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Perceptions of Elementary School Teacher Education Students on the Use of AI to Support Inclusive Education in Elementary Schools

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ABSTRACT

The rapid development of Artificial Intelligence (AI) has permeated various sectors of education, including primary education, which urgently requires accommodating student diversity through inclusive education. Pre-service teachers in the Primary School Teacher Education (PGSD) program play a strategic role in bridging the use of AI technology with the principles of inclusive education in primary schools. This article aims to comprehensively examine PGSD students' perceptions of AI use, the factors shaping those perceptions, and their relevance in supporting inclusive education in primary schools, through a literature review of more than thirty scholarly sources published between 2021 and 2026. The results show that PGSD students generally hold positive views toward AI use in learning, shaped by perceived ease of use, effectiveness, academic environment support, and ethical awareness. AI is seen as having great potential to support inclusive education through material personalization, learning differentiation, format-conversion technology for students with disabilities, and augmented-reality-based concept visualization. Nevertheless, a consistent gap was found between this positive perception and students' conceptual understanding of children with special needs, their technical readiness to apply AI in inclusive classrooms, institutional readiness, and the ethical and religious-value considerations accompanying the technology's use. This study recommends strengthening AI literacy and inclusive education competencies in an integrated manner within the PGSD curriculum, accompanied by stronger institutional support, so that future primary school teachers are prepared to use AI wisely, adaptively, ethically, and in favor of student diversity.

Article Information

Keywords:
Persepsi Mahasiswa; Artificial Intelligence; Pendidikan Inklusif; Sekolah Dasar; PGSD.

ABSTRACT

Perkembangan kecerdasan buatan (Artificial Intelligence/AI) yang pesat telah merambah berbagai sektor pendidikan, termasuk pendidikan dasar yang di dalamnya terdapat kebutuhan mendesak untuk mengakomodasi keberagaman peserta didik melalui pendidikan inklusif. Mahasiswa Pendidikan Guru Sekolah Dasar (PGSD) sebagai calon guru memiliki peran strategis dalam menjembatani pemanfaatan teknologi AI dengan prinsip-prinsip pendidikan inklusif di sekolah dasar. Artikel ini bertujuan mengkaji secara mendalam persepsi mahasiswa PGSD terhadap penggunaan AI, faktor-faktor yang memengaruhi persepsi tersebut, serta relevansinya dalam mendukung pendidikan inklusif di sekolah dasar, melalui pendekatan kajian pustaka (literature review) atas lebih dari tiga puluh sumber ilmiah yang terbit pada rentang tahun 2021–2026. Hasil kajian menunjukkan bahwa mahasiswa PGSD secara umum memiliki persepsi positif terhadap pemanfaatan AI dalam pembelajaran, yang dibentuk oleh faktor kemudahan penggunaan, efektivitas, dukungan lingkungan akademik, dan kesadaran etis. AI dipandang berpotensi besar mendukung pendidikan inklusif melalui personalisasi materi, diferensiasi pembelajaran, teknologi konversi format bagi peserta didik disabilitas, serta visualisasi konsep berbasis augmented reality. Meskipun demikian, ditemukan kesenjangan yang konsisten antara persepsi positif tersebut dengan pemahaman konseptual mahasiswa mengenai anak berkebutuhan khusus, kesiapan teknis penerapan AI di kelas inklusif, kesiapan kelembagaan perguruan tinggi, serta pertimbangan etis dan nilai-nilai keagamaan yang menyertai penggunaan teknologi tersebut. Kajian ini merekomendasikan penguatan literasi AI dan pendidikan inklusif secara terintegrasi dalam kurikulum PGSD, disertai penguatan dukungan kelembagaan, agar calon guru sekolah dasar siap memanfaatkan AI secara bijak, adaptif, etis, dan berpihak pada keberagaman peserta didik.

