

THE ROLE OF ARTIFICIAL INTELLIGENCE IN SUPPORTING SOCIAL INCLUSION AND ENGAGEMENT IN SCHOOL LIFE AMONG PRIMARY EDUCATION STUDENTS

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Abstract: *Artificial intelligence is increasingly used in primary education to support accessibility, participation, and personalized learning. This study examines its perceived role in promoting social inclusion and engagement in school life among primary education students. A questionnaire was designed for primary school teachers and included Likert-scale items and open-ended questions. The study involved 60 primary school teachers who completed a questionnaire consisting of Likert-scale items and open-ended questions. The results suggest that AI may support students with learning, communication, or language difficulties and may increase participation in classroom activities. However, teachers expressed concerns about unequal access, data privacy, inaccurate content, excessive dependence on technology, and reduced human interaction. The study concludes that AI can contribute to inclusive education when it is used responsibly, under teacher supervision, and as a complement to human relationships.*

Keywords: *artificial intelligence; social inclusion; school engagement; primary education; teacher perceptions*

Theoretical foundation

Artificial intelligence is becoming increasingly present in education through adaptive learning platforms, automated feedback, translation applications, accessibility tools, and systems that generate text, images, or learning activities. In primary education, these technologies can help teachers adapt learning materials and provide students with different ways of accessing information. They may also offer additional support to children who need simplified explanations, repeated practice, or

alternative forms of communication. However, the educational value of AI depends on the way it is integrated into teaching and on the extent to which it responds to students' real needs (Miao & Holmes, 2023).

Social inclusion involves more than the physical presence of students in the same classroom. It refers to their ability to participate in lessons, communicate with others, contribute to shared activities, and feel accepted as members of the school community. During primary education, these experiences are particularly important because children develop their confidence and sense of belonging through daily interactions with teachers and classmates. When students experience repeated difficulties or feel excluded from common activities, their motivation and participation may gradually decrease.

Artificial intelligence may contribute to inclusion by reducing some of the barriers encountered by students with different educational needs. Text-to-speech applications can support children with reading difficulties, while speech-to-text tools may help those who find handwriting or written expression challenging. Translation systems can assist students who are still learning the language of instruction. Visual prompts, automated captions, and adapted digital interfaces may also improve access for students with sensory or communication difficulties. Research on AI in inclusive education suggests that these technologies can improve accessibility and make learning experiences more responsive to individual needs (Melo-López et al., 2025).

AI may be particularly useful for students with special educational needs. Adaptive systems can modify the pace, format, or difficulty of an activity and provide additional explanations when required. Assistive technologies may also help students communicate and participate more independently. Nevertheless, the available evidence remains limited, and many applications have not yet been studied over long periods or in different school contexts. AI should therefore be used carefully and should support, rather than replace, the assistance provided by qualified teachers and specialists (Linsenmayer, 2025).

The connection between AI and inclusion can also be explained through the principles of Universal Design for Learning. This framework encourages teachers to offer several ways of presenting information, engaging students, and allowing them to demonstrate their knowledge. AI can contribute to these principles by transforming written content into audio, simplifying a difficult explanation, generating visual support, or allowing students to respond through different formats. The latest Universal Design for Learning guidelines also emphasize learner agency and the removal of barriers created by bias and systems of exclusion (CAST, 2024).

School engagement is another central concept of the present study. It includes behavioral, emotional, and cognitive dimensions. Behavioral engagement refers to participation in lessons, learning activities, and the wider life of the school. Emotional engagement concerns students' feelings toward teachers, classmates, learning, and school. Cognitive engagement involves curiosity, concentration, effort, and persistence when completing a task (Fredricks et al., 2004).

AI may influence all three dimensions. Interactive activities, accessible instructions, and immediate feedback may encourage students to participate more actively. Personalized assistance may reduce frustration and help children experience progress. Alternative explanations and examples may also stimulate curiosity and support sustained effort. However, time spent using a digital application does not necessarily represent genuine engagement. Meaningful engagement requires students to understand the purpose of an activity, make decisions, and connect their work with broader learning experiences.

Self-determination theory provides another useful perspective. According to Ryan and Deci (2017), students' motivation is supported when their needs for autonomy, competence, and relatedness are fulfilled. AI may strengthen autonomy by offering choices and different ways of completing a task. It may support competence through adapted exercises and immediate feedback. Relatedness, however, depends mainly on meaningful relationships with teachers and classmates. AI can facilitate communication, but it cannot replace friendship, empathy, cooperation, or genuine recognition from another person.

Recent research indicates that primary school students are interested in AI but may have incomplete or unrealistic ideas about its capabilities. Students often associate AI with familiar technologies while finding it difficult to understand how these systems produce their answers. This highlights the importance of introducing age-appropriate AI literacy in primary education (Walan, 2025). A systematic review of AI literacy education in primary schools also shows that students can develop knowledge, creativity, problem-solving abilities, and interest in technology when AI is taught through practical and collaborative activities. Nevertheless, the field is still developing, and the number of empirical studies focused specifically on primary education remains relatively small (Yim & Su, 2025).

