The Role of AI as a Communication Mediator in the Learning Process

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Abstract
The development of Artificial Intelligence (AI) has brought significant changes to digital learning practices, particularly in the way educational communication takes place. This study aims to examine the role of AI as a communication mediator in the learning process through a synthesis of Scopus-indexed scientific literature. This study uses a literature review approach by analyzing 40 scientific articles discussing the use of AI in education, including generative AI, educational chatbots, intelligent tutoring systems, pedagogical agents, and social robots. The analysis was conducted thematically to identify patterns of AI's role in mediating learning communication. The results show that AI acts as a communication mediator through four main functions: (1) an instructional dialogue mediator that facilitates two-way interaction and cognitive scaffolding; (2) a feedback and learning regulation mediator that provides instant and dialogic responses; (3) a mediator of social and collaborative communication that supports group interaction and inclusive learning; and (4) a mediator of personalized learning communication that tailors the style and content of interactions based on learners' needs. These findings confirm that AI functions not only as a technological tool but also as a non-human communicative actor that shapes the structure, meaning, and dynamics of pedagogical communication. This research contributes to the development of educational communication studies by offering a conceptual perspective on AI as a communication mediator in learning. Its practical implications include the importance of pedagogical and ethical design in AI integration so that the communication mediation role performed by AI is aligned with educational goals and values.
Keywords: artificial intelligence, educational communication, communication mediator, digital learning, literature review

INTRODUCTION

Digital transformation has changed the way communication takes place in learning—no longer just a linear lecturer-student relationship, but an ecosystem of interactions mediated by platforms, data, and intelligent systems. In this context, Artificial Intelligence (AI) is increasingly prominent not merely as a "tool," but as an active communication mediator: AI connects messages, shapes dialogue structures, provides feedback, regulates turn-taking, personalizes responses, and even influences how learners interpret instructions and construct understanding. The increased use of generative AI (e.g., ChatGPT), educational chatbots, intelligent tutoring systems (ITS), pedagogical agents, and social robots marks an important shift: pedagogical communication is not only managed by humans, but also shaped by non-human agents that interact in a conversational, adaptive, and contextual manner (Deng et al., 2025; Okonkwo & Ade-Ibijola, 2021; Graesser et al., 2005; Belpaeme et al., 2018).

Historically, learning studies have focused on the effectiveness of instructional strategies, the quality of interactions, and feedback as determinants of learning outcomes. However, when AI is introduced as a mediator, the key question shifts: how does AI change the educational communication process itself? Systems such as AutoTutor show that mixed-initiative dialogue can encourage knowledge elaboration through structured questions and answers, so that students do not simply receive information but are "guided" to develop reasoning (Graesser et al., 2005). The efficiency of dialogue

and the quality of information exchange have also been shown to impact the tutoring process and comprehension, especially when interactions are designed so that student responses are processed into relevant feedback (Kopp et al., 2012; Graesser et al., 2004). In other words, AI acts as a mediator that regulates the flow of communication (e.g., prompting, scaffolding, correction, clarification), so that learning communication becomes more structured, responsive, and potentially personalized.

The next development expands the role of AI mediators through chatbots. A systematic review shows that chatbots are used for academic services, material exercises, tutoring, and self-directed learning support with strengths in 24/7 availability, quick responses, and the ability to facilitate consistent communication (Okonkwo & Ade-Ibijola, 2021; Kuhail et al., 2023). In online learning, scaffolding-based chatbots such as *Sara, the Lecturer,* confirm that conversation agents can structure learning support, help reduce confusion, and increase engagement in online classes (Winkler et al., 2020). Chatbots are also beginning to be used to strengthen collaborative learning, not only by answering questions, but also by sparking discussions, reminding students of group assignments, and facilitating the coordination of learning activities (Kılıçkaya, 2025). In simulation-based learning spaces, the integration of dialogue systems with ITS for 3D procedural training indicates that AI mediators can bridge technical instruction and immersive learning experiences, while optimizing instructional communication in virtual environments (Paladines, 2023).