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1. Introduction

The digital transformation in education has driven the integration of artificial intelligence (AI) technology into various levels of education, including elementary schools. Various studies have shown that the application of AI in elementary school learning can assist teachers in developing teaching materials, providing faster feedback, and creating more innovative learning experiences through platforms such as Quizizz, Diffit AI, and Gemini AI based on Augmented Reality (Tuningsih & Wahyuningsih, 2025; Punggeti & Prijambodo, 2026). The acceleration of this technology adoption is also driven by the urgency of mastering information technology for prospective elementary school teachers in building a learning ecosystem that is more modern and relevant to the needs of the current generation of students (Gotama & Muliastrini, 2026).

On the other hand, the complexity of elementary school classes, which contain diverse characteristics and learning needs of students, demands an inclusive approach. Therefore, the use of technology must not ignore the principle of fulfilling the right to learn for all students, including children with special needs. Inclusive education is a policy mandate that affirms that every child, regardless of physical, intellectual, social, or emotional conditions, has the right to receive a decent education in regular schools (Hanifah, 2023). However, the implementation of inclusive education in the field still faces various challenges, ranging from teachers' limited understanding of the needs of children with special needs, the lack of adaptive learning media, to the limited role of mentors such as shadow teachers who ideally help students build accurate self-awareness in their learning process (Astutik, 2026).

In this context, AI is beginning to be viewed as a potential tool to bridge this gap. Several studies have shown that digital technologies, including those based on artificial intelligence, can be a bridge to equal access to learning, for example through text-to-speech conversion technology for visually impaired students (Martiningsih, 2023), STEAM-based learning approaches that accommodate diverse learning styles (Hermawan et al., 2024), and adaptive learning systems that have been empirically proven to improve student learning outcomes and motivation (Respati, 2026). Mapping research trends on augmented reality technology in elementary school learning even explicitly directs its orientation toward equity in inclusive education in Indonesia (Salsabila, 2026), indicating that this issue is not merely discourse but has become a direction for the development of research and practice in elementary education going forward.

Elementary School Teacher Education (PGSD) students, as future educators, play a key role in determining the future use of AI in elementary school classrooms. PGSD students' perceptions of AI will also determine the extent to which the technology will be wisely adopted and integrated with the principles of inclusive education. Several studies have shown that PGSD students generally have a positive attitude toward the use of AI in learning (Muhaimin, 2024; Chaerani et al., 2025; Putri, 2025), but few studies have specifically linked these perceptions to the context of inclusive education in elementary schools. A comprehensive understanding of these two issues is crucial for AI utilization in elementary schools to be oriented not only toward efficiency and innovation but also toward student diversity.

This issue is becoming increasingly relevant given that the use of AI in education is not without risks. Several studies warn that the use of AI without adequate digital literacy and critical thinking has the potential to degrade the quality of learning, even implicating the moderation of values and attitudes in the classroom if teachers do not play an active role as mentors (Hastutiningrum, 2026). Therefore, studies on elementary school teacher education students' perceptions of AI need to be placed within a broader framework, one that looks not only at technical benefits but also at the ethical, social, and institutional readiness aspects that accompany it.

Based on the description, this article is compiled to examine four main points, namely: (1) how are the general perceptions of PGSD students regarding the use of AI in learning and the factors that shape them; (2) how PGSD students view the potential of AI in supporting inclusive education in elementary schools, including as a tool for differentiation and personalization of learning; (3) what challenges and gaps arise between these positive perceptions and the conceptual, technical, ethical, and institutional readiness of PGSD students in integrating AI into inclusive learning; and (4) what are the implications of these findings for strengthening the curriculum and competencies of PGSD students in the future. This study is expected to provide a conceptual contribution to the development of a PGSD curriculum that is responsive to technological developments while supporting the principle of education for all.

2.Research Method

This article was compiled using a descriptive-analytical literature review approach. Source searches were conducted through online academic databases such as Google Scholar and higher education institution repositories, using a combination of keywords "perceptions of PGSD students," "use of AI in learning," "inclusive education in elementary schools," and "children with special needs." From hundreds of initial search results, a staged selection was carried out based on inclusion criteria, namely: (1) published between 2021 and 2026; (2) relevant to one or more of the three main research themes, namely perceptions of PGSD students, use of AI in

learning in elementary schools, and inclusive education; and (3) originating from sources whose credibility can be traced, whether in the form of journal articles, proceedings, book chapters, or theses/dissertations published openly.

