

Knowledge of Student-Teachers Regarding AI-Integrated Tools in the Teaching–Learning Process

Aditya Verma^a, Dr Gayatri Ahuja^b

^a official email address: phdadi25@gmail.com

^a Ph.D. Scholar, Department of Education, AYJNISHD (Divyangjan), Mumbai

^b HoD & Reader, Department of Education, AYJNISHD (Divyangjan), Mumbai

Abstract

Artificial Intelligence is increasingly shaping contemporary education by enabling data-driven instruction, adaptive learning, and personalized teaching approaches. The present study aimed to assess the knowledge level of student-teachers regarding AI-integrated tools used in the teaching-learning process. A purposive sample of 30 B.Ed. Special Education student-teachers from Mumbai were selected. Data were collected using a structured, knowledge-based questionnaire covering AI concepts, applications in education, ethical considerations, and inclusive classroom use. Descriptive statistical analysis revealed that 47% of participants had low knowledge, 43% demonstrated high knowledge, and only 10% had moderate knowledge. The findings indicate a polarised distribution, highlighting the need for systematic integration of AI literacy within teacher education programs, particularly in special education.

Keywords: Knowledge level, Student-teachers, Artificial Intelligence, AI-integrated tools, Special education

1. Introduction

The integration of technology into education has accelerated in the 21st century, with Artificial Intelligence at the forefront of this transformation. AI-integrated tools such as adaptive learning systems, speech recognition software, intelligent tutoring systems, and predictive analytics have the potential to redefine how teachers deliver instruction and how students learn (Luckin et al., 2016). For special education, AI applications offer unique opportunities to enhance accessibility, customisation, and support for learners with diverse needs by addressing barriers in communication, cognition, and engagement.

Globally, education systems are moving toward a paradigm where AI is not only considered a technological innovation but also an essential pedagogical tool. For instance, AI-driven platforms are increasingly being used for personalized learning pathways, automated assessment, and real-time feedback systems, all of which can significantly improve student outcomes (Holmes et al., 2019). In the Indian context, the National Education Policy, 2020, states the importance of integrating emerging technologies such as AI, coding, and digital literacy into teacher education. This policy directive places a responsibility on teacher education institutions to prepare student-teachers for classrooms where digital and AI-based interventions are becoming standard.

However, successful implementation depends significantly on teachers' preparedness and their knowledge of AI tools. Teachers' attitudes, awareness, and ability to adapt play a critical role in determining the extent to which AI can be effectively embedded in classroom practices (Zawacki-Richter et al., 2019). Student-teachers, as future practitioners, must therefore be equipped not only with pedagogical knowledge but also with technological competencies aligned with the expectations of 21st-century classrooms. For those pursuing special education, this preparedness is even more crucial, as the population they serve often requires innovative, technology-driven solutions tailored to specific disabilities.

Despite the promising potential of AI in education, research suggests gaps in AI awareness and literacy among pre-service teachers. These gaps may hinder effective adoption and slow down the realization of inclusive, equitable, and technology-enhanced education. Understanding the current knowledge levels of

student-teachers is, therefore, a necessary first step in designing targeted training modules, professional development workshops, and curriculum reforms.

This research study investigates the level of knowledge among student-teachers regarding AI-integrated tools in the teaching and learning process, with a specific focus on B.Ed. Special Education students in Mumbai. The findings are expected to contribute to policy dialogue, curriculum design, and teacher training initiatives, particularly in special education, where the integration of AI holds immense promise.

2. Need for the Study

The education sector is experiencing a paradigm shift due to the rapid infusion of Artificial Intelligence technologies. In India, the National Education Policy 2020 emphasizes the importance of integrating AI and digital literacy across all levels of education, with teacher education programs being central to this transformation. However, while policy frameworks highlight the urgency of AI adoption, there is limited empirical evidence on the preparedness of pre-service teachers, particularly those in specialized domains such as special education. This gap between policy aspirations and on-ground teacher readiness states the critical need to assess and strengthen AI literacy among student-teachers.

For student-teachers specializing in Hearing Impairment, Intellectual Disability, and Learning Disability, the role of AI is uniquely significant. AI-powered text-to-speech tools, voice recognition systems, predictive learning software, and adaptive testing platforms can act as assistive technologies that bridge accessibility gaps. These tools have the potential to transform traditional teaching practices into more inclusive and personalized approaches, thereby improving the quality of education for children with special needs. Yet if teachers are not adequately prepared to use such innovations, the promise of AI to advance inclusive education remains under-realised.

Globally, scholars have argued that teachers' technological awareness and confidence are determinants of adoption (Zawacki-Richter et al., 2019). While some educators demonstrate high enthusiasm and readiness, others exhibit reluctance due to a lack of exposure, insufficient training, or apprehensions about ethical implications. In the Indian context, where digital divides already exist across socio-economic and institutional boundaries, pre-service teachers' knowledge levels are likely to vary widely. Assessing these variations provides valuable insights for designing differentiated training interventions that cater to the diverse preparedness levels of future educators.

