



From Passive Learners to Learning Agents: Reimagining Collaborative Pedagogy in AI-Enhanced Online Higher Education

Moh. Najib Ihsan*

Universitas Islam Negeri Sunan Ampel Surabaya, Indonesia

Email: najib.ihsan14@gmail.com

DOI: <https://doi.org/10.61987/bamj.v1i1>

Article History:

Received: 02 December 2025

Revised: 14 February 2026

Accepted: 10 March 2026

Keywords:

*Artificial Intelligence,
Collaborative Pedagogy,
Student Agency, Online
Learning*

***Correspondence Address:**

najib.ihsan14@gmail.com

Abstract :

Artificial intelligence (AI) is increasingly transforming online education, yet its widespread use may encourage students to become passive recipients of machine-generated information. This study aimed to examine how collaborative pedagogy in AI-enhanced learning can foster students' agency and transform them from passive learners into active learning agents. A qualitative case study was conducted at MTs Nurul Jadid. Data were collected through semi-structured interviews, participant observation, and documentation, and analyzed through data condensation, data display, and conclusion drawing and verification. The findings indicate that AI-enhanced collaborative learning encouraged students to discuss, compare, verify, and collectively evaluate AI-generated information before incorporating it into learning tasks. AI also supported student agency by enabling learners to initiate inquiries, explore alternative explanations, evaluate information, make decisions, and assume responsibility for learning outcomes. The study concludes that AI does not automatically produce active learning; its educational value depends on pedagogical design that integrates technological assistance with collaboration, critical evaluation, and learner responsibility. The findings imply that educators should adopt human-centered, collaborative, and agency-oriented approaches when integrating AI into learning environments.

INTRODUCTION

Artificial intelligence is reshaping higher education, making learning increasingly mediated by intelligent systems and digital platforms. This transformation matters to society because universities are responsible not only for transmitting knowledge but also for developing graduates who can think critically, collaborate effectively, and learn independently (Agonafir, 2023; Daniel et al., 2024; Solak et al., 2025). AI access can substantially expand learning opportunities, yet it can also encourage students to outsource judgment when technology substitutes for intellectual effort (Benson et al., 2024; Chugh et al., 2023). Recent evidence shows growing AI adoption among university students, while systematic reviews report benefits for personalization, engagement, communication, and collaborative learning. However, UNESCO emphasizes that educational AI should remain human-centered, ethical, equitable, and pedagogically

purposeful (Kebede et al., 2025; Mardiyah et al., 2024; Townsend et al., 2024). Therefore, the central social challenge is not whether AI should enter higher education, but how universities can redesign learning so students use AI to strengthen participation, reflection, collaboration, and decision-making rather than becoming passive consumers of machine-generated knowledge.

The general problem emerges when technological convenience develops faster than pedagogical adaptation. Online higher education has expanded access and flexibility, but many learning environments still reproduce transmission-oriented practices in which lecturers provide materials, students complete standardized tasks, and interaction becomes secondary to content delivery (Darabi et al., 2024; Gallagher-Ford et al., 2025; Lee et al., 2023). Generative AI intensifies this tension because students can obtain explanations, summaries, ideas, translations, and draft responses instantly. Such accessibility can reduce productive struggle and encourage cognitive offloading when learning activities do not require students to question, negotiate, create, or justify knowledge (L. Chen, 2025; Stokstad et al., 2026; Zhan et al., 2024). Collaborative learning can also become superficial if students divide assignments or use AI individually before submitting a shared product. Consequently, society faces a problem: institutions may possess advanced technologies while retaining learning designs that position students primarily as recipients. This mismatch makes pedagogical transformation essential for meaningful and participatory online learning across diverse contexts today.

This problem is visible in online higher-education classrooms, where AI tools increasingly coexist with learning management systems, discussion forums, video meetings, and collaborative documents. Students commonly use AI to clarify concepts, generate ideas, summarize readings, formulate questions, and improve written work, while lecturers experiment with AI-supported feedback and personalized learning (C.-M. Chen & Huang, 2024; Kilpeläinen-Pettersson et al., 2025; Lin et al., 2024). Yet the presence of these tools does not automatically produce active participation. Evidence from higher education research indicates that AI can improve learner-content interaction, motivation, communication, peer learning, and cooperative support, but outcomes depend strongly on task design and emotional engagement. Research on student agency similarly shows that collaborative participation, co-creation, feedback, and access to resources can foster learners' control over learning actions, although integrated approaches remain limited. Therefore, students have unprecedented access to AI assistance, but opportunities to exercise agency through collaboration may remain underdeveloped. This paradox defines the empirical context of this study.