Based on these criteria, more than thirty sources were selected as the primary analytical material in this study. These sources were then analyzed thematically to identify patterns, similarities, and differences in findings across sources. The thematic analysis process was carried out by grouping the findings into several broad categories: general perceptions of AI, factors shaping perceptions, the potential of AI for inclusive education, perceptions of children with special needs, challenges and gaps between perceptions and practices, ethical dimensions, and institutional readiness. The results of these groupings were then synthesized into a structured discussion in the results and discussion sections, while still considering the context and limitations of each source, which generally consisted of case studies, literature reviews, or community service activities at a specific institutional scale. Therefore, generalization of the findings requires caution.

3. Results and Discussion

a. General Perception of Elementary School Teacher Education Students on the Use of AI in Learning

In general, the literature review results indicate a tendency towards positive perceptions from PGSD students towards the presence of AI in the learning process. Chaerani et al. (2025) in their study of PGSD students found that the majority of students viewed AI, particularly ChatGPT, as a tool that facilitates the learning process, although they also recognized the need for caution in its use. Similar findings were expressed by Muhaimin (2024) who emphasized that students have a positive attitude towards AI but still need to strengthen their understanding so that its use is more optimal and responsible. This is reinforced by Putri (2025) who found that PGSD students' perceptions of the use of the ChatGPT platform as an interactive learning resource were in the positive category on average in the aspects measured, ranging from ease of access to the relevance of the resulting material.

This positive perception is also supported by a study by Wildaniah et al. (2026), which found that ChatGPT was considered effective as a learning co-facilitator in a hybrid learning model, particularly in aiding understanding of the material. Febrianty et al. (2025) also highlighted the impact of ChatGPT on students' thinking skills, while also reminding them of the importance of maintaining non-technical skills such as communication and collaboration so that they are not eroded by dependence on AI. Meanwhile, Divani et al. (2026) found that the AI literacy of PGSD students in facing the transformation of 21st-century education was also influenced by their perceptions of the benefits and ease of use of the technology. In fact, a survey of PGSD students reported by Ananda et al. (2025) showed that the majority of prospective teachers believed in the importance of integrating AI-based technology into the future elementary education curriculum.

From these findings, it can be concluded that primary school teacher education students are generally optimistic about the benefits of AI in learning, particularly in terms of efficiency, personalized content, and strengthening conceptual understanding. However, this optimism needs to be balanced with a critical understanding of the limitations and ethical implications of AI use in the context of primary education, as will be further outlined in the following section.

b. Factors that Shape PGSD Students' Perceptions of AI

Primary school teacher education students' positive perceptions of AI are not formed singly, but are influenced by a number of interrelated factors. Pamuti et al. (2025) through research on hundreds of students, including 137 prospective elementary school teachers, identified that perceptions of AI use are shaped by six main aspects: the variety of tools or applications used, intensity of use, effectiveness, ease of use, academic environmental support, and ethical awareness in its use. These findings reinforce the view that perceived ease of use and perceived usefulness are the two main determinants driving student acceptance of new technologies, in line with the findings of Respati (2026) who emphasized that perceived ease of use of AI-based adaptive learning systems correlates with increased learning motivation.