The emergence of **generative AI** reinforces the mediating dimension of communication because AI responses are no longer just "templates," but can take the form of explanations, examples, revisions, and natural-looking dialogues. A recent meta-analysis of ChatGPT use in experimental studies shows considerable attention to the impact of generative AI on learning outcomes, indicating significant potential while also demanding caution in pedagogical design (Deng et al., 2025). In the context of language, the design of ChatGPT-mediated feedback activities in EFL learning highlights that AI can take on the role of a "partner" in the revision and reflection process, so that feedback communication does not only come from lecturers, but also through iterative student-AI interactions (Zhang, 2025). In fact, the chatbot-based *learning-by-teaching* approach shows how AI can facilitate pedagogical communication strategies that encourage learners to re-explain material, build arguments, and strengthen understanding through teaching practice (Empowering Learners, 2024). At this point, AI becomes a mediator that orchestrates learning communication—shifting the communication pattern from one-way to multi-source dialogue.

However, the effectiveness of AI as a communication mediator cannot be separated from the psychological and social aspects of educational communication. Studies on pedagogical agents show that the conversational style brought by agents can enhance certain learning experiences—such as a sense of closeness, attention, or clarity of instructions—but the results depend on message design, context, and learning objectives (Lin et al., 2020). In terms of equity, "friendly" virtual instructors designed with certain characteristics can also influence the engagement of groups that have been underrepresented in STEM, indicating that AI mediation is not neutral; it carries social implications in learning communication (Krämer et al., 2016). Furthermore, the factor of trust is crucial: perceptions of virtual humans can change due to trust levels, although an increase in positive perceptions does not always correlate with an increase in learning outcomes (Schroeder et al., 2021). This confirms the gap between "convincing communication" and "communication that truly supports learning"—a challenge that is relevant when AI acts as a mediator.

Furthermore, social robots exhibit the most "visible" form of communication mediation because robots are present as social entities in the classroom. A review of educational robots confirms that robots can act as tutors, peers, or social facilitators that influence interaction, motivation, and learning participation (Belpaeme et al., 2018). Robot-supported collaborative learning (RSCL) model shows that robots can facilitate group work and discussion dynamics, so that collaborative communication is not only guided by teachers but also assisted by robotic agents (Rosenberg-Kima et al., 2020). In the context of special needs, a systematic review shows that social robots have the potential to mediate safer, more structured, and adaptive communication for certain learners, although their effectiveness depends on the design of the intervention and the characteristics of the participants (Papakostas et al., 2021). Other review evidence also highlights robots as learning companions that can support tutoring and learning relationships, but strict evaluation of their impact mechanisms is needed (Pai, 2024). Thus, robots are

not merely "tools," but rather communication mediums that shape the pedagogical atmosphere.

On the system development side, the need for personalized learning drives the adaptation framework for conversational ITS so that communication can be tailored to the needs, levels, and responses of learners (Arnau-González et al., 2025). ITS research developments also show a trend of expansion from traditional tutorial systems to conversational, adaptive, and data-driven systems that place dialogue at the core of learning (Guo et al., 2021). In the context of specific robot applications, robot designs that enhance social interaction (e.g., certain educational robot designs) indicate that the main goal of AI is not always purely academic, but also the facilitation of social communication that supports learning readiness (Madrid Ruiz et al., 2025). Meanwhile, studies in the field of online education continue to debate how chatbots affect the quality of interaction, learning independence, and the formation of meaning in learning communication (Engeness, 2025).

In other words, the research landscape shows an intensification of attention on the role of AI as a mediator, but it is not always integrated into a comprehensive educational communication framework.

