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# Preparing future educators for AI-driven workforce transformation

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**Abstract**
As artificial intelligence (AI) continues to reshape the education sector and the future workforce, preparing educators to effectively integrate AI into their teaching practices has become a critical priority. This study investigates the readiness, awareness, and perceptions of pre service teachers toward AI, focusing on students enrolled in the Bachelor of Education (B.Ed.) program at Spicer Adventist University, Pune. Using a quantitative research design, data were collected via a structured 14-question survey administered through Google Forms. The results, based on responses from 65 participants, reveal a high level of general awareness about AI, particularly tools like ChatGPT, but a limited understanding of its broader applications and ethical implications. Although most respondents viewed AI positively-as a means to personalize learning and reduce teacher workload-only a minority felt adequately supported or trained by their current teacher education programs. Statistical analysis showed weak positive correlations between AI exposure and perceived benefits, suggesting that simple exposure alone is insufficient to shift perceptions or build competence. The main barriers to AI adoption included lack of access to tools and insufficient training, rather than ideological resistance. Participants expressed a strong preference for practical, hands-on learning experiences, indicating a need for more structured, skills-based AI training within teacher education curricula. The findings underscore an urgent need for educational reforms that integrate AI literacy and ethical awareness into preservice teacher training, preparing future educators not only to use AI effectively but also to guide AI-literate students in an evolving workforce landscape. The study concludes by proposing directions for curriculum design, policy recommendations, and future research to bridge existing gaps in AI preparedness among educators.

**Keywords:** Coherence, continuation writing

**Introduction**
Artificial intelligence (AI) is quickly becoming a major part of education, changing the way teachers work and the skills they need to do their jobs well. Recent studies show that by 2024-2025, about 60% of teachers in the U.S. will be regularly using AI tools in their classrooms. These tools help teachers save time by assisting with tasks like lesson planning, grading, and organizing class activities. They also help make learning more engaging for students (Malek Ash *et al*., 2025) [10]. In addition, AI supports more personalized learning experiences, automatic assessments, and provides teachers with up-to-date information about student progress (Feuerriegel *et al*., 2024; Cukurova *et al*., 2023) [3, 2].

However, even though AI is being used more and more, many teachers, especially those who are still in training, do not feel fully prepared to use it effectively. Most teacher education programs are not yet providing enough training on how to use AI in the classroom. In fact, less than half of future teachers say they feel confident or informed about AI tools (Frontiers in Education, 2024). Research shows that to use AI well, teachers need a mix of important skills. These include understanding how AI works, knowing how to combine technology with good teaching practices, being aware of ethical issues, and having the confidence to use AI tools (Karataş & Yüce, 2024; Ravi *et al*., 2023; Nazaretsky *et al*., 2022) [6, 14, 11].

At the same time, teachers have different opinions about using AI in schools. Many believe it can make their work easier and improve how students learn. But they also worry about problems like cheating, how accurate AI-generated content is, student data privacy, fairness, and how AI might change their role as educators (Kim & Kim, 2022; Oh & Ahn, 2024) [8, 12]. Because of all these changes and challenges, it is very important to look at how teacher

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training programs are responding to AI. We also need to better understand how teachers feel about using AI, how prepared they are, and what kind of support they need to use it effectively and responsibly. There is a growing concern about whether current and future educators possess the necessary competencies to effectively teach AI-literate students and integrate AI tools into pedagogical practice. Additionally, educators' perceptions and apprehensions about AI adoption in classrooms remain underexplored, creating uncertainty around effective implementation strategies. This gap highlights the urgent need to evaluate and redesign teacher training to align with the evolving demands of AI-enhanced education.

## Research objectives

1. To analyze the impact of AI on the future workforce.
2. To identify the competencies educators need to teach in an AI-integrated world.
3. To assess current teacher education programs related to AI preparedness.
4. To explore the integration of AI tools and technologies in educator training.
5. To propose a framework or model for training future educators in the AI era.
6. To understand educators' perceptions and attitudes towards AI in education and employment.
7. To encourage policy recommendations for educational reforms.

## Hypotheses

1. There is a significant relationship between AI exposure in teacher education programs and preservice teachers' confidence in using AI tools.
2. Preservice teachers with greater knowledge of AI demonstrate more positive attitudes toward AI integration in education.
3. Access to hands-on AI training significantly increases preservice teachers' perceived readiness to use AI in the classroom.
4. There is a positive correlation between the frequency of AI use and the belief that AI can reduce teachers' workload and personalize student learning.
5. The lack of institutional support and training is a major barrier to AI adoption among preservice teachers.

