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Artificial Intelligence as a Learning Partner: Rethinking the Roles of Teachers, Learners, and Knowledge Construction in Contemporary Education

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Abstract

The rapid development of generative artificial intelligence (GenAI) has transformed how teachers and students access, process, and construct knowledge in contemporary education. The increasing capacity of AI systems to provide information, generate ideas, support dialogue, and offer feedback raises fundamental questions about the changing roles of teachers and students and the position of AI within the learning process. This study aims to analyze the conceptualization of AI as a learning partner and examine its implications for teacher roles, student agency, and knowledge construction. This qualitative study employs a systematic literature review (SLR) with thematic-conceptual synthesis. Relevant literature was identified through Google Scholar, supported by Consensus as a supplementary literature discovery and verification tool. The reviewed literature was analyzed through thematic coding, categorization, comparison, and conceptual synthesis. The findings indicate two major patterns. First, the involvement of AI shifts the role of teachers from primary transmitters of information toward pedagogical guides, knowledge curators, dialogue facilitators, and validators of information and educational values, while students are increasingly positioned as active agents who question, evaluate, interpret, and reflect on AI-generated information. Second, knowledge construction becomes more relational, involving the interaction of teachers, students, and AI through processes of generation, verification, interpretation, negotiation, and reflection. AI therefore functions as a cognitive learning partner rather than a final epistemic authority. The study contributes a conceptual framework that integrates the teacher as a pedagogical agent, the student as an epistemic agent, and AI as a cognitive partner while maintaining human agency at the center of education.

Keywords: Agency; Collaboration; Education; Intelligence; Knowledge; Learning; Pedagogy; Technology

Kecerdasan Buatan sebagai Mitra Pembelajaran: Meninjau Ulang Peran Guru, Peserta Didik, dan Konstruksi Pengetahuan dalam Pendidikan Kontemporer

Abstrak

Perkembangan pesat kecerdasan buatan generatif (GenAI) telah mengubah cara guru dan peserta didik mengakses, mengolah, dan mengonstruksi pengetahuan dalam pendidikan kontemporer. Kemampuan sistem AI untuk menyediakan informasi, menghasilkan gagasan, mendukung dialog, dan memberikan umpan balik memunculkan pertanyaan mendasar mengenai perubahan peran guru dan peserta didik serta kedudukan AI dalam proses pembelajaran. Penelitian ini bertujuan menganalisis konseptualisasi AI sebagai mitra pembelajaran dan mengkaji implikasinya terhadap peran guru, agensi peserta didik, dan konstruksi pengetahuan. Penelitian kualitatif ini menggunakan tinjauan literatur sistematis (SLR) dengan sintesis tematik-konseptual. Literatur yang relevan ditelusuri melalui Google Scholar dengan dukungan Consensus sebagai alat tambahan untuk menemukan dan memverifikasi publikasi. Literatur dianalisis melalui pengodean tematik, kategorisasi, perbandingan, dan sintesis konseptual. Hasil penelitian menunjukkan dua pola utama. Pertama, keterlibatan AI menggeser peran guru dari penyampai utama informasi menjadi pembimbing pedagogis, kurator pengetahuan, fasilitator dialog, serta pemeriksa validitas informasi dan nilai-nilai pendidikan. Pada saat yang sama, peserta didik semakin diposisikan sebagai agen aktif yang mempertanyakan, mengevaluasi, menafsirkan, dan merefleksikan informasi yang dihasilkan AI. Kedua, konstruksi pengetahuan menjadi lebih relasional melalui interaksi guru, peserta didik, dan AI dalam proses menghasilkan, memverifikasi, menafsirkan, menegosiasikan, dan merefleksikan pengetahuan. Dengan demikian, AI berfungsi sebagai mitra pembelajaran kognitif, bukan sebagai otoritas epistemik terakhir. Penelitian ini menawarkan kerangka konseptual yang memadukan guru sebagai agen pedagogis, peserta didik

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sebagai agen epistemik, dan AI sebagai mitra kognitif, dengan tetap menempatkan agensi manusia sebagai pusat pendidikan.

