specific learning goals.

- **Simulation and Virtual Reality:** AI technologies can be used to create realistic simulations and virtual reality environments for pre-service teachers to practice classroom management, instructional strategies, and decision-making in a safe and controlled setting. This immersive learning experience allows pre-service teachers to develop practical skills and confidence before entering real classrooms.
- **Virtual Teaching Assistants and Chatbots:** Pre-service teacher education programs are leveraging AI-powered virtual teaching assistants and chatbots to provide real-time support and guidance to pre-service teachers. These virtual assistants can answer questions, provide feedback on assignments, and offer pedagogical advice, thereby enhancing the learning experience and fostering self-directed learning.
- **AI for Classroom Management and Behavior Analysis:** AI tools can assist pre-service teachers in managing classroom dynamics and analyzing student behavior patterns. For instance, AI-powered systems can monitor student engagement levels, detect signs of disengagement or distraction, and provide suggestions for intervention strategies to support positive behavior management practices.
- **Professional Development and Continuing Education:** AI technologies can support pre-service teachers' ongoing professional development by offering personalized learning pathways, recommending relevant resources and training materials, and facilitating collaboration and knowledge sharing among educators.
- **Ethical and Social Implications of AI in Education:** Pre-service teacher education programs are also focusing on the ethical and social implications of AI in education. This includes discussions on data privacy, algorithmic bias, and the responsible use of AI technologies to ensure equitable and inclusive learning environments.
- **Research and Innovation:** AI is driving innovation in pre-service teacher education through research projects and collaborations exploring the potential applications of AI in various aspects of teaching and learning. This includes investigating the effectiveness of AI-powered educational interventions, developing new pedagogical approaches, and examining the impact of AI on teacher-student interactions.
- **Assessment and Progress Tracking:** AI algorithms can automate the grading of assignments, assessments, and student work submitted by pre-service teachers. AI technologies can assist in assessing pre-service teachers' knowledge, skills, and competencies through adaptive assessments, quizzes, and performance tasks. These assessments can be used to track pre-service teachers' progress over time, identify areas for growth, and inform instructional planning and support. Additionally, AI-powered systems can provide instant feedback on assignments, highlighting strengths, weaknesses, and areas for improvement. This automated grading and feedback process saves time for instructors and promotes timely feedback for pre-service teachers.
- **Language Learning and Translation:** AI-powered language learning platforms can assist pre-service teachers in learning and teaching languages by providing interactive lessons, pronunciation practice, and translation services. These platforms use natural language processing (NLP) algorithms to analyze speech patterns, identify errors, and offer targeted language instruction.

### Role of teacher educators

The role of teacher educators is crucial in integrating artificial intelligence (AI) into pre-service teacher education. Teacher educators play a multifaceted role in preparing future educators to effectively leverage AI technologies in their teaching practice. Here are some key roles:

- ❖ **Curriculum Development:** Teacher educators are responsible for designing and updating pre-service teacher education curricula to incorporate AI concepts, tools, and applications. They identify relevant content areas, learning objectives, and pedagogical approaches that align with the integration of AI in teaching and learning.
- ❖ **Instruction and Facilitation:** Teacher educators deliver instructional sessions, workshops, and training modules to pre-service teachers on AI-related topics. They provide guidance on how to use AI tools effectively, facilitate hands-on learning experiences, and foster critical thinking and reflection about the ethical and pedagogical implications of AI in education.
- ❖ **Professional Development:** Teacher educators offer professional development opportunities for in-service teachers to enhance their knowledge and skills in AI integration. They organize seminars, conferences, and ongoing training programs to support teachers' continuous learning and growth in using AI technologies to improve teaching effectiveness and student learning outcomes.
- ❖ **Modeling Best Practices:** Teacher educators serve as role models by demonstrating effective use of AI technologies in their own teaching and research. They showcase innovative pedagogical approaches,

exemplary projects, and successful case studies that highlight the benefits of AI integration in education.