Academic support is also a significant determinant. Sakti et al. (2024), through a systematic literature review on the influence of ChatGPT on the learning process, found that the effectiveness of AI utilization can be hampered if it is not supported by institutional policies or an adequate understanding of ethical use among students. Therefore, strengthening positive perceptions of AI cannot be separated from the role of universities in providing clear usage guidelines, adequate supporting facilities, and a space for critical discussion regarding the ethical limitations of using this technology in the context of elementary school teacher education.

c. The Potential of AI in Supporting Inclusive Education in Elementary Schools

Several studies have shown that implementing AI in elementary schools has the potential to expand access and quality of learning for students with diverse needs. Inzaghi et al. (2024) emphasized that AI can support the creation of a more modern and inclusive education, one example being the use of AI-based educational games that help students understand the subject matter. Tuningsih and Wahyuningsih (2025), through

mentoring activities with elementary school teachers, found that the use of applications such as Quizizz and Diffit AI can encourage more innovative and inclusive learning, as teachers can adjust the difficulty level of the material to suit students' needs.

Similar potential is also reflected in the mentoring activities utilizing Gemini AI as a generic prompt in the creation of Augmented Reality (AR)-based teaching materials in elementary schools (Punggeti & Prijambodo, 2026), which aligns with the mission of supporting more inclusive education through more concrete visualization of materials for students with different learning styles. In line with that, mapping of augmented reality research trends in science learning in elementary schools shows that AI-based adaptive learning technology is able to analyze individual student learning needs, so that research in this field is explicitly directed at achieving inclusive educational equity (Salsabila, 2026). Azzahra et al. (2026) also added that AI pedagogically has the potential to support innovative learning as well as the development of creative thinking skills in elementary school students, which is one of the important 21st-century competencies for all students without exception.

More specifically, Martiningsih (2023) highlighted the use of e-Pub technology as a learning support medium for people with visual impairments, demonstrating that digital technologies, including those based on artificial intelligence, can bridge the gap in equal access to learning. Similarly, the STEAM approach, integrated with the role of millennial educators, is also seen as a strategy for building a more inclusive future for education (Hermawan et al., 2024). These findings indicate that AI has significant potential for use as a learning differentiation tool, ranging from adjusting the difficulty level of material, converting the format of teaching materials to suit students' sensory needs, to visualizing abstract concepts more concretely.

d.AI as a Tool for Differentiation and Personalization of Learning in Elementary Schools

In addition to its general function as a tool, AI is also beginning to be utilized more specifically by PGSD students to design differentiated teaching materials. Amalia (2026) found, through a case study of PGSD students, that AI has significant potential to support student processes, perceptions, and reflections in developing balanced literacy teaching materials tailored to the needs and reading abilities of diverse students. This demonstrates that AI functions not only as a passive source of information but also as an active partner for student teachers in designing more personalized and contextual learning strategies.

The use of AI-based digital platforms in elementary school learning was also highlighted by Siahaan et al. (2026), who emphasized that AI can be a solution for prospective elementary school teachers in providing more varied and responsive learning to students' needs. In the realm of community service, the program to strengthen elementary school teachers' competencies in game-based learning through campus-based PKM KKN activities also showed that the integration of educational game technology, some of which have utilized elements of artificial intelligence, also supports the development of more inclusive education at the elementary school level (Maksum et al., 2026). This series of findings emphasizes that the potential of AI in supporting learning differentiation is not only limited to the concept level, but is beginning to be realized in various real practices, both by elementary school teacher education students in lectures and by teachers in mentoring and community service activities.

d. Perceptions of Children with Special Needs and Readiness to Support Inclusion

In addition to perceptions of AI, PGSD students' understanding of children with special needs is also a crucial factor in determining the success of technology integration in inclusive education. Amalia (2022) found that prospective elementary school teacher students' perceptions of children with special needs in the context of inclusive schools were heavily influenced by their experiences in Inclusive Education courses, where students who had taken these courses tended to have more positive understandings and attitudes. Hanifah (2023) also emphasized that inclusive education requires the readiness of all stakeholders, including prospective teachers, to provide equal learning opportunities for children with special needs in regular schools.