AI literacy should include more than learning how to operate an application. Children should understand that AI-generated information may be inaccurate, incomplete, or biased. They should learn to verify important information, protect personal data, and recognize the difference between their own contribution and automatically generated

content. Critical use is especially important because younger students may accept a convincing answer without questioning its accuracy.

The educational use of AI also raises concerns about equity. Not all students have equal access to devices, internet connections, accessible applications, or adult assistance. AI systems may also reproduce stereotypes or provide poorer results for languages and social groups that are insufficiently represented in their training data. These problems may intensify existing forms of educational disadvantage instead of reducing them. Research on AI, equity, and inclusion therefore emphasizes the need for equal access, transparent systems, teacher training, and careful evaluation of possible bias (Varsik & Vosberg, 2024).

Similar concerns have been identified in studies of technology-supported education for minority students. Although AI can offer personalized feedback and improve access to learning, its benefits depend on cultural relevance, appropriate infrastructure, and the ability of teachers to integrate technology into inclusive educational practices. Without these conditions, technological innovation may create new barriers for students who are already at risk of exclusion (Salas-Pilco et al., 2022).

The teacher consequently remains central to the responsible use of AI in primary education. Teachers must decide whether a tool is accurate, accessible, safe, and appropriate for the students' age. They must review generated materials and protect students' privacy. They must also ensure that personalized technological support does not isolate a child from classmates or reduce participation in shared activities.

AI can therefore support social inclusion and school engagement when it improves accessibility, strengthens students' confidence, and creates new opportunities for participation. Its contribution is not automatic. Positive outcomes depend on equitable access, age-appropriate AI literacy, teacher supervision, ethical safeguards, and the preservation of meaningful human relationships.

Research

The empirical component of the study was based on a questionnaire administered to primary school teachers. The purpose of the research was to examine teachers' perceptions of the role of artificial intelligence in supporting students' social inclusion and engagement in school life.

The study involved 60 primary school teachers from eight schools located in urban and rural areas. Of the participants, 42 worked in urban schools and 18 in rural schools. Their teaching experience ranged from 2 to 31 years, with an average professional experience of

14.6 years. The questionnaire was administered between February and March 2026.

The research instrument included 20 closed-ended items and three open-ended questions. The closed-ended items were measured on a five-point Likert scale, ranging from 1, strongly disagree, to 5, strongly agree.

The questionnaire examined teachers' perceptions of accessibility, classroom participation, motivation, communication, perceived competence, peer interaction, school belonging, and teacher supervision. It also investigated concerns related to unequal access to technology, inaccurate content, data privacy, excessive dependence on digital tools, and reduced human interaction.

Several questions focused on the usefulness of AI-supported tools for students with learning difficulties, communication needs, or limited proficiency in the language of instruction. Teachers were also asked whether AI could increase students' willingness to participate, improve their confidence, and make classroom tasks easier to understand.

The open-ended questions invited participants to describe situations in which AI could support inclusion and engagement. They were also asked to identify the main risks associated with its use and the conditions required for responsible implementation in primary education.

The questionnaire was distributed online through a secure digital form. School principals and teacher coordinators shared the invitation with primary school teachers. Participation was voluntary, and all respondents were informed about the purpose of the study before completing the questionnaire.

The questionnaire did not request names, contact details, or information that could identify individual students, teachers, or schools. The collected data were used only for research purposes.

The quantitative data were analyzed using descriptive statistics. Frequencies, percentages, mean scores, and standard deviations were calculated for the main questionnaire dimensions. The answers to the open-ended questions were examined through thematic analysis. Recurrent ideas were identified and grouped into broader categories related to educational benefits, ethical concerns, and implementation conditions.

The research aimed to determine how primary school teachers evaluate the contribution of artificial intelligence to accessible learning, student participation, communication, motivation, and school belonging. It also sought to identify the main factors that may encourage or limit the responsible use of AI in primary education.

Results

The analysis showed that most teachers had a generally positive perception of the role of artificial intelligence in supporting students' participation and access to learning. The highest mean score was recorded for the use of AI in adapting learning materials to students' individual needs, with a mean of 4.32 and a standard deviation of 0.68. A total of 81.7% of the respondents agreed or strongly agreed that AI could make educational content more accessible.

Teachers also considered AI useful for students with learning difficulties. This dimension obtained a mean score of 4.18, while 78.3% of the participants believed that AI-supported tools could help students understand instructions and complete classroom tasks more independently.

The use of translation, speech-to-text, and text-to-speech applications was evaluated positively. A total of 75% of the respondents considered these tools helpful for students with language, reading, or communication difficulties. The mean score for this item was 4.10, with a standard deviation of 0.74.