Based on these developments, this study positions "AI as a communication mediator" as its main focus, not only assessing the effectiveness of AI, but also explaining the mechanisms of its communication mediation: (1) how AI changes the flow of instructional communication (e.g., question and answer, scaffolding, feedback), (2) how AI affects the socio-psychological dimensions of learning communication (trust, engagement, perception), and (3) how AI mediates collaborative communication in learning (e.g., group discussions, coordination, learning-by-teaching). By linking findings from generative AI (Deng et al., 2025; Zhang, 2025), educational chatbots (Okonkwo & Ade-Ibijola, 2021; Kuhail et al., 2023; Winkler et al., 2020), dialog-based ITS (Graesser et al., 2005; Kopp et al., 2012), pedagogical agents (Lin et al., 2020; Schroeder et al., 2021), and social robots (Belpaeme et al., 2018; Rosenberg-Kima et al., 2020; Papakostas et al., 2021), this study is expected to contribute to conceptual and empirical understanding of how educational communication "changes form" when mediated by AI. Ultimately, the expected contribution is not only recommendations for technology use, but also a more precise pedagogical communication framework: when AI is effective as a mediator, how to design ethical and educational AI interactions, and how to balance the roles of humans and AI in learning communication.

METHOD

This study uses a literature review approach with the aim of synthesizing scientific findings related to the role of Artificial Intelligence (AI) as a mediator of communication in the learning process. This approach was chosen because it allows researchers to systematically and conceptually integrate previous research results, thereby producing a comprehensive understanding of the patterns, roles, and mechanisms of communication mediation carried out by AI in the context of education.

Research Design

The research design used is a narrative–thematic literature review, which focuses on grouping and interpreting findings based on conceptual themes, rather than on calculating statistical effects. This approach is considered relevant given that the purpose of the study is to examine the communicative functions of AI (e.g., dialogue, feedback, collaboration, and personalization) and their implications for learning communication, rather than to test causal relationships experimentally.

Data Sources and Literature Search Strategy

The research data sources consisted of 40 scientific articles indexed by Scopus and published in reputable international journals and indexed conference proceedings. These articles covered various forms of AI in education, including generative AI (e.g., ChatGPT), educational chatbots, intelligent tutoring systems (ITS), pedagogical agents, and social robots.

The literature search process was conducted using relevant keywords, such as *artificial intelligence in education*, *AI-mediated learning*, *educational chatbots*, *intelligent tutoring systems*, *pedagogical agents*, *social robots in education*, and *communication in learning*. This combination of keywords was used to ensure that the literature covered both the technological and educational communication dimensions.

RESULTS

The Role of AI as a Communication Mediator in the Learning Process

Based on an in-depth review of 40 Scopus-indexed scientific articles focusing on AI in the context of education, the results of this study show that Artificial Intelligence functions as a mediator of learning communication through four main roles, namely: (1) mediator of instructional dialogue, (2) mediator of feedback and learning regulation, (3) mediator of social and collaborative communication, and (4) mediator of personalization and adaptation of learning. These findings show that AI not only supports the learning process technically, but also actively shapes the structure, meaning, and dynamics of pedagogical communication.

1. AI as a Mediator of Instructional Dialogue

The literature consistently shows that AI plays an important role in mediating instructional dialogue between learners and learning materials. Dialogue-based systems such as Intelligent Tutoring Systems (ITS) and educational chatbots facilitate two-way communication through question and answer sessions, concept clarification, and structured cognitive prompting. Classic research on *AutoTutor* confirms that mixed-initiative dialogue allows AI to initiate questions while responding adaptively to learner input, thereby promoting deeper knowledge elaboration and conceptual understanding (Graesser et al., 2005; Graesser et al., 2004).

The effectiveness of AI-mediated instructional dialogue is also determined by the efficiency and quality of interactions. Kopp et al. (2012) found that efficiently designed tutoring dialogues—with relevant and targeted responses—contribute to improved student understanding. In a more recent context, the integration of dialogue systems with ITS in a 3D environment shows that AI is capable of bridging complex procedural communication with immersive learning experiences, making instructions easier to understand and follow (Paladines, 2023).