## Review of literature
## Artificial Intelligence in Education: Tools and Applications

Recent advancements in artificial intelligence (AI) have introduced a wide array of tools and applications within educational settings, transforming how instruction and learning occur. A 2024 systematic literature review identified several dominant categories of AI-powered educational technologies, such as intelligent tutoring systems, adaptive learning platforms, chatbots, learning analytics dashboards, and educational robotics. These tools are designed to personalize instruction, automate feedback, assess learner profiles, and simulate interactive learning environments (Zawacki-Richter et al., 2024) [17]. More recently, generative AI tools such as ChatGPT have emerged as influential classroom companions. A 2025 mixed-methods study spanning South Asia and Europe ($n = 130$) highlighted students' growing reliance on GenAI for content generation, reflection, and tutoring. It also emphasized the importance of competencies such as prompt engineering, critical thinking, and AI ethics, which are now being incorporated into educational goals (Khan et al., 2025) [7].

## Benefits and Limitations of AI in Learning Environments

AI offers substantial benefits in educational environments, including personalized learning experiences, increased efficiency, real-time feedback, and targeted interventions. A comprehensive 2024 meta-review of 96 literature reviews reported that the most cited benefits were personalized learning (16.7%), improved instructional quality (16.1%), and enhanced feedback and assessment systems (15%). Additionally, AI facilitates improved student engagement, critical thinking, and accommodation of diverse learning needs (Chang et al., 2024) [1]. However, despite these advantages, the use of AI in education also presents significant limitations. Chief among these are ethical concerns, including data privacy violations, algorithmic bias, and a lack of fairness and transparency in decision-making processes. Concerns about over-reliance on AI tools include the possibility of diminished critical thinking and creativity among learners.

## AI and Workforce Evolution: Emerging Skills

As AI reshapes the workforce, it simultaneously redefines the skills that students must acquire to thrive in the future. A 2025 study involving higher education institutions in Asia and Europe identified 14 essential AI-era competencies, including AI literacy, ethical awareness, critical thinking, data evaluation, and the ability to generate effective AI prompts. The study stressed that these skills are now fundamental to preparing graduates for emerging career landscapes (Khan et al., 2025) [7]. Complementing this, a 2025 survey involving 2,000 students across multiple countries revealed that over 60% of respondents believed responsible AI use would be central to their future careers. This shift suggests that AI-readiness is no longer a niche attribute but a mainstream expectation for employability in diverse sectors, especially those driven by data and automation (Greenberg & Lee, 2025) [5]. Therefore, educational institutions must prioritize the development of cognitive, ethical, and collaborative skills to ensure students can adapt to rapidly evolving workforce demands.

## Educational Adaptation for Future Professions

To prepare learners for AI-driven careers, educational institutions must undergo meaningful transformation in curriculum design and pedagogical strategies. Universities are increasingly embedding AI and digital literacy into formal coursework, while promoting interdisciplinary project-based learning that simulates real-world problems. Initiatives such as those at the University of Florida and others across Asia demonstrate how cross-sector partnerships can align academic learning with industry needs. These shifts indicate that future-ready education must integrate AI not only as a tool but as a pedagogical partner. Such adaptation also demands reevaluating assessment methods, classroom management, and student support models in line with AI's growing role.

**Teacher Competency in AI: Digital Literacy and Pedagogical Adaptation:** Teachers play a central role in

mediating the use of AI in classrooms, making their digital competence and pedagogical adaptability crucial. Current literature emphasizes that educators must develop a foundational understanding of AI systems, including their ethical implications, data mechanics, and potential biases. A recent scoping review covering 118 studies on large language models (LLMs) in education revealed that many implementations suffer from limited teacher involvement, opaque system design, and lack of pedagogical scaffolding. It calls for human-centered, co-designed AI tools that reflect real instructional needs (Zhou *et al*., 2024) [18]. Without proper training and institutional support, even the most sophisticated AI tools may exacerbate inequality and reduce instructional quality.

## Global Frameworks and Models for AI Competency

Globally, several frameworks have been developed to guide AI and digital competence in education. Among the most prominent is the Digital Intelligence (DQ) framework, endorsed by the OECD and IEEE. It comprises eight dimensions, ranging from digital literacy and safety to creativity, rights awareness, and emotional intelligence. Governments in Asia, Europe, and North America are increasingly using DQ to develop national AI curricula and teacher training modules (Park, 2024) [13]. Another recent initiative, the Digital Education Council, was established in Singapore in 2024. It aims to provide a collaborative global platform for higher education institutions to exchange best practices, standardize ethical AI implementation, and promote workforce-readiness through AI-competent pedagogy (Tan & Mohan, 2025) [15]. These frameworks help ensure that AI adoption in education is ethical, inclusive, and globally aligned.