Previous scholarship has established pathways for integrating AI into higher education. Systematic reviews show that AI-supported learning can personalize content, provide adaptive feedback, enhance motivation, support assessment, and facilitate collaborative interaction. Research on AI-powered collaborative learning further identifies task design and emotional engagement as conditions for successful outcomes. Meanwhile, studies of AI-enabled self-regulated learning indicate that chatbots, adaptive systems, and environments can support autonomy and regulation. These contributions show that AI can function as a learning scaffold rather than an automation tool. Nevertheless, much literature remains organized around technological capabilities, individual personalization, learning performance, or isolated forms of self-regulation. Less attention has been devoted to how AI can be deliberately embedded within collaborative pedagogy to transform students from recipients of assistance into agents who initiate inquiry, negotiate meaning, evaluate AI outputs, and co-construct knowledge

with peers. This limitation identifies an important conceptual and pedagogical gap.

A second limitation concerns the fragmented treatment of student agency, collaboration, and artificial intelligence. Reviews of agency in higher education find that existing practices include isolated elements such as participation, co-creation, feedback, or resource provision, while accounts of agency remain scarce. Research on AI in higher education frequently demonstrates improved engagement or personalized learning without explaining how students exercise sustained control over learning processes. This creates a gap between what AI enables and what pedagogy actually organizes students to do. If AI supplies increasingly capable answers, collaborative learning must be redesigned around questions, judgment, dialogue, verification, reflection, and shared responsibility. Otherwise, technological assistance may unintentionally reinforce passive learning by making intellectual decisions invisible. The unresolved issue is not simply whether AI improves outcomes, but under what collaborative pedagogical conditions AI can stimulate agentic learning. Addressing this issue is essential for developing human-centered online higher education.

The state of the art proposed in this study is to reconceptualize AI-enhanced online learning through a combined lens of collaborative pedagogy and student agency. Rather than treating AI as a tutor that delivers individualized assistance, the study positions AI as a mediating resource within learning activities that require students to initiate questions, distribute responsibilities, challenge machine outputs, exchange perspectives, and justify collective decisions. This approach extends personalization models by emphasizing the social and agentic dimensions of learning. Its novelty lies in connecting three elements often investigated separately: intelligent technological support, structured peer collaboration, and learner agency. This perspective reframes the student from an AI user into a learning agent who actively directs, evaluates, and reshapes interactions with technology and peers. This contribution matters because UNESCO calls for human-centered AI, while research demonstrates that agency and collaboration remain incompletely integrated. A pedagogical model connecting these dimensions can offer stronger theoretical and practical foundations.

This study addresses the research problem of how collaborative pedagogy can be reimagined so AI-enhanced online higher education develops students as active learning agents rather than passive recipients of AI assistance. It asks how learning activities can connect AI-supported inquiry with peer interaction, critical evaluation, reflection, and responsibility. The problem is significant because access to AI does not itself determine whether students exercise agency. Without structures, students may rely on generated answers while contributing less questioning, reasoning, and dialogue. The study consequently focuses on conditions that enable AI to support active participation rather than cognitive substitution. It examines how collaborative learning designs can redistribute responsibility, require students to interrogate information, and make their decisions visible within online processes themselves. In doing so, the research moves beyond asking whether AI is useful toward examining how AI can be pedagogically organized to cultivate agency within diverse online higher-education settings and learning communities.

The study argues that AI becomes effective when positioned as a mediating resource within collaborative learning, not as an answer provider. When students must formulate questions, compare AI outputs, challenge assumptions, exchange perspectives, negotiate interpretations, and justify decisions, technology can become a catalyst for learning. This argument implies that student agency is socially and

pedagogically produced, not automatically generated by access. The contribution is a framework connecting intelligent technological support, structured collaboration, and agentic learning in online higher education. Such integration may strengthen autonomy, collaborative competence, critical engagement, and reflective judgment while preserving human responsibility for knowledge construction. Ultimately, the research positions AI not as a replacement for human learning, but as a catalyst that can help transform students from passive users of technology into active learning agents capable of directing, evaluating, and co-creating their learning experiences. This perspective provides a foundation for reimagining collaborative pedagogy in AI-enhanced online higher education.