- ❖ **Research and Scholarship:** Teacher educators engage in research and scholarship to advance knowledge and understanding of AI in education. They conduct empirical studies, evaluate AI applications in teaching and learning contexts, and contribute to the development of evidence-based practices and guidelines for AI integration in pre-service teacher education.
- ❖ **Collaboration and Partnerships:** Teacher educators collaborate with industry partners, technology developers, and other stakeholders to stay abreast of the latest AI trends and innovations. They foster partnerships with schools, universities, and professional organizations to promote interdisciplinary collaboration and share best practices in AI integration.
- ❖ **Advocacy and Policy Development:** Teacher educators advocate for policies and initiatives that support the integration of AI into pre-service teacher education. They participate in policy discussions, advisory committees, and advocacy campaigns to raise awareness about the importance of AI literacy for educators and advocate for resources and support to facilitate AI integration in teacher preparation programs.

### Advantages in integrating artificial intelligence (AI) into pre-service teacher education

Integrating artificial intelligence (AI) into pre-service teacher education offers numerous advantages that can enhance the quality of training and prepare educators more effectively for the challenges of modern classrooms. Here are several key advantages:

1. **Tailored Learning:** AI can provide personalised learning experiences tailored to the individual needs, preferences, and learning styles of pre-service teachers. This adaptive learning approach ensures that each pre-service teacher receives instruction and support that aligns with their specific strengths and areas for improvement.
2. **Efficiency and Flexibility:** AI-powered platforms and tools can automate routine tasks such as grading assignments, generating personalised feedback, and providing additional practice exercises. This automation frees up valuable time for instructors and pre-service teachers, allowing them to focus on more meaningful and engaging learning activities.
3. **Data-Driven Decision Making:** AI algorithms can analyse large datasets to identify patterns, trends, and insights related to pre-service teachers' learning behaviours, performance, and progress. This data-driven approach enables educators to make informed decisions about instructional strategies, curriculum design, and professional development opportunities.
4. **Enhanced Teaching Practice:** AI technologies can simulate realistic classroom scenarios, allowing pre-service teachers to practise instructional strategies, classroom management techniques, and decision-making skills in a safe and controlled environment. This hands-on experience helps pre-service teachers build confidence and competence before entering real classrooms.
5. **Access to Resources and Support:** AI-powered educational platforms can offer pre-service teachers access to a wide range of instructional resources, teaching materials, lesson plans, and professional development opportunities. These platforms use AI algorithms to recommend relevant resources based on pre-service teachers' interests, needs, and instructional goals.
6. **Improved Feedback and Assessment:** AI can automate the grading of assignments, assessments, and student work submitted by pre-service teachers. Additionally, AI-powered systems can provide instant feedback on assignments, highlighting strengths, weaknesses, and areas for improvement. This timely feedback promotes reflection and growth among pre-service teachers.
7. **Enhanced Collaboration and Communication:** AI technologies can facilitate collaboration and communication among pre-service teachers, instructors, and peers. AI-powered platforms can support online discussions, group projects, and collaborative learning activities, fostering a sense of community and shared learning experiences.
8. **Innovative Pedagogical Approaches:** AI enables the development of innovative pedagogical approaches that leverage adaptive learning, personalised instruction, and immersive experiences. These approaches engage pre-service teachers in interactive, experiential learning activities that promote deeper understanding and retention of content.

In summary, the advantages of using AI in pre-service teacher education include tailored learning, efficiency, data-driven decision-making, enhanced teaching practice, access to resources and support, improved feedback and assessment, collaboration, and innovative pedagogical approaches. By harnessing the power of AI, pre-service teacher education programs can better prepare future educators to meet the diverse needs of students and excel in the ever-evolving field of education.