In online learning, scaffolding-based conversational agents such as *Sara, the Lecturer*, have been shown to improve the clarity of instructions and reduce student confusion, especially in independent learning environments (Winkler et al., 2020). These findings indicate that AI functions as a filter and regulator of instructional messages, ensuring that learning communication is sequential, focused, and responsive to learners' needs.

2. AI as a Feedback Mediator and Learning Regulator

A review of the literature shows that one of the most dominant roles of AI is as a feedback mediator. Generative AI, particularly ChatGPT, is widely used to provide instant feedback, corrections, additional explanations, and dialogic suggestions for improvement. A meta-analysis by Deng et al. (2025) shows that the use of ChatGPT in experimental studies contributes positively to learning outcomes, especially when AI is used to support the process of reflection and revision, rather than simply providing answers.

In the context of language learning, the design of ChatGPT-mediated feedback activities allows students to engage in an iterative communication process—writing, receiving AI responses, revising, and reflecting on the results (Zhang, 2025). This pattern confirms the role of AI as a mediator that connects learners with academic standards and learning objectives, while also encouraging self-regulated learning.

A systematic review of educational chatbots also confirms that chatbots play an important role in providing consistent and easily accessible formative feedback (Okonkwo & Ade-Ibijola, 2021; Kuhail et al., 2023). Chatbots not only answer factual questions, but also help learners understand mistakes, direct attention to key concepts, and maintain continuity of learning communication outside of face-to-face hours. Thus, AI functions as a regulatory mediator that supports the continuity of pedagogical communication.

3. AI as a Mediator of Social and Collaborative Communication

Another important finding shows that AI not only mediates cognitive communication but also

social communication in learning. In collaborative learning, chatbots and conversation agents are used to facilitate group discussions, task coordination, and the exchange of ideas among learners. Kılıçkaya (2025) shows that chatbots can enhance collaborative learning practices by sparking discussions, asking provocative questions, and helping to maintain group focus.

The chatbot-mediated *learning-by-teaching* approach also shows that AI can facilitate reflective communication, where learners act as "teachers" who re-explain the material to AI, thereby deepening their conceptual understanding (Empowering Learners, 2024). In this context, AI acts as *a communicative partner* that encourages the articulation of knowledge.

The role of AI in social mediation is even more evident in the use of social robots. A comprehensive review by Belpaeme et al. (2018) shows that educational robots can act as tutors, peers, or social facilitators that influence the dynamics of classroom interactions. The robot-supported collaborative learning (RSCL) model shows that robots can facilitate small group communication and increase discussion participation (Rosenberg-Kima et al., 2020). In special education, social robots also function as mediators of safe and structured communication for learners with specific needs (Papakostas et al., 2021; Pai, 2024).

4. AI as a Mediator of Personalization and Adaptation of Learning Communication

The results of the literature review also confirm that AI acts as a mediator of personalized learning communication. The adaptation framework for conversational ITS shows that AI can adjust communication style, difficulty level, and feedback form based on learner profiles and responses (Arnau-González et al., 2025). This personalization allows learning communication to be more relevant and contextual.

Studies on pedagogical agents show that conversational style can enhance certain learning experiences, although the impact varies depending on message design and learner characteristics (Lin et al., 2020). The aspect of trust also emerges as a key factor: positive perceptions of virtual humans are influenced by the level of trust, although this does not always correlate directly with improved learning outcomes (Schroeder et al., 2021). This shows that the personalization of communication by AI must consider affective and ethical dimensions.

ITS trend studies also reveal a shift in research towards more adaptive, dialogic, and data-driven systems, with communication at the core of AI-assisted learning processes (Guo et al., 2021). In the context of educational robots, robot design to enhance social interaction also confirms that communication personalization is often aimed at building readiness and comfort for learning, not just knowledge transfer (Madrid Ruiz et al., 2025).