Kata kunci: **Agensi; Kecerdasan; Kolaborasi; Pedagogi; Pembelajaran; Pendidikan; Pengetahuan; Teknologi**

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INTRODUCTION

The development of generative artificial intelligence (GenAI) has brought significant changes to the contemporary educational landscape, particularly in the ways students and educators access, process, and utilize knowledge. The emergence of various systems based on large language models (LLMs), such as ChatGPT, enables users to obtain explanations, develop ideas, formulate questions, explore multiple perspectives, and receive feedback rapidly and interactively. This transformation indicates that technology no longer functions merely as a medium for delivering instructional content but has begun to participate in activities related to human thinking and knowledge construction. Several studies have shown that GenAI has the potential to support personalized learning, instructional material development, feedback provision, and knowledge building, although its use also raises concerns regarding information accuracy, bias, privacy, academic integrity, and technological dependence (Chen et al., 2023). Under these conditions, access to knowledge is no longer entirely dependent on teachers as sources of information, as students can interact directly with AI systems to obtain and develop information. This situation is significant for education because changes in access to knowledge may affect how teachers perform their pedagogical functions and how students construct their own understanding. Therefore, the emergence of GenAI raises not only technological questions concerning how AI is used in learning, but also pedagogical and epistemological questions regarding how the position of teachers, student agency, as well as the authority and construction of knowledge should be reconsidered in contemporary education (Cress et al., 2023).

Previous studies have demonstrated that generative artificial intelligence (GenAI) offers substantial benefits in supporting teaching and learning activities, although its effectiveness depends on how AI is integrated into pedagogical practice. In the K-12 educational context, Zhang and Tur (2024), through a systematic review of 13 studies, found that ChatGPT can support lesson planning, instructional material development, differentiation, and more personalized learning experiences, although concerns regarding output quality and academic integrity remain. Across broader educational contexts, Albadarin et al. (2024) found that students use ChatGPT to obtain explanations, feedback, ideas, writing assistance, and more personalized learning support, while educators use it to develop lesson plans, quizzes, and supplementary learning resources. These findings indicate that the use of GenAI is not limited to student activities but has also become part of teachers' pedagogical practices. Regarding knowledge construction, Chen et al. (2023) demonstrated that students can use ChatGPT in knowledge building, while educators play a role in providing learning spaces and scaffolding to ensure that interactions with GenAI remain purposeful. An et al. (2025) also found that integrating GenAI into a collaborative learning environment based on mind mapping improved task performance and generated a knowledge construction process that developed from individual interaction to peer and group interaction. Meanwhile, Jeon and Lee (2023) identified a complementary relationship between teachers and ChatGPT, in which AI functions as a dialogue partner, content provider, teaching assistant, and evaluator, while teachers continue to perform pedagogical decision-making, guide students as active investigators, and foster ethical awareness regarding AI use. This perspective is further supported by (Cress & Kimmerle, 2023), who position human–AI dialogue as one possible pathway for the co-construction of knowledge, particularly when

interaction goes beyond information delivery and encourages knowledge transformation through argumentation and idea development. Overall, the existing literature indicates that GenAI has evolved from merely an informational support tool into a component of pedagogical, dialogic, and constructive learning activities. At the same time, these developments demonstrate that the role of AI in learning cannot be separated from pedagogical design, teacher involvement, and students' cognitive engagement in evaluating and processing AI-generated outputs.

Although research on artificial intelligence (AI) in education has developed rapidly, an important conceptual gap remains to be addressed. Previous literature has focused extensively on the use of AI to support learning effectiveness, personalization, educator productivity, academic achievement, and the development of specific skills. A systematic review by (Yusuf et al., 2024) of 407 publications showed that research on generative AI (GenAI) in education has largely addressed applications, impacts, potential, ethical implications, user experiences, and technology adoption. At the same time, the review identified limited discussion of cultural dimensions and specific educational contexts, indicating that a deeper understanding of the implications of GenAI for educational practice remains necessary. Thus, attention to AI in education has largely revolved around questions concerning its functions, benefits, risks, and effectiveness, while the pedagogical and epistemic relations that emerge from the presence of AI have not received comparable attention.