Moreover, empirical studies on AI integration in education have largely focused on developed nations, leaving a research gap in the Indian context, particularly concerning teacher education in special education programs. As these teachers are expected to lead inclusive classrooms, their preparedness carries both pedagogical and social implications. Without targeted interventions, the absence of AI literacy could exacerbate existing inequities in special education, depriving students with disabilities of the benefits of adaptive and intelligent learning tools.

Therefore, the present study addresses a critical need by systematically evaluating the Knowledge levels of B.Ed. Special Education student-teachers in Mumbai. The findings not only provide evidence of current preparedness but also inform curriculum developers, policymakers, and teacher educators about the urgency of embedding AI training into pre-service teacher education. By identifying knowledge gaps, this research contributes to the ongoing discourse on how to effectively prepare the next generation of teachers to embrace AI-driven pedagogies in inclusive classrooms.

3. Review of Literature

Prior studies have examined teachers' attitudes toward technology integration, highlighting both opportunities and barriers. Vekiri and Chronaki (2008) found that gender influences self-efficacy and openness toward adopting technology, with women often underestimating their abilities despite comparable performance.

UNESCO (2022) emphasized the gendered nature of teaching, particularly in inclusive education contexts, where female representation predominates.

Luckin et al. (2016) stated AI's transformative role in personalizing learning and improving equity. In India, the NEP 2020 advocates integrating AI into teacher training programs, recognising its potential to redefine pedagogy. Teachers must be equipped not only with technical proficiency but also with critical AI literacy, i.e., the ability to interrogate AI systems for fairness, accountability, and transparency (UNESCO, 2021; Selwyn, 2020). Despite these policy imperatives, empirical evidence regarding pre-service teachers' knowledge of AI, particularly in special education, remains scarce, creating the need for studies like the present one.

4. Methodology

Research Design: A descriptive survey method was adopted to assess the knowledge level of student-teachers regarding AI-integrated tools.

Sample: The sample consisted of 30 student-teachers pursuing B.Ed. in Special Education at Mumbai University (Batch 2024–2026). The purposive sampling technique ensured that participants possessed relevant characteristics, namely their enrolment in programs focused on special needs education (H.I, I.D, L.D).

Tool: A structured knowledge-based questionnaire was used, including items on:

- Basic concepts of Artificial Intelligence
- Educational applications of AI
- Role of AI in inclusive education
- Ethical and practical considerations

Demographics

- Gender: Female (n = 26, 86.67%), Male (n = 4, 13.33%)
- Age: Majority (46.67%) between 21–25 years, with a small proportion above 40 years.

Data Analysis: Responses were analysed using descriptive statistics, categorising knowledge levels as High, Medium, or Low.

5. Results

Table 1. Results of the Participants – Knowledge Level

Knowledge Level	Frequency	Percentage
High	13	43%
Medium	3	10%
Low	14	47%
Total	30	100%

The results indicate that 47% of the participants demonstrated low levels of knowledge, suggesting that a significant proportion of student-teachers lack adequate conceptual understanding of Artificial Intelligence and its applications in classroom settings. Only 43% achieved high knowledge levels, while 10% performed at a moderate level. This distribution reveals a polarised pattern, indicating that while some student-teachers are

well-informed about AI-integrated tools, a significant segment still requires systematic training and academic support to develop foundational AI literacy for effective classroom implementation.

6. Implications

These findings reveal a significant knowledge gap that could hinder the effective adoption of Artificial Intelligence in inclusive education. Although a considerable proportion of student-teachers demonstrate high levels of knowledge, nearly half have a limited understanding of AI concepts and their educational applications. This uneven knowledge base highlights the need for systematic curriculum interventions to ensure more uniform and comprehensive AI literacy among future educators. In line with the NEP 2020, teacher education programmes must integrate structured AI-focused coursework, workshops, and practical exposure so that all student-teachers are adequately prepared to implement AI-integrated tools in inclusive classroom settings.

7. Summary and Conclusion

The present study examined student-teachers' knowledge of AI-integrated tools in the teaching-learning process. The findings show that:

- 47% of student-teachers have low knowledge, indicating poor preparedness
- 43% possess high knowledge, showing strong conceptual awareness
- 10% fall in the medium category, reflecting limited transitional understanding

The highly polarized pattern indicates a significant knowledge gap among future special educators. To ensure equitable and effective use of AI in inclusive classrooms, teacher education institutions must prioritize structured AI education. Strengthening knowledge foundations will enable student-teachers to confidently and ethically integrate AI tools to enhance learning outcomes for children with special needs.

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