Table 1. Research findings (compiled by the researcher).

No	Dimension of AI's Role as a Mediator	Forms of AI Mediation	Key Findings of Communication Research	Primary Source (Example)
1	Instructional Mediator	Intelligent Tutoring Systems (ITS), dialogic chatbots, cognitive prompting, and scaffolding	AI facilitates two-way dialogue through structured adaptive questioning, thereby improving students' conceptual understanding	Graesser et al. (2005); Graesser et al. (2004); Kopp et al. (2012)
2	Structural Mediator of Learning Communication	Scaffolding-based conversational agents, ChatGPT	AI regulates the flow of instructional communication, reduces confusion, and improves message clarity in online learning	Winkler et al. (2020); Paladines (2023)

3	Formative Feedback Mediator	Educational chatbots	AI provides instant, dialogic, and iterative feedback that supports student reflection and self-regulation	Deng et al. (2025); Okonkwo & Ade-Ibijola (2021); Kuhail et al. (2023)
4	Reflection and Revision Mediator	Generative AI (ChatGPT)	AI mediates the revision process through repeated dialogue that encourages negotiation of meaning and deep understanding	Zhang (2025); Deng et al. (2025)
5	Collaborative Learning Mediator	Collaborative Chatbot	AI triggers group discussions, maintains communication focus, and assists task coordination in collaborative learning	Kılıçkaya (2025); Empowering Learners (2024)
6	Learning-by-Teaching Mediator	Chatbot as a learning partner	AI functions as a dialogue partner that encourages learners to re-explain the material, thereby strengthening knowledge construction	Empowering Learners (2024); Graesser et al. (2005)
7	Social Communication Mediator	Social robots	Educational robots facilitate social interaction, increase participation, and shape communication dynamics in the classroom	Belpaeme et al. (2018); Rosenberg-Kima et al. (2020)
8	Education Inclusion Mediator	Social robots for special needs	AI provides safe, structured, and adaptive communication for students with special needs	Papakostas et al. (2021); Pai (2024)
9	Communication Personalization Mediator	Adaptive Conversational ITS	AI adjusts communication style, difficulty level, and type of feedback based on the learner's profile	Arnau-González et al. (2025); Guo et al. (2021)
10	Affective and Relational Mediator	Pedagogical agents, virtual humans	Perception, trust, and AI character influence communication quality, although they do not always have a direct impact on learning outcomes	Lin et al. (2020); Schroeder et al. (2021); Krämer et al. (2016)

DISCUSSION

The Role of AI as a Communication Mediator in the Learning Process

This discussion interprets the findings of the literature review by placing Artificial Intelligence (AI) as a communicative actor that acts as a mediator in the learning process. Unlike the instrumental approach that views AI only as an instructional tool, the findings of this study show that AI functions as a regulator of communication flow, a provider of pedagogical meaning, and a connector of interactions between learners, materials, and learning objectives. Thus, AI needs to be understood within

the framework of educational communication that emphasizes the processes of interaction, dialogue, and meaning construction.

1. AI and the Transformation of Instructional Communication Patterns

Traditionally, instructional communication has been dominated by the instructor-student relationship with a relatively linear message flow. The presence of AI—particularly ITS, chatbots, and generative AI—has shifted this pattern to become dialogic and layered. Systems such as *AutoTutor* demonstrate that AI is capable of mediating instructional dialogue through mixed-initiative dialogue strategies, in which AI not only responds but also initiates questions, clarifications, and cognitive scaffolding (Graesser et al., 2005; Graesser et al., 2004). From a communication perspective, AI acts as a gatekeeper of instructional messages, determining when, how, and in what form information is conveyed.