The results also indicated a positive relationship between AI use and classroom participation. Approximately 73.3% of the teachers agreed that interactive and personalized activities could increase students' willingness to become involved in lessons. The mean score for this dimension was 4.05.

A slightly lower score was obtained for the influence of AI on student motivation. The mean was 3.87, and 68.3% of the teachers agreed that immediate feedback and adapted tasks could encourage students to continue working. Some respondents noted that the motivational effect depended on the quality of the activity and on the teacher's guidance.

Teachers were more cautious when evaluating the contribution of AI to peer interaction. Only 51.7% of the participants agreed that AI-supported activities could improve cooperation among students. The mean score was 3.42. Several respondents considered that technology could support group work when it was integrated into collaborative tasks, but they also warned that excessive individual use might reduce direct communication.

A similar pattern was observed in relation to school belonging. The mean score for this dimension was 3.38. While 48.3% of the teachers believed that AI could help some students feel more confident and included, 30% selected a neutral response. This suggests that teachers viewed school belonging as being influenced mainly by human relationships rather than by technology alone.

Teacher supervision received one of the highest levels of agreement. A total of 91.7% of the respondents considered that AI should be used

only under the guidance of a teacher. The mean score was 4.67, with a standard deviation of 0.52. Most participants believed that teachers should verify generated content and decide whether the tool was appropriate for the students' age and needs.

The respondents also expressed concerns about the risks associated with AI use. Data privacy was identified as the most important concern, with 86.7% of the teachers agreeing that children's personal information required stronger protection. The mean score for this item was 4.53.

Inaccurate or inappropriate content was another major concern. A total of 83.3% of the participants believed that primary school students might have difficulty recognizing false information generated by AI. The mean score was 4.47.

Unequal access to devices and digital resources was mentioned by 80% of the respondents. Teachers from rural schools expressed this concern more frequently than those working in urban schools. They noted that limited internet access and insufficient equipment could prevent some students from benefiting from AI-supported activities.

Excessive dependence on technology also received a high level of agreement. Approximately 76.7% of the participants believed that frequent use of AI could reduce students' ability to work independently. The mean score for this dimension was 4.12.

The responses to the open-ended questions supported the quantitative findings. Teachers most frequently mentioned adapted materials, translation, additional explanations, and support for students with learning difficulties as important benefits. They also referred to increased confidence among students who were reluctant to speak or who needed more time to complete tasks.

The main concerns identified in the open-ended responses were privacy, inaccurate information, unequal access, reduced effort, and limited interaction with classmates. Several teachers emphasized that AI should not complete tasks on behalf of students.

The respondents also identified several conditions for responsible implementation. These included teacher training, age-appropriate applications, clear school rules, parental information, secure platforms, and continuous verification of AI-generated content.

Overall, the results suggest that teachers perceived AI as most useful for accessibility, differentiated learning, and classroom participation. Its contribution to peer relationships and school belonging was evaluated more cautiously. The findings also show that teachers considered human supervision essential and recognized the need for strong ethical and educational safeguards.

Conclusions

The findings indicate that artificial intelligence can support social inclusion and engagement in school life among primary education students, especially when it is used to improve accessibility, adapt learning materials, and provide additional support for children with different educational needs.

Teachers perceived AI as particularly useful for students with learning, language, reading, writing, or communication difficulties. Tools such as text-to-speech, speech-to-text, translation, and adaptive learning applications may help students understand tasks, participate more actively, and work with greater confidence.

The results also suggest that AI may contribute to behavioral and cognitive engagement. Personalized activities, immediate feedback, and accessible explanations can encourage students to become more involved in classroom tasks and to continue working when they encounter difficulties.

However, the contribution of AI to peer interaction and school belonging was evaluated more cautiously. These aspects depend mainly on direct relationships with teachers and classmates. Technology may support cooperation, but it cannot replace empathy, friendship, recognition, and shared experiences.

The study also identified several important concerns. Data privacy, inaccurate content, unequal access to technology, excessive dependence, and reduced human interaction may limit the educational benefits of AI. These risks are particularly relevant in primary education because younger students may not fully understand how AI systems work or how their personal information is used.

Teacher supervision emerged as an essential condition for responsible implementation. Teachers should verify generated content, select age-appropriate tools, and decide when AI is suitable for a particular activity. They should also ensure that technological support does not isolate students or reduce their opportunities for collaboration.

The responsible use of AI requires clear school policies, secure digital platforms, teacher training, parental information, and age-appropriate AI literacy. Students should learn to question generated information, protect personal data, and recognize the difference between their own work and content produced by a digital system.

Overall, artificial intelligence should be viewed as a complementary educational resource. Its role is to support participation, accessibility, and differentiated learning, not to replace teachers or human relationships.

The study concludes that AI can contribute to more inclusive and engaging primary school environments when it is used carefully,

ethically, and under constant human guidance. Its success depends less on the technology itself and more on the way schools integrate it into meaningful, collaborative, and student-centered learning experiences.

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