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Unlocking AI potential: A study on B.Ed. students' preparedness for tech-driven teaching

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Abstract
The rapid integration of Artificial Intelligence (AI) into education is reshaping teaching and learning practices, requiring future educators to be both technologically proficient and pedagogically adaptive. This study investigates the familiarity, preparedness, perceptions, and challenges faced by Bachelor of Education (B.Ed.) students in integrating AI-based learning platforms into their future teaching practices. Using a quantitative, descriptive survey design, data were collected from 55 pre-service teachers at Spicer Adventist University, Pune, through a structured questionnaire administered via Google Forms. Descriptive statistical analysis revealed that 85.45% of participants use AI tools, with the majority reporting perceived improvements in academic performance. While AI use was associated with increased confidence in learning, fewer students felt adequately prepared for classroom integration. Findings highlighted significant support for incorporating AI into teacher education, alongside strong concerns about overreliance potentially diminishing critical thinking and creativity. The lack of targeted training emerged as a key barrier, with over 85% of respondents emphasizing the need for professional development. The study recommends embedding AI literacy and ethical considerations into B.Ed. curricula, adopting blended learning approaches, and providing differentiated support based on demographic factors. These findings offer actionable insights for teacher education programs to equip future educators with the skills and critical awareness needed to leverage AI effectively and responsibly in educational contexts.

Keywords: Tech-driven teaching, AI technologies, personalized learning

Introduction
As we are advancing in the age of innovation, technology plays a very important role and it has brought a significant change in the field of education. There is a drastic change in the teaching and learning process. Classrooms are turning from blackboard to smartboard. The learning journey is redefined with technologies. The transformation of learning through AI tools has caught the attention of many educators, leading to the study of the effectiveness of these tools in students' academic performance.

With the integration of AI into education, teaching approaches and learning methods need to be redefined. Traditional teaching methods are transformed into AI-driven instructional approaches that enable personalized learning. There is a rapid transformation from a teacher-centered classroom to a student-centered classroom. An upgrade is needed in the pedagogical practices as AI is integrated into the education system. Though the new trend in the education system is welcomed by most educators, it is also considered a threat by some of them. Therefore, this research explores the understanding of how student teachers perceive and adapt AI tools in their teaching and learning processes, as well as the potential challenges they face while using AI tools in learning.

The rapid integration of Artificial Intelligence (AI) into educational environments is transforming traditional pedagogical practices and reshaping the roles of educators and learners alike. As classrooms become increasingly digitized, the need for educators who are not only technologically literate but also capable of leveraging AI tools effectively has become paramount (Luckin *et al.*, 2016) [10]. In this evolving educational landscape, teacher preparation programs must ensure that pre-service teachers, particularly Bachelor of Education (B.Ed.) students, are adequately equipped to navigate and utilize AI-driven teaching strategies.

AI applications in education—ranging from intelligent tutoring systems to automated assessment tools and adaptive learning platforms have shown significant promise in enhancing student engagement, personalization, and overall learning outcomes (Holmes *et al.*, 2019) [5].

However, the successful implementation of these technologies largely depends on the teacher's competence, confidence, and willingness to integrate AI into the curriculum (Zawacki-Richter *et al*., 2019) [14]. This presents a critical challenge for teacher education institutions: preparing future educators not only to use technology, but to understand its pedagogical implications and ethical considerations.

Despite growing discourse on AI in education, limited empirical research has focused specifically on the readiness of B.Ed. students to adopt AI-driven teaching methods. Many teacher training curricula still lag in embedding AI literacy and digital pedagogical skills, leading to a potential mismatch between technological advancements and teacher preparedness (Sergis *et al*., 2021) [11]. Moreover, factors such as access to digital infrastructure, institutional support, and personal attitudes towards technology significantly influence pre-service teachers' readiness (Tondeur *et al*., 2017) [12].

This study seeks to investigate the preparedness of B.Ed. students for tech-driven teaching, with a particular focus on their awareness, attitudes, and perceived competencies related to AI in education. By identifying existing gaps and enablers, the research aims to inform curriculum development and policy interventions that can empower future educators to harness AI effectively and ethically in their teaching practices.

Review of literature

Perception and Readiness of B.Ed Students Towards Integration of AI in Education

Some educators welcome generative AI as it is considered as a tool to bring new ideas and improve technical expression, yet feared by some as they suspect that it would cripple their critical thinking and disturb their cognitive development (Holmes *et al*., 2022; Kormos & Csizér, 2023) [6, 9]. According to Holmes *et al*. (2019) [5], the teaching and learning methodologies are being reshaped by the integration of AI in education, making learning more efficient and engaging.