This gap becomes increasingly important as AI is involved not merely as a supporting tool but also as part of dialogue and knowledge construction. Previous studies have begun to examine AI as a collaborator and knowledge-building partner. (Cress & Kimmerle, 2023), for example, demonstrated that human-AI interaction can create possibilities for knowledge construction through dialogue, while (Jung & Jin, 2026) showed that GenAI has been examined across various stages of knowledge construction, although its support has been more commonly discussed at the stages of initiation and exploration than at the stages of negotiation and synthesis. These findings indicate that AI can no longer be adequately understood solely as an instrument for providing information. However, existing studies still tend to examine human-AI relationships or the effectiveness of AI use within particular contexts separately. There remains insufficient conceptualization of how the presence of AI simultaneously transforms the relationship among teachers, students, and knowledge within an integrated pedagogical and epistemic framework.

Accordingly, the research gap addressed in this study lies in the need to integrate three positions that have more often been examined separately: the teacher as a pedagogical agent, the student as an epistemic agent, and AI as a cognitive partner. The issue that remains insufficiently explained is no longer simply whether AI can function as a collaborator in learning, but rather how the relationship among these three actors shapes the processes of selecting, verifying, interpreting, critically questioning, negotiating, and constructing knowledge. This study therefore shifts the focus from the instrumental question of "How effective is AI in learning?" toward the more fundamental conceptual question of "How is knowledge constructed when teachers, students, and AI systems are involved in the learning process?" This shift provides the basis for developing a conceptual framework that positions AI as a cognitive partner without diminishing teachers' pedagogical agency or students' epistemic agency within education.

In response to this conceptual gap, this study offers a conceptual reconstruction of the relationship among teachers, students, and artificial intelligence (AI) in the process of knowledge construction, positioning AI not as a replacement for teachers or merely as an instructional instrument, but as a learning partner within an educational ecosystem that remains centered on human agency (Alfredo et al., 2024; Ouyang & Jiao, 2021). This conceptualization shifts the pedagogical relationship from the previously dominant linear pattern of teacher-student-knowledge toward a relational pattern of

teacher-student-AI, in which each actor performs a distinct function. The teacher is positioned as a pedagogical agent who directs the learning process, curates knowledge sources, facilitates dialogue, and safeguards the validity, context, and educational values of knowledge (Kim et al., 2022; Ouyang & Jiao, 2021). Students are positioned as epistemic agents who actively formulate questions, evaluate AI-generated outputs, compare multiple sources, interpret information, reflect on it, and construct their own understanding. Meanwhile, AI is positioned as a cognitive partner that provides alternative information, dialogic stimuli, feedback, and perspectives that can expand the thinking process, while not being treated as the final authority of knowledge.

This conceptualization is grounded in the study by Tang et al. (2024), which emphasizes the importance of language, dialogue, representation, critical questioning, and literacy in understanding students' interactions with GenAI. Tang argues that students need to be guided not to accept GenAI outputs as definitive answers, but rather to use them as part of a process of reading, questioning, evaluating, and constructing knowledge. This perspective is further supported by Tang et al. (2024), who propose a dialogic approach that positions GenAI as a dialogic agent capable of facilitating collaborative dialogue and the co-construction of knowledge rather than serving as an authoritative provider of knowledge. Accordingly, the novelty of this study does not lie in the claim that AI can function as a collaborator in learning, since this idea has already begun to emerge in previous research. Rather, its novelty lies in integrating three positions—the teacher as a pedagogical agent, the student as an epistemic agent, and AI as a cognitive partner—into a single conceptual framework for knowledge construction. This framework offers a new way of understanding learning through the stages of generation, verification, interpretation, and reflection, such that AI-generated outputs do not stop at the level of information reception but become objects of dialogue, evaluation, negotiation, and meaning-making. Through this framework, the study contributes conceptually to contemporary education by shifting attention from the intensity of AI use toward the reconstruction of roles, agency, epistemic authority, and mechanisms of knowledge construction within human-AI relationships.