## Challenges in integrating artificial intelligence (AI) into pre-service teacher education

Integrating artificial intelligence (AI) into pre-service teacher education also presents several challenges that must be addressed to maximize its effectiveness and ensure equitable outcomes. Here are some key challenges:

1. **Access and Equity:** Not all pre-service teachers may have equal access to AI-powered tools and resources due to disparities in technology infrastructure, internet connectivity, and financial resources. Ensuring equitable access to AI technologies is essential to prevent exacerbating existing inequalities in education.
2. **Training and Support:** Pre-service teachers and educators may lack the necessary training and support to effectively use AI technologies in teaching and learning. Providing comprehensive professional development programs and ongoing support is crucial to build educators' capacity and confidence in utilizing AI tools.
3. **Ethical Considerations:** AI technologies raise ethical concerns related to data privacy, security, transparency, and algorithmic bias. Pre-service teachers and educators need to be aware of these ethical implications and engage in critical discussions about responsible AI use in education.
4. **Pedagogical Integration:** Integrating AI into pre-service teacher education requires careful consideration of its pedagogical implications and alignment with educational goals and standards. Pre-service teachers need guidance on how to effectively integrate AI technologies into their teaching practices to enhance learning outcomes.
5. **Overreliance on Technology:** There is a risk of overreliance on AI technologies, leading to a reduction in human interaction and critical thinking skills. Pre-service teachers must strike a balance between leveraging AI tools and maintaining meaningful teacher-student relationships and fostering students' higher-order thinking skills.
6. **Quality of AI Algorithms and Data:** The quality and accuracy of AI algorithms depend on the quality and diversity of the data used to train them. Biases in AI algorithms can perpetuate inequalities and reinforce stereotypes, particularly in educational settings. Pre-service teachers need to critically evaluate AI-generated recommendations and outputs to mitigate potential biases.
7. **Cost and Sustainability:** Implementing AI technologies in pre-service teacher education programs requires significant financial investment in infrastructure, software licenses, and professional development. Ensuring the long-term sustainability of AI initiatives may be challenging for institutions with limited resources.
8. **Resistance to Change:** Resistance to change from pre-service teachers, educators, and educational institutions can impede the adoption of AI in teacher education. Addressing concerns, fostering a culture of innovation, and highlighting the benefits of AI are essential to overcoming resistance and promoting widespread adoption.

## References

- Abu-Al-Aish, A., & Love, S. (2013). Factors influencing students' acceptance of m-learning: An investigation in higher education. *The International Review of Research in Open and Distributed Learning*. <https://doi.org/10.19173/irrodl.v14i5.1631>
- Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In *Action control* (pp. 11–39). Springer. [https://doi.org/10.1007/978-3-642-69746-3\\_24](https://doi.org/10.1007/978-3-642-69746-3_24)
- Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Prentice-Hall.
- A harbi, S., & Drew, S. (2018). The role of self-efficacy in technology acceptance. In *Proceedings of the Future Technologies Conference* (pp. 1142–1150). Springer. [https://doi.org/10.1007/978-3-030-02686-8\\_85](https://doi.org/10.1007/978-3-030-02686-8_85)
- Ayanwale, M. A., Sanusi, I. T., Adelana, O. P., Aruleba, K. D., & Oyelere, S. S. (2022). Teachers' readiness and intention to teach artificial intelligence in schools. *Computers and Education Artificial Intelligence*, 3, 100099. <https://doi.org/10.1016/j.caeai.2022.100099>
- Byrne, B. M. (2016). *Structural equation modeling with AMOS: Basic concepts, applications, and programming* (3rd ed.). Routledge.
- Chen, N.-S., Yin, C., Isaias, P., & Psotka, J. (2020a). Educational big data: Extracting meaning from data for smart education. *Interactive Learning Environments*, 28(2), 142–147. <https://doi.org/10.1080/10494820.2019.1635395>
- Dai, Y., Chai, C. S., Lin, P. Y., Jong, M. S. Y., Guo, Y., & Qin, J. (2020). Promoting students' well-being by developing their readiness for the artificial intelligence age. *Sustainability*, 12(16), 6597. <https://doi.org/10.3390/su12166597>

- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340. <https://doi.org/10.2307/249008>
- Eagly, A. H., & Wood, W. (2012). Social role theory. *Handbook of theories of social psychology*, 2.
- Eaton, A. A., Saunders, J. F., Jacobson, R. K., & West, K. (2020). How gender and race stereotypes impact the advancement of scholars in STEM: Professors' biased evaluations of physics and biology post-doctoral candidates. *Sex Roles*, 82, 127–141. <https://doi.org/10.1007/s11199-019-01052-w>
- Kaban, A. L., & Boy Ergul, I. (2020). Teachers' Attitudes Towards the Use of Tablets in Six EFL Classrooms. In L. Tomei & E. Podovšovnik (Eds.), *Advances in Educational Technologies and Instructional Design. Examining the Roles of Teachers and Students in Mastering New Technologies* (pp. 284–298). IGI Global. <https://doi.org/10.4018/978-1-7998-2104-5.ch015>
- Kennedy, P. (2002). Learning cultures and learning styles: Myth-understandings about adult (Hong Kong) Chinese learners. *International Journal of Lifelong Education*, 21(5), 430–445. <https://doi.org/10.1080/02601370210156745>
- Papadakis, S. (2018). Evaluating pre-service teachers' acceptance of mobile devices with regards to their age and gender: A case study in Greece. *International Journal of Mobile Learning and Organisation*, 12(4), 336–352. <https://doi.org/10.1504/IJMLO.2018.095130>
- Pedró, F., Subosa, M., Rivas, A., & Valverde, P. (2019). Artificial intelligence in education: Challenges and opportunities for sustainable development. Paris: UNESCO. Retrieved June 8, 2022 from <https://unesdoc.unesco.org/ark:/48223/pf0000366994?locale=es>
- Pelch, M. (2018). Gendered differences in academic emotions and their implications for student success in STEM. *International Journal of STEM Education*, 5(1), 1–15. <https://doi.org/10.1186/s40594-018-0130-7>
- R.Core Team. (2021). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. Retrieved June 8, 2022 from <https://www.R-project.org/>
- Reiss, M. J. (2021). The use of AI in education: Practicalities and ethical considerations. *London Review of Education*. <https://doi.org/10.14324/LRE.19.1.05>
- Rogers, E. M., Singhal, A., & Quinlan, M. M. (2014). Diffusion of innovations. In *An integrated approach to communication theory and research* (pp. 432–448). Routledge. <https://doi.org/10.4324/9780203887011>
- Sánchez-Prieto, J. C., Cruz-Benito, J., Therón, R., & García-Peñalvo, F. J. [Francisco J.] (2019). How to Measure Teachers' Acceptance of AI-driven Assessment in eLearning. In M. Á. C. González, F. J. R. Sedano, C. F. Llamas, & F. J. García-Peñalvo (Eds.), *Proceedings of the Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality* (pp. 181–186). ACM. <https://doi.org/10.1145/3362789.3362918>
- Schepers, J., & Wetzels, M. (2007). A meta-analysis of the technology acceptance model: Investigating subjective norm and moderation effects. *Information & Management*, 44(1), 90–103. <https://doi.org/10.1016/j.im.2006.10.007>
  - Scherer, R., & Teo, T. (2019). Unpacking teachers' intentions to integrate technology: A meta-analysis. *Educational Research Review*, 27, 90–109. <https://doi.org/10.1016/j.edurev.2019.03.001>
- Vandenberg, R. J., & Lance, C. E. (2000). A review and synthesis of the measurement
- Wang, Y., Liu, C., Tu, Y.-F. (2021). Factors affecting the adoption of ai-based applications in higher education: An analysis of teachers' perspectives using structural equation modeling. *Educational Technology & Society*, 24 (3), 116–129. Retrieved June 8, 2023 from <https://www.jstor.org/stable/27032860>
- 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. <https://doi.org/10.1186/s41239-019-0171-0>