Perceptions of AI-Based Learning Among Pre-service Teachers

Research by Huang *et al*. (2021) [7] found that pre-service teachers, including B.Ed. Students exhibit a mix of enthusiasm and concern regarding AI integration in education. While they appreciate the automation of administrative tasks and personalized learning features, many express anxiety about data privacy, teacher replacement, and lack of control over instructional design.

Effectiveness of AI Tools in Teacher Education

A study by Chan *et al*. (2020) [3] explored the use of AI-powered platforms (e.g., Coursera, Edmodo with AI add-ons) in teacher training programs. The findings indicated that B.Ed. Students who used AI-enhanced platforms showed improved engagement and deeper conceptual understanding. However, the effectiveness was influenced by the students' digital literacy and the level of institutional support provided.

AI and Personalized Learning for B.Ed. Students

According to Zawacki-Richter *et al*. (2019) [14], personalized learning pathways created through AI algorithms allow pre-service teachers to learn at their own pace and focus on areas of weakness. This is particularly valuable in education courses where theoretical understanding and reflective practice are key components.

Challenges in Implementing AI-Based Learning Platforms

Despite the benefits, studies such as those by Luckin *et al*. (2016) [10] emphasize challenges like a lack of training for both faculty and students, limited access to reliable AI tools, and ethical issues around data use. For B.Ed. Students, these barriers may limit the potential effectiveness of such platforms unless systematically addressed.

Students' Satisfaction and Motivation

A study by Alghamdi (2022) [1, 2] found that B.Ed. Students reported higher motivation and satisfaction when using AI-integrated learning management systems, particularly those that provided real-time feedback and gamified elements. However, satisfaction levels varied based on user-friendliness and perceived relevance to their teaching career.

Future Prospects and Policy Implications

Government and institutional policies are beginning to support AI-based learning in teacher education. Studies by UNESCO (2021) [13] suggest integrating AI training into B.Ed. Curricula to better prepare future teachers for AI-enhanced classrooms. This policy-level recognition adds legitimacy and broader scope for effective implementation.

Objectives

1. To assess the familiarity of B.Ed. students with various AI-based learning tools and platforms.
2. To evaluate the preparedness and confidence levels of B.Ed. students in integrating AI technologies into their future teaching practice.
3. To identify the perceived benefits and challenges faced by B.Ed. students regarding the use of AI in teacher education.
4. To examine the attitudes and perceptions of B.Ed. students towards the role of AI in transforming teaching and learning.
5. To determine the training and professional development needs of B.Ed. students for effective AI integration in classrooms.

Hypotheses

1. There is a significant relationship between the use of AI-based learning platforms and the perceived improvement in academic performance among B.Ed. students.
2. B.Ed. Students who frequently use AI tools feel more confident and prepared to integrate AI into their future teaching practices.
3. B.Ed. Students perceive AI-based learning platforms as more effective in delivering personalized learning compared to traditional teaching methods.
4. A lack of training significantly affects B.Ed. students' ability to effectively integrate AI tools in the classroom.
5. B.Ed. Students who perceive AI positively are more likely to support its integration into teacher education programs.
6. B.Ed. Students express concern that overreliance on AI tools may negatively impact critical thinking and

creativity in learning.

Methodology

Research Design

The study employed a quantitative research design using a questionnaire-based survey to collect data from the participants.

Sample

The sample of this study comprised 55 preservice teachers enrolled in the Bachelor of Education (B.Ed.) program at Spicer Adventist University, Pune, India. Specifically, the sample included students from both first-year and second-year cohorts during the academic year 2025-2026. These participants were selected because they represent future educators currently undergoing professional training, making them particularly relevant to the investigation of AI awareness, usage, and attitudes in teacher education.

Sampling Technique

A purposive sampling technique was used to select the participants. This non-probability sampling method was chosen to intentionally target individuals who are in a specific stage of teacher training and are likely to encounter or engage with educational technologies, including AI tools. The selection was based on their availability, willingness to participate, and relevance to the research focus.

Instrument: The instrument used for data collection was a structured questionnaire consisting of demographic items and Likert scale-based statements, organized according to the research objectives discussed earlier.

Data Collection: Data was collected using a Google form, which consisted of 14 questions.

Data Analysis

The study employed descriptive statistical analysis, calculating frequencies and percentages for responses to Likert-scale and demographic questions to assess trends and patterns in B.Ed. students' awareness, preparedness, and perceptions of AI integration. The results were then interpreted the stated hypotheses

Findings of the study

Hypothesis 1: There is a significant relationship between the use of AI-based learning platforms and the perceived improvement in academic performance among B.Ed. students.