To address this conceptual problem, this study aims to analyze the conceptualization of artificial intelligence as a learning partner in contemporary education, particularly in relation to the transformation of teacher roles, student agency, and knowledge construction. Using a qualitative literature-based approach, the study examines ideas, patterns, and arguments presented in previous research to understand how pedagogical and epistemic relationships among teachers, students, and AI are constructed in learning contexts. Specifically, the study addresses two research questions: (1) How are the positions and roles of teachers and students reconceptualized when AI is involved as both a source of information and a learning partner in contemporary education? and (2) How can the relationship among teachers, students, and AI be understood in shaping the processes of knowledge construction, verification, negotiation, interpretation, and meaning-making? These questions provide the basis for formulating a conceptual framework that integrates the teacher as a pedagogical agent, the student as an epistemic agent, and AI as a cognitive partner. Through this framework, the study is expected to contribute theoretically to the development of AI-based pedagogy that continues to position humans at the center of education while emphasizing teacher agency, students' critical engagement, and the ethical, reflective, and responsible use of AI.

METHODS

This study employs a qualitative approach using library research. This approach was selected because the study focuses on examining, interpreting, comparing, and synthesizing ideas, arguments, and findings from scholarly literature concerning the role of artificial intelligence (AI) in contemporary education.

Library-based research is appropriate for studies that seek to synthesize and interpret existing literature in order to develop a comprehensive understanding of a particular research problem (Snyder, 2019). Rather than examining AI through direct field observations or human participants, this study analyzes existing scholarly sources to develop a conceptual understanding of the changing relationships among teachers, students, AI, and knowledge construction.

The research context is the scholarly literature on artificial intelligence, generative AI, education, teacher roles, student agency, human-AI interaction, and knowledge construction. The primary data consist of scholarly journal articles and relevant academic publications that directly address the research focus. Literature published primarily between 2020 and 2026 was considered to capture recent developments in AI and education. However, earlier theoretical and conceptual works were also included when they provided fundamental perspectives relevant to the analysis.

The literature was collected through scholarly searches using Google Scholar as the primary source. Consensus was also used as a supplementary tool to identify, trace, and verify relevant scholarly publications. The search employed combinations of keywords related to the research focus, including "artificial intelligence," "generative AI," "ChatGPT," "AI in education," "teacher role," "teacher agency," "student agency," "learner role," "knowledge construction," "knowledge building," and "human-AI collaboration." The selection of literature was based on its relevance to the research questions, academic credibility, substantive contribution, and availability of sufficient information for analysis. Publications that focused exclusively on the technical aspects of AI without educational relevance, popular non-academic materials, duplicate publications, and sources that did not substantively address the research focus were excluded.

Data collection was conducted through documentation and systematic note-taking of the selected literature. The researcher served as the primary instrument in identifying, reading, interpreting, and synthesizing the literature. A literature extraction matrix was used to organize information from each source, including the author, publication year, research context, research objectives, theoretical perspectives, methodological approach, main findings, implications for teacher and student roles, and relevance to knowledge construction. The collected literature was subsequently organized according to recurring concepts and arguments related to the research questions.

Data were analyzed thematically through an iterative process of familiarization with the literature, initial coding, categorization, identification of recurring patterns, comparison across sources, and interpretation of emerging themes. Thematic analysis provides a systematic approach for identifying, organizing, and interpreting patterns of meaning within qualitative data (Braun & Clarke, 2021). In this study, the analysis focused on three main conceptual domains: (1) the transformation of teacher and student roles, (2) changes in the processes of knowledge construction, and (3) the relationship between humans and AI in learning. Findings from different studies were compared to identify converging and diverging perspectives, theoretical tendencies, and conceptual gaps. The results of this analysis were then synthesized to develop a conceptual understanding of AI as a learning partner without replacing human pedagogical and epistemic agency.