## Methodology

- **Research Design:** The study employed a quantitative research design using a questionnaire-based survey to collect data from the participants.
- **Sample:** The sample for this study was drawn from Spicer Adventist University, Pune, India. A total of 65 teacher-education students participated in the research. The respondents represented both first-year and second-year B.Ed. students during the academic year 2025 -

2026 with a balance of male and female participants across different age groups. Stratified random sampling was employed to ensure representation from various demographic categories.

## 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

**Descriptive Statistics:** The average (mean) level of AI use among participants was 3.5 on a 5-point scale, indicating moderate use overall. The frequency distribution showed that 40% of respondents used AI tools frequently, 35% used them occasionally, and 25% rarely or never used them.

## Correlation Formula

We used the Pearson correlation coefficient (r):

$$ r = \frac{n(\sum xy) - (\sum x)(\sum y)}{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]} $$

Where:
$x_i$ = AI use score for respondent i
$y_i$ = Perceived performance score for respondent i
$\underline{x}$ = mean of AI use scores
$\underline{y}$ = mean of perceived performance scores
n = number of respondents (complete cases only)

| Pair Compared | r-value | Strength | Interpretation |
|---|---|---|---|
| AI use ↔ Workload reduction | 0.082 | Very weak positive | Slight tendency for those with more program AI support to believe AI reduces workload |
| AI use ↔ Personalized learning | 0.176 | Weak Positive | Small tendency for those with more program AI support to believe AI helps students learn more personally |

## Interpretation

- **Direction:** Both relationships are positive → higher perceived AI use in training is associated with higher perceived benefits of AI.
- **Strength:** Weak in both cases, meaning that program support explains only a small part of the variation in beliefs.
- **Implication:** Simply having AI in teacher training may not strongly shift beliefs; practical exposure, hands-on experience, and broader AI literacy may be needed to influence perceptions more significantly.

**Findings and Discussion:** This survey, conducted among 65 teacher-education students, offers a snapshot of how

future educators perceive AI. The sample was predominantly female (78%), with a fairly even distribution across three age groups: 20-25 years (35%), 26-30 years (34%), and 31 years or older (31%). Respondents were almost evenly split between first-year B.Ed. students (51%) and second-year students (49%). These demographics suggest the findings largely reflect the perspectives of young adult, female educators-in-training in the early stages of their teaching careers.

## AI Knowledge and Awareness

The results show that while AI is widely recognized, in-depth understanding is limited. A strong majority (69.2%) reported knowing "a little" about AI, while only 18.5%

claimed to know a lot. Another 12.3% had heard of AI but did not understand it, and no respondents indicated they had never heard of it. This reflects a high level of basic awareness but a clear gap in deeper knowledge.

Awareness of specific AI tools was heavily concentrated on one category: chatbots like ChatGPT, recognized by 90.8% of respondents. Other tools had much lower recognition rates - facial recognition (26.2%), machine learning (21.5%), automated grading tools (16.9%), and predictive analytics (10.8%). These results suggest that public perception of AI among educators-in-training is shaped primarily by high-profile conversational tools, with less familiarity with the broader AI ecosystem.

## Attitudes Toward AI in Teaching and Jobs

Respondents overwhelmingly agreed that AI will play a significant role in shaping future employment, with 69.3% agreeing or strongly agreeing. Likewise, 70.8% agreed or strongly agreed that teachers should understand AI to help their students.

Concerns about AI replacing teaching jobs were minimal. Nearly 90% disagreed or strongly disagreed with the idea that AI could replace or threaten teaching roles, indicating confidence in the continued need for human educators. Instead, AI was largely viewed as a supportive tool: two-thirds of respondents agreed or strongly agreed that AI could help students learn in a more personal way, and 63% believed it could reduce teachers' workloads.

Despite these positive attitudes, there is a gap in current preparation. Only 31% felt their teacher education program was actively helping them learn about AI, while 59% said they were learning "a little", and 9% reported no learning at all. However, when asked about the importance of AI in teacher training, 54% rated it as important or very important, and 42% said it was somewhat important, showing clear demand for stronger AI integration in teacher preparation.

The main barriers to AI adoption in teaching were structural rather than ideological. A striking 98% cited a lack of access to AI tools as the biggest challenge, followed by 50% who pointed to insufficient knowledge or training. Ethical concerns (33%), curriculum restrictions (14%), and resistance from others (11%) were seen as less pressing obstacles. In terms of openness to adaptation, most respondents were at least somewhat willing to change their teaching to include AI, with only 4.6% unwilling.