The mentoring dimension also received significant attention in this study. Astutik (2026) emphasized that the role of shadow teachers in mentoring children with special needs needs to be directed so that children are able to build an accurate perception of themselves, while also viewing their surroundings, including teachers and peers, as partners who support their existence, not as parties who discriminate. This view is relevant to the findings of Utami and Nofrianni (2026) who emphasized that the role of interactive learning, including that utilizing educational robotics and artificial intelligence, can complement each other in building inclusive education that changes social perceptions of children with special needs in a more positive way. Ristanti et al. (2026) also added that the successful implementation of inclusive education in elementary schools depends not only on teacher readiness, but also on the wider community's perception of children with special needs and the involvement of the local community in supporting their education process.

These three findings suggest that strengthening primary school teacher education students' positive perceptions

of AI needs to be accompanied by a stronger understanding of the characteristics and needs of children with special needs, whether through formal lectures, direct mentoring experiences, or increased social support from the surrounding environment. Without an adequate understanding of inclusive education, AI's potential as a tool for differentiated learning risks being underutilized and even misapplied in the classroom.

e. Challenges and Gaps between Perception and Practice Readiness

Despite the generally positive perception, several studies have revealed a gap between perceptions and practical readiness in utilizing AI for inclusive education in elementary schools. Putri (2026) explicitly found a striking gap between the perceptions of teachers and prospective teachers and the actual practice of using AI in the classroom, even though AI is seen as having the potential to support inclusive education at the elementary school level. This gap is further reinforced by the findings of Mulyani and Suriansyah (2026) who highlighted various challenges to implementing AI in elementary school learning, including among elementary school teacher education students, such as limited access to infrastructure, minimal training, and concerns about the accuracy and ethics of AI use. Irnaeni's (2025) findings, through her thesis research on elementary school teachers in Semarang City, also confirmed that positive teacher perceptions of AI are not always followed by consistent concrete actions in utilizing it in the classroom, indicating obstacles at the implementation level even though attitudes toward the technology have been formed.

Another emerging issue is the shift in pedagogical roles between teachers and generative AI. Agustang and Massuanna (2026) critically examined how pedagogical control, from planning to implementing learning, is beginning to be distributed between teachers and generative artificial intelligence, including in the context of inclusive education. The study found that students' perceptions of this division of control varied depending on the subject and the learning context, necessitating clarity regarding the extent to which AI can replace or merely assist teachers, particularly in pedagogical decision-making for students with special needs. These gaps highlight that PGSD students' positive perceptions of AI do not necessarily equate to their conceptual, technical, or ethical readiness to apply it to inclusive learning.

f. Ethical and Responsible Dimensions in the Use of AI in the Classroom

In addition to technical challenges, the use of AI in learning also requires adequate ethical awareness from PGSD students as future educators. Hastutiningrum (2026) warns that uncontrolled use of AI has the potential to cause a degradation in the quality of learning and has implications for the moderation of students' religious values and attitudes in the classroom. Therefore, strengthening digital literacy, critical thinking skills, and strengthening the role of teachers as moral and spiritual guides is necessary to ensure that the use of AI remains within educational corridors. This view is relevant to the context of inclusive education, where pedagogical decisions regarding students with special needs cannot be completely left to automated systems without consideration of values and human empathy from teachers.

This ethical awareness is also reflected in the findings of Sakti et al. (2024) who highlighted the importance of considering students' perceptions of the ethics of using AI in education, given that easy access to generative technology has the potential for misuse if not balanced with a clear understanding of academic boundaries. Febrianty et al. (2025) also emphasized the importance of maintaining non-technical skills such as communication and collaboration in students so that they are not eroded by excessive reliance on AI. Thus, strengthening the ethical dimension needs to be placed as an integral part of strengthening AI literacy for PGSD students, especially in the context of inclusive learning that demands high sensitivity to the diverse needs and dignity of each student.

g. Institutional Readiness and Support for the PGSD Higher Education Ecosystem

Strengthening the perception and competence of elementary school teacher education students towards AI cannot be separated from the active role of higher education institutions in providing a supporting ecosystem. Gotama and Muliastrini (2026) emphasized the urgency of mastering information technology, including AI, for prospective elementary school teachers in building a more modern learning ecosystem, which needs to be facilitated through relevant curricula and lecture programs. A mentoring activity on the use of Canva AI for teachers in designing teaching media showed that increasing knowledge, skills, and positive perceptions of AI can be achieved effectively through a structured mentoring program, which has the potential to be replicated in the provisioning program for elementary school teacher education students before entering the field (Alqadri et al., 2025).