The credibility of the analysis was maintained through source triangulation, cross-checking arguments across multiple scholarly publications, explicit selection criteria, and documentation of the analytical process. Different theoretical and empirical perspectives were compared to reduce reliance on a single source or interpretation. The researcher also maintained consistency between the research questions, literature selection, coding process, thematic interpretation, and conceptual synthesis. These procedures are consistent with the principles of credibility and dependability in qualitative research (Lincoln & Guba, 1985).

Because this study did not involve direct human participants, informed consent was not required. Nevertheless, research ethics were maintained through responsible use of scholarly sources, accurate attribution, respect for copyright, consistent application of APA 7th edition citation practices, and avoidance of manipulating or misrepresenting previous research findings.

RESULTS AND DISCUSSION

Based on the synthesis of the literature reviewed, two major patterns emerged that directly address the research focus: the reconstruction of teachers' and students' positions in AI-based learning and the transformation of knowledge construction within teacher-student-AI relationships. The findings indicate that the involvement of AI does not necessarily eliminate the role of humans in learning but rather shifts the nature of each actor's contribution. This shift is particularly evident in the transformation of teachers' functions from information transmitters toward learning process guides, while students are increasingly expected to play an active role in evaluating and processing information obtained through AI.

Reconstruction of Teachers' and Students' Positions and Roles

The first research question asks how the positions and roles of teachers and students are reconceptualized when AI is involved as both a source of information and a learning partner in contemporary education. The synthesis indicates that the involvement of AI does not eliminate the roles of teachers and students; rather, it reconstructs their functions and increases the importance of human agency in the learning process.

For teachers, the findings indicate a shift from the conventional role of information transmitter toward that of a pedagogical agent. Teachers increasingly function as learning-process guides, resource curators, facilitators of dialogue, and supervisors of AI-supported learning. Zhang and Tur (2024) found that ChatGPT can support lesson planning, instructional material development, differentiation, and personalized learning, while concerns about output quality and academic integrity continue to require teacher involvement. Similarly, Albadarin et al. (2024) reported that educators use ChatGPT to develop lesson plans, quizzes, and learning resources, indicating that AI can extend rather than replace teachers' pedagogical functions.

This reconceptualization is further supported by (Jeon & Lee, 2023), who identified complementary functions between teachers and ChatGPT. AI may function as an interlocutor, content provider, teaching assistant, and evaluator, whereas teachers remain responsible for pedagogical decision-making, guiding students as active investigators, and fostering ethical awareness. Thus, the teacher's authority is not primarily derived from being the sole provider of information but from the capacity to design learning experiences, evaluate information, provide contextual interpretation, and guide students in using AI responsibly.

The position of students is likewise reconstructed from relatively passive recipients of information toward epistemic agents who actively participate in evaluating and constructing knowledge (Chen et al., 2023) showed that students can engage with ChatGPT in knowledge-building activities, while teacher-provided learning spaces and scaffolding remain important. The findings suggest that students are therefore not expected merely to accept AI-generated responses but to question, evaluate, interpret, compare, and develop the information obtained through AI.

This shift is particularly important because AI-generated information does not automatically constitute validated knowledge. Students' epistemic agency becomes visible when they formulate questions, examine AI-generated outputs, compare information with other sources, identify possible limitations, and reflect on the meaning of the information within a particular learning context. In this sense, the presence of AI increases rather than diminishes the need for students' critical engagement.

Taken together, the findings provide a direct answer to the first research question: the involvement of AI reconceptualizes teachers as pedagogical agents and students as epistemic agents. Teachers increasingly provide pedagogical direction, contextual interpretation, ethical guidance, and validation, while students assume greater responsibility for questioning, evaluating, interpreting, and constructing knowledge. AI occupies a complementary position as a source of information and cognitive stimulus rather than as the final authority of knowledge. The resulting relationship is therefore not a replacement of human roles by AI, but a redistribution and reconstruction of functions within a teacher–student–AI learning relationship.