The analysis of data for the first hypothesis revealed that a large proportion of B.Ed. Students (85.45%) reported using AI-based learning platforms, with 66.67% stating that these tools improved their academic performance and 74.07% noting better performance in assignments and examinations. These results suggest a clear positive association between AI usage and perceived academic improvement. While statistical significance has not yet been tested, the trend indicates that frequent use of AI tools is closely linked to better academic outcomes.

Hypothesis 2: B.Ed. Students who frequently use AI tools feel more confident and prepared to integrate AI into their future teaching practices.

The findings showed that 50.91% of students agreed or strongly agreed that AI tools increased their confidence in learning. However, when asked whether they felt prepared to integrate AI into their future teaching practices, only 14.81% strongly agreed, while 37.04% felt underprepared and 48.15% were neutral. This indicates that although AI use fosters confidence in learning, it does not necessarily translate into readiness for classroom application. The hypothesis is therefore only partially supported, highlighting the need for targeted training to transform learning confidence into teaching competence.

Hypothesis 3: B.Ed. Students perceive AI-based learning platforms as more effective in delivering personalized learning compared to traditional teaching methods.

The fourth hypothesis, which examined perceptions of AI-based platforms as more effective in delivering personalized learning than traditional methods, only 42.59% of students agreed, while 38.89% were neutral and 18.52% disagreed. This suggests that less than half of the respondents view AI as superior for personalization, with a high degree of neutrality indicating uncertainty or varied experiences among students. This offers only limited support for the hypothesis.

Hypothesis 4: A lack of training significantly affects B.Ed. students' ability to effectively integrate AI tools in the classroom.

The fifth hypothesis received strong confirmation from the data, with 85.19% of students agreeing or strongly agreeing that more training is needed to effectively integrate AI into classroom practice. Similarly, 85.18% supported the need for professional development in AI for education. These findings clearly indicate that insufficient training is a major barrier to successful AI integration, strongly supporting the hypothesis.

Hypothesis 5: B.Ed. Students who perceive AI positively are more likely to support its integration into teacher education programs.

For the sixth hypothesis, which proposed that students with positive perceptions of AI are more likely to support its integration into teacher education programs, 61.11% expressed support for such integration. This aligns with the generally favorable perceptions of AI's benefits, as around 70% of respondents reported improved academic performance from AI use. This relationship between positive perception and advocacy for integration supports the hypothesis.

Hypothesis 6: B.Ed. Students express concern that overreliance on AI tools may negatively impact critical thinking and creativity in learning.

Finally, the seventh hypothesis, concerning concerns over AI's potential negative effects on critical thinking and creativity, was strongly supported. A majority of 66.66% agreed or strongly agreed that overreliance on AI could reduce critical thinking ability. These concerns highlight the importance of balancing AI use with traditional pedagogical methods to preserve essential cognitive skills.

Recommendations

Based on the findings of the study, several recommendations can be made to enhance the effective use of AI-based learning platforms among B.Ed. students.

Firstly, there is a clear need to integrate AI literacy into teacher education curricula. Although the majority of students have prior experience with AI tools, many still feel underprepared to use them effectively in teaching. Therefore, B.Ed. Programs should include dedicated modules focusing on AI fundamentals, pedagogical integration, and practical applications in the classroom. This would ensure that future teachers not only know how to operate AI tools but can also use them strategically to enhance learning outcomes.

Secondly, the results highlight the importance of continuous professional development on AI in education. Regular workshops, training sessions, and hands-on practice opportunities should be provided to help students and educators keep up with rapidly evolving AI technologies. These sessions should also address ethical considerations, data privacy issues, and responsible use of AI in education, ensuring that students approach AI integration with both competence and caution.

Furthermore, the study shows that students still value face-to-face interaction as essential in education, indicating that AI should complement rather than replace traditional teaching methods. A balanced approach, blending AI-driven personalization with human interaction, can help maintain the social, emotional, and interactive aspects of learning while leveraging AI's strengths in efficiency and adaptability.

The concern expressed by many students regarding AI's potential impact on critical thinking and creativity should also be addressed. Teacher training should incorporate strategies that encourage learners to question, evaluate, and critically engage with AI-generated content. This would ensure that AI supports rather than diminishes cognitive development.