## Training and Curriculum Support

When asked about the types of training that would help them feel ready to use AI in the classroom, the top priorities were hands-on practice with real AI tools (43%) and workshops or short courses about AI (42%). Training on the social and ethical side of AI (23%) and on how to integrate AI into lesson planning (23%) were less frequently chosen, while group projects involving AI were the least requested (17%). This indicates a strong preference for practical, skills-based preparation over theoretical or group-based approaches.

Regarding curriculum integration, the majority of respondents (77%) felt AI topics should be included in Computer Science or Technology courses. However, there was also support for embedding AI in Language/English (37%), Social Studies/Ethics (26%), and Math (23%). This

reflects recognition that AI literacy is not only a technical skill but also a cross-disciplinary competency.

## Recommendations

Based on the survey findings, a comprehensive professional development strategy for AI integration in teacher education should focus on practical skill-building, structured certification, and flexible micro-learning.

Hands-on workshops should form the foundation of this strategy, as 43% of respondents indicated a preference for direct experience with AI tools. These workshops, offered in-person or virtually, could range from half-day sessions to multi-day events. They should cover the practical use of AI for lesson planning, grading, and personalized instruction, as well as provide classroom simulations that allow educators to experiment with AI-enhanced teaching approaches in a safe, guided environment.

For more in-depth expertise, certification programs should be developed and offered by universities or education ministries. These could be semester-long or intensive short-term courses that include modules on AI literacy, ethics, tool mastery, and AI-driven pedagogy. Successful completion would grant educators a recognized credential demonstrating their proficiency in AI integration. Given that 54% of survey participants rated AI in teacher training as important or very important, these certifications would help formalize AI skills as a core part of teacher qualifications.

In addition, micro-credentials offer a flexible, accessible way for educators to upskill gradually. These short, stackable online courses-typically 5-10 hours in length-could focus on highly targeted applications such as using chatbots for student engagement, ethical AI use in the classroom, or leveraging AI for differentiated instruction. This format is especially suited to the 69.2% of respondents who reported knowing only "a little" about AI, as it allows them to build confidence in specific areas before progressing to more advanced training. By combining workshops, certification programs, and micro-credentials, teacher education institutions can create a professional development pathway that meets educators where they are and equips them for an AI-driven future.

## Implications for teacher education and workforce

The survey findings highlight that while future educators are generally optimistic about AI's role in education, their knowledge and exposure remain limited. This suggests that teacher education programs must move beyond basic awareness to provide structured, hands-on training that builds both technical competence and pedagogical confidence in AI use. Integrating AI literacy, ethics, and practical tool application into the curriculum will better prepare educators to guide students in an increasingly AI-driven society.

For the workforce, the results indicate that AI is more likely to be viewed as a supportive enhancement rather than a threat to teaching roles. This reinforces the need for professional development that focuses on leveraging AI to improve efficiency, personalize learning, and reduce administrative workload-skills that will be increasingly valuable across educational contexts. As AI adoption grows, educators with strong AI competencies will be better positioned to adapt to technological changes, maintain relevance in their roles, and contribute to shaping ethical, student-centered uses of AI in schools.

**Limitation and suggestion for future research**
This study provides valuable insights into how future educators perceive AI, but several limitations should be acknowledged. First, the sample size was relatively small (65 respondents) and drawn from a single group of teacher-education students, which limits the generalizability of the findings. The demographic composition-predominantly female and concentrated in the early stages of their teaching careers-may also mean that the results reflect a narrower perspective than the wider educator population. Additionally, the study relied on self-reported perceptions rather than direct measures of AI competence or classroom application, which may introduce bias due to overestimation or underestimation of actual skills.

Future research should expand the sample to include a more diverse range of educators in terms of gender, age, professional experience, and geographic location. Longitudinal studies would be valuable for tracking changes in AI knowledge, attitudes, and practices over time, particularly as AI tools and training programs become more widely available. Experimental or intervention-based studies could assess the impact of specific AI training modules on teacher confidence, instructional practices, and student outcomes. Finally, future work should explore not only technical proficiency but also critical thinking, ethical reasoning, and cross-disciplinary applications of AI, ensuring that educators are prepared for both the opportunities and challenges of teaching in the AI era.

**Conclusion**
This survey paints a picture of a future teaching workforce that is aware of AI, optimistic about its potential, and eager to integrate it into the classroom but hampered by limited access to tools and practical training. While conversational AI dominates current awareness, there is a clear need to expand knowledge to include a wider range of applications.

Teacher education programs have an opportunity to meet this demand by offering hands-on AI training, ensuring access to tools, and embedding AI across multiple subject areas. By addressing these gaps, educators will be better equipped not only to use AI effectively themselves but also to prepare their students for a world where AI is a central part of work, communication, and problem-solving.

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