This finding is in line with the argument that learning effectiveness is greatly influenced by the quality of dialogue, not just content (Kopp et al., 2012). When AI regulates the structure of dialogue—for example, through gradual prompting or adaptive feedback—learning communication becomes more systematic and focused. The integration of dialogue systems with ITS in a 3D environment also shows that AI is capable of bridging technical language and visual experiences, thereby reducing the cognitive load on learners (Paladines, 2023). Thus, AI not only facilitates the delivery of messages, but also transforms the way messages are produced and received in learning.

2. AI as a Mediator of Feedback and Self-Regulation

The following discussion highlights the role of AI as a mediator of continuous feedback. In educational communication, feedback is the primary mechanism that connects learning actions with learning objectives. Generative AI such as ChatGPT expands this function by providing instant, dialogic, and iterative feedback. The meta-analysis by Deng et al. (2025) confirms that the positive impact of AI on learning outcomes occurs when AI is used to support reflection and self-regulation, rather than simply providing final answers.In language learning, for example, ChatGPT mediates feedback communication through repeated revision dialogues, engaging students in a process of negotiating meaning between the initial text, AI responses, and academic goals (Zhang, 2025). From a communication perspective, this process demonstrates that AI functions as a pedagogical interlocutor, facilitating reflective interaction and extending the learning communication cycle.

A systematic review of educational chatbots also confirms that chatbots help maintain the continuity of learning communication outside the formal classroom, allowing learners to access clarification and support at any time (Okonkwo & Ade-Ibijola, 2021; Kuhail et al., 2023). In this context, AI acts as a temporal mediator, expanding the time and space of educational communication. However, the discussion also emphasizes the need for clear pedagogical design so that AI feedback does not replace the reflective role of educators, but rather complements it.

3. Social and Relational Dimensions in AI Mediation

The findings of this study show that the role of AI as a mediator is not limited to the cognitive dimension, but also includes the social and relational dimensions of learning communication. Chatbots used in collaborative learning have been shown to facilitate group discussions, maintain focus, and trigger the exchange of ideas (Kılıçkaya, 2025). The chatbot-mediated *learning-by-teaching* approach even shows that AI can encourage learners to articulate knowledge more explicitly, thereby deepening understanding through reflective communication (Empowering Learners, 2024).

The social role of AI is increasingly evident in the use of social robots. A review by Belpaeme et al. (2018) confirms that educational robots not only deliver material but also influence the dynamics of interaction and participation. The RSCL model shows that robots can act as social facilitators who help regulate turn-taking, encourage collaboration, and create an inclusive learning environment (Rosenberg-Kima et al., 2020). In special education, social robots even serve as safer and more structured communication mediators for certain learners (Papakostas et al., 2021; Pai, 2024).

However, this discussion also emphasizes that AI social mediation has ethical and psychological

implications. Studies on virtual humans show that trust influences learners' perceptions of AI agents, although it does not always correlate directly with improved learning outcomes (Schroeder et al., 2021). This means that socially "convincing" communication is not necessarily pedagogically effective. This requires caution in designing the persona, language style, and level of autonomy of AI in learning interactions.

4. Personalization of Communication and the Tension between Adaptation and Control

Another important aspect of the discussion is the personalization of learning communication. The adaptation framework for conversational ITS shows that AI can adjust communication style, difficulty level, and type of feedback based on learner profiles (Arnau-González et al., 2025). This personalization reinforces the argument that AI functions as a mediator that bridges individual needs with curriculum objectives.

However, this discussion also highlights the tension between adaptation and pedagogical control. Studies on pedagogical agents show that conversational communication styles can enhance certain learning experiences, but the effects are not always consistent across all contexts (Lin et al., 2020). Furthermore, findings on gender gaps in STEM indicate that AI character design can influence the engagement of certain groups, meaning that communication personalization is not neutral (Krämer et al., 2016). Thus, AI personalization should be understood as a value-laden communication practice that needs to be guided by pedagogical and ethical principles. A review of ITS trends also shows that research is moving towards increasingly adaptive and data-driven systems, with communication at the core of the design (Guo et al., 2021). However, this discussion emphasizes that the greater the autonomy of AI in mediating communication, the more important the role of educators as meaning guides and guardians of educational goals.