At a broader curricular level, adaptive curriculum design that is responsive to social and technological changes is an urgent need, given that elementary schools are required to integrate AI into daily learning practices without ignoring the perception gap between schools and the community regarding the purpose of education itself (Afnanda et al., 2026). The idea of a technology-based transformation of the educational ecosystem is also echoed in the concept of EdTech 5.0, which highlights the importance of adaptive learning systems based on data analysis to support the personalization of the learning process as a whole, including at the elementary education level

(Setiawan et al., 2026). This series of findings confirms that the readiness of PGSD students to utilize AI for inclusive education cannot stand alone but needs to be supported by institutional readiness that includes curriculum, mentoring programs, and institutional policies that support responsible technology integration.

h. Implications for Strengthening the Curriculum and Competencies of PGSD Students

Based on the synthesis of the findings above, there are several important implications for curriculum development and strengthening the competencies of PGSD students. First, there is a need for the integration of AI literacy and inclusive education materials simultaneously in education courses, so that students not only understand the technical workings of AI, but are also able to assess its relevance and ethical limitations in the context of student diversity, in line with the findings of Divani et al. (2026) regarding the importance of AI literacy in facing the transformation of 21st-century education. Second, field experience programs or teaching practices for PGSD students need to provide space for direct exploration of the use of AI-based applications that have been proven to support learning differentiation, such as platforms for creating adaptive teaching materials, learning format conversion media for students with special needs, or mentoring with shadow teachers in inclusive schools.

Third, universities that administer PGSD programs need to provide ethical guidelines and ongoing training on the use of AI that supports the principles of inclusive education, as exemplified by various mentoring and community service programs that have been proven effective in increasing the knowledge and positive perceptions of prospective teachers (Alqadri et al., 2025; Maksum et al., 2026). Fourth, periodic evaluation and updating of the PGSD curriculum is a necessity to remain responsive to technological developments and social needs, in line with the idea of adaptive curriculum design (Afnanda et al., 2026) and the vision of a future technology-based learning ecosystem (Setiawan et al., 2026). With these four steps, the gap between positive perceptions and practical readiness identified in various studies can be minimized from the time of prospective teacher education, so that PGSD graduates are truly ready to become agents of change in realizing innovative and inclusive basic education.

4.Conclusion

This literature review shows that elementary school teacher education students generally have a positive perception of the use of AI in learning, shaped by factors such as ease of use, effectiveness, academic support, and ethical awareness. Elementary school teacher education students also view AI as having great potential to support inclusive education in elementary schools, both as a tool for personalizing materials, differentiating learning, converting teaching materials, and using augmented reality-based concept visualization tools that can accommodate diverse learning styles and needs of students, including children with special needs.

However, this positive perception has not been fully balanced by an adequate conceptual understanding of inclusive education, technical readiness to implement AI in diverse classrooms, ethical and spiritual awareness in its use, or adequate institutional support from universities that administer PGSD programs. This gap between perception and practical readiness has been consistently found across various research contexts, from university students to teachers already serving in the field, confirming that this problem is structural and requires systematic intervention, not just a short-term technical solution.

Therefore, strengthening the integration of AI literacy and inclusive education into the PGSD curriculum, along with strengthening institutional support in the form of ethical guidelines, mentoring programs, and adaptive curriculum updates, is a strategic step that needs to be taken immediately. This way, prospective elementary school teachers can utilize AI wisely, adaptively, ethically, and in line with the principle of education for all. Further field research specifically measuring PGSD students' perceptions and readiness regarding the intersection of these two issues, both through broad-scale quantitative approaches and in-depth qualitative studies, is still urgently needed to strengthen and expand the conceptual findings generated in this study.

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