Patterns of Knowledge Construction, Verification, Negotiation, and Meaning-Making

The synthesis of the literature indicates that AI involvement in learning can expand knowledge construction when interaction with AI is integrated with other forms of human activity. An et al. (2025), in a study involving 30 preservice teachers working in groups, found that groups using GenAI in a collaborative mind mapping environment demonstrated a knowledge construction process that progressed from individual interaction to peer interaction and subsequently to group interaction. The groups also demonstrated higher task performance than the groups using a learning environment without GenAI in that study. These findings suggest that AI can form part of a process that extends the movement of ideas from individual activity toward collaborative knowledge construction.

A similar pattern is evident in the dialogic study by Tang et al. (2024). In an action research study involving four secondary school teachers, GenAI was used in activities focused on critical questioning, assessment, and differentiation. The initial findings indicated active student engagement in dialogue with GenAI, including the use of follow-up questions and the integration of multiple perspectives during the learning process. In this pattern, AI-generated outputs did not remain as final answers but became material for further questioning and use in instructional dialogue.

Tang et al. (2024) also identified the importance of dialogue, critical questioning, argumentation, reading and writing, and multimodal representation in the use of GenAI in science education. The synthesis indicates that interaction with GenAI has pedagogical value when embedded within language and discourse activities that enable students to interpret and question generated information. Overall, the findings indicate that knowledge construction in AI-based learning environments follows a more dynamic pattern: information may be generated through interaction with AI, examined by students, guided through teachers' pedagogical decisions, discussed through multiple perspectives, and subsequently interpreted and reinterpreted to construct meaning.

Taken together, the findings addressing the two research questions reveal a close relationship between changes in actor roles and transformations in knowledge construction. Teachers' positions shift toward guiding and managing pedagogical processes, while students assume a more active role in evaluating and processing information. At the same time, AI functions as a source of information and a catalyst for interaction that can extend knowledge construction, while verification, interpretation, negotiation, and meaning-making remain grounded in human activity within the learning process. These findings represent a synthesis of the literature available in this review; the final size of the literature corpus and the distribution of studies according to methodological categories require further strengthening after the final search and screening process has been completed.

CONCLUSION

This study addressed two research questions concerning the reconceptualization of teacher and student roles and the transformation of knowledge construction when artificial intelligence is involved in

contemporary education. Regarding the first research question, the findings indicate that the involvement of AI reconstructs rather than eliminates the roles of teachers and students. Teachers are increasingly positioned as pedagogical agents who guide learning processes, curate and validate information, facilitate dialogue, and provide ethical and contextual direction. Students, meanwhile, are positioned as epistemic agents who actively formulate questions, evaluate AI-generated information, compare sources, interpret information, and construct their own understanding. AI therefore functions as a complementary learning partner rather than a replacement for human pedagogical and epistemic agency.

Regarding the second research question, the findings show that the relationship among teachers, students, and AI creates a more dynamic process of knowledge construction. AI can contribute to the generation of information, ideas, alternative perspectives, and dialogic stimuli, while teachers provide pedagogical direction and students engage in verification, interpretation, questioning, negotiation, and reflection. Knowledge is therefore not constructed through the passive acceptance of AI-generated information but through interaction among AI-generated outputs, human critical judgment, pedagogical guidance, and reflective meaning-making.

Taken together, the answers to the two research questions support a conceptual framework in which the teacher acts as a pedagogical agent, the student as an epistemic agent, and AI as a cognitive learning partner. This framework emphasizes that the educational value of AI depends not simply on its capacity to generate information but on how its outputs are critically examined, interpreted, contextualized, and integrated into human learning processes. The study therefore positions human agency, critical engagement, and pedagogical responsibility as central conditions for meaningful AI-supported knowledge construction. Because the study is based on library research, further empirical research is needed to examine this conceptual framework across different educational levels and learning contexts.

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