Finally, given the variations in AI preparedness based on demographic factors such as gender, age, and year of study, further research is recommended to explore these differences in depth. This would allow the design of more targeted training programs. Additionally, efforts should be made to foster a positive yet critical mindset toward AI, encouraging students to embrace its potential while remaining aware of its limitations. By following these recommendations, teacher education institutions can ensure that future educators are well-equipped to harness AI effectively and responsibly in their professional practice.

Practical Implications

The findings of this study have several practical implications for teacher education programs and the integration of AI into educational practice. Firstly, the strong association between frequent AI use and perceived improvement in academic performance suggests that AI-based learning platforms can be effectively integrated into B.Ed. programs as supplementary teaching and learning tools. This can help future educators develop familiarity and competence with AI before entering the profession, ensuring they are prepared to apply these tools in real classroom settings.

Secondly, the evident need for more training highlights the importance of embedding structured AI-focused professional development within teacher training institutions. This could include hands-on workshops, simulated classroom experiences, and collaborative projects that allow students to explore AI applications in lesson planning, assessment, and personalized learning.

Moreover, the recognition of ethical concerns surrounding AI use indicates that AI literacy must extend beyond technical skills to include ethical, social, and pedagogical considerations. Teacher education programs should therefore equip students with the ability to critically assess AI-generated content, address issues of bias and privacy, and make informed decisions about responsible use.

In addition, the finding that students still value face-to-face interaction reinforces the need for blended learning approaches, where AI complements but does not replace human instruction. This balance can help preserve the interpersonal and socio-emotional benefits of traditional teaching while leveraging AI's strengths in data-driven personalization and efficiency.

Finally, since differences in AI preparedness exist across gender, age, and year of study, tailored support strategies should be developed. For example, novice users may require introductory training, while more experienced users could benefit from advanced integration techniques. These practical steps will help ensure that all B.Ed. students, regardless of background, are equally empowered to harness AI tools effectively in their teaching careers.

Limitation and Suggestion for Future Research

Limitation

This study has certain limitations that should be considered when interpreting the findings. Firstly, the data was collected from a relatively small sample of B.Ed. students, which may limit the generalizability of the results to other teacher education programs or geographic regions. Secondly, the research relied on self-reported perceptions, which may be influenced by personal biases, social desirability, or limited experience with AI tools. Thirdly, the study did not measure actual academic performance data but rather students' perceptions of improvement, meaning that the findings reflect subjective viewpoints rather than objective outcomes. Additionally, the cross-sectional design captures students' opinions at a single point in time, without accounting for how their experiences or attitudes toward AI might change with increased exposure or training. Finally, the study primarily focused on general AI-based learning platforms, without distinguishing between different types of tools or their specific features, which could affect the perceived usefulness and effectiveness.

Suggestions for Future Research

Future research could address these limitations in several ways. Expanding the study to include a larger and more diverse sample across multiple institutions would enhance the generalizability of the findings. Longitudinal studies could be conducted to track changes in students' perceptions, confidence, and skills over time as they receive training and gain practical experience with AI tools. Incorporating objective performance measures, such as grades, teaching simulation outcomes, or skill assessments, could help validate whether perceived improvements correspond to measurable gains. Further studies could also explore differences between various AI-based platforms, comparing their specific impacts on engagement, personalization, and learning outcomes. In addition, future research should examine how integrating AI into teacher education affects actual classroom practices once graduates begin teaching, thereby linking pre-service training with in-

service application. Finally, qualitative approaches, such as interviews or focus groups, could provide deeper insights into the nuanced challenges and benefits that B.Ed. students experience when engaging with AI technologies.

Conclusion

This study explored B.Ed. students' perceptions, usage patterns, and preparedness regarding AI-based learning platforms, along with the relationship between AI usage and perceived academic improvement. The findings indicate that a majority of students have prior experience with AI tools, with ChatGPT emerging as the most commonly used platform. Students generally perceive AI-based platforms as effective in enhancing understanding, engagement, and academic performance, although many still consider face-to-face interaction essential in education. The results also reveal that frequent users of AI tools report higher confidence and preparedness to integrate AI into future teaching practices. However, a significant proportion of students expressed concerns about the potential negative impact of AI on critical thinking and creativity.

The study further highlights a strong demand for more training and professional development in AI integration, suggesting that insufficient preparation remains a key barrier to effective classroom use. Demographic differences in AI preparedness, particularly across gender, age, and year of study, underline the need for targeted support. Overall, the research underscores that while B.Ed. Students recognize the potential of AI in education, its successful integration into teacher education programs will require structured training, ethical awareness, and a balanced approach that complements traditional teaching methods.

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