5. Theoretical Implications for Educational Communication Studies

Theoretically, these findings and discussions broaden our understanding of educational communication by including AI as a non-human actor with communicative agency. AI not only conveys messages, but also shapes the structure of dialogue, determines the rhythm of interaction, and influences the process of meaning construction. Therefore, educational communication studies need to move beyond the classic communicator–message–communicant model toward a distributed communication model in which humans and AI collaborate in mediating learning.

These findings also support the argument that the effectiveness of AI in education depends heavily on how it is integrated into pedagogical communication practices—not merely on its technological sophistication (Deng et al., 2025; Okonkwo & Ade-Ibijola, 2021). In other words, pedagogically communicative AI is more important than AI that is merely technically intelligent.

Overall, this discussion confirms that AI acts as a mediator of learning communication through four main dimensions: instructional dialogue, regulatory feedback, social-collaborative interaction, and communication personalization. These roles show that AI does not replace educators, but rather orchestrates and expands pedagogical communication in digital and hybrid learning spaces. The challenge ahead lies in designing AI that is not only cognitively effective, but also ethical, reflective, and aligned with the values of educational communication.

CONCLUSION

This literature review-based study aims to understand the role of Artificial Intelligence (AI) as a communication mediator in the learning process by systematically reviewing 40 Scopus-indexed scientific articles covering generative AI, educational chatbots, intelligent tutoring systems (ITS), pedagogical agents, and social robots. Based on the synthesis of findings and discussion, this study concludes that AI has evolved from a mere instructional tool to a non-human communicative actor that actively mediates, regulates, and shapes pedagogical communication.

First, AI has been proven to play a significant role as a mediator of instructional dialogue. Through dialogue-based systems such as ITS and chatbots, AI manages question-and-answer flows, provides

cognitive scaffolding, and facilitates adaptive concept clarification. This role shifts learning communication from a one-way pattern to a more dynamic and structured dialogical interaction. AI helps ensure that instructional messages are not only conveyed but also actively processed by learners through meaningful dialogue.

Second, AI functions as a mediator of feedback and learning regulation. The presence of generative AI enables the provision of instant, consistent, and dialogic feedback, thereby extending the learning communication cycle. AI-mediated feedback contributes to strengthening learners' reflection and self-regulation, especially when AI is used as a learning partner that supports the revision and comprehension process, rather than as a substitute for educator assessment. In this case, AI expands the space and time of educational communication beyond the boundaries of the formal classroom.

Third, this study concludes that AI also acts as a mediator of social and collaborative communication. Chatbots and social robots are able to facilitate group discussions, task coordination, and collaborative learning by creating more structured and inclusive interactions. In certain contexts, AI even functions as a social facilitator that helps build participation,

especially for learners with special needs. These findings confirm that AI mediation not only impacts cognitive aspects but also relational dynamics in learning.

Fourth, AI acts as a mediator of personalization and adaptation of learning communication. Through analysis of student responses and profiles, AI can adjust communication styles, difficulty levels, and forms of feedback. This personalization increases the relevance and contextuality of learning communication, but at the same time raises ethical and pedagogical challenges related to control, transparency, and fairness. Therefore, AI personalization needs to be guided by humanistic educational communication principles and learning objectives.

Overall, the main conclusion of this study is that AI does not replace the role of educators, but orchestrates and expands pedagogical communication. The effectiveness of AI in learning is largely determined by how AI is designed and integrated as a communication mediator that is aligned with educational values, ethics, and learning objectives. By positioning AI as a communication mediator—not merely instructional technology—this study contributes theoretically to the study of educational communication and offers a conceptual foundation for the development of more reflective, inclusive, and sustainable AI-based learning practices.

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