RESEARCH METHOD

This study employed a qualitative research approach using a case study design to investigate how collaborative pedagogy is reimagined in AI-enhanced online higher education. A qualitative approach was selected because the study sought to understand participants' experiences, perceptions, interactions, and pedagogical practices within their natural educational context rather than measure relationships among predetermined variables. The case study design was considered appropriate because the research focused on an educational phenomenon that is closely connected to its institutional, technological, and social context. In particular, the study examined how AI-supported learning influences students' participation, collaboration, critical engagement, and development as learning agents. The case study enabled the researchers to explore these processes comprehensively through multiple sources of evidence. This design also allowed the researchers to identify patterns of interaction between teachers, students, collaborative learning activities, and AI-supported learning resources, thereby providing an in-depth understanding of the phenomenon within the selected research setting.

The research was conducted at MTs Nurul Jadid, an Islamic educational institution selected purposively because it provides a relevant context for examining the intersection between collaborative pedagogy, digital learning, and emerging educational technologies. The institution was selected based on its ongoing efforts to integrate technology into instructional practices while maintaining an educational environment grounded in Islamic values. This combination provides an important setting for examining how technology-mediated learning can encourage students to become more active participants rather than passive recipients of instructional content. MTs Nurul Jadid was also considered suitable because its learning environment involves teacher–student interaction, peer collaboration, digital learning resources, and structured classroom activities that enable the researchers to observe pedagogical processes directly. Furthermore, the institutional context provides an opportunity to examine how AI-supported learning practices are interpreted and implemented within a religious educational setting. The selection of this site therefore enabled the study to capture the phenomenon holistically and contextually.

Data were collected through three complementary techniques: semi-structured interviews, participant observation, and documentation. Semi-structured interviews were conducted with teachers and students who were directly involved in technology-supported and collaborative learning activities. The interviews explored participants' experiences with AI-supported learning, patterns of collaboration, perceptions of student participation, decision-making processes, challenges, and the ways AI influenced their learning activities. Participant observation was conducted during learning activities to

examine interactions between teachers and students, peer collaboration, students' engagement with AI-supported resources, and observable forms of learning agency. Field notes were recorded systematically throughout the observation process. Documentation was used to complement interview and observation data and included lesson plans, learning materials, student assignments, digital learning records, discussion activities, and other relevant instructional documents. The use of multiple data collection techniques enabled methodological triangulation and provided a more comprehensive representation of the phenomenon under investigation.

RESULT AND DISCUSSION

Result

Collaborative Learning in AI-Enhanced Learning

Collaborative learning in AI-enhanced learning was operationally defined as a learning process in which students construct knowledge through peer interaction while using artificial intelligence as a supporting resource rather than as a substitute for human interaction. In the field, collaboration was identified through several observable indicators, including the distribution of learning responsibilities, exchange of ideas, discussion of AI-generated information, peer feedback, joint problem solving, and collective decision-making. AI was positioned as an additional resource that students could consult when exploring concepts, generating ideas, or clarifying difficult materials. However, students were expected to discuss and evaluate the information collectively before incorporating it into their learning products. Thus, collaboration was not merely represented by students working in groups, but by the occurrence of meaningful interaction in which learners negotiated interpretations, challenged information, and jointly constructed conclusions.

One teacher explained, "When students use AI during group activities, I do not ask them to simply copy the answers. Each group has to discuss whether the information provided by AI is appropriate, compare it with the learning materials, and then decide together what should be used." This statement indicates that AI-supported collaboration was deliberately structured around collective evaluation rather than technological dependence. The teacher's role was primarily facilitative, directing students to question and verify information before accepting it. The finding suggests that collaborative pedagogy can transform AI from an answer-generating mechanism into a mediating resource for group reasoning. The emphasis on discussion and verification also demonstrates that students remained responsible for determining the validity and relevance of AI-generated information. Consequently, the collaborative process encouraged students to engage cognitively with both their peers and the technology.

A student similarly stated, "We usually ask AI when we do not understand something, but we do not immediately use the answer. We discuss it with our group because sometimes the answer is different from what we learned from the teacher or the textbook." This response demonstrates that students perceived AI as a preliminary source of information that required further examination through peer discussion. The statement also reveals an emerging pattern of distributed knowledge construction, in which AI provides informational input while students collectively determine its usefulness. From the researcher's interpretation, this practice indicates that collaboration becomes more meaningful when students are required to negotiate technological information rather than individually consume it. Peer discussion functions

as a mechanism for verification, interpretation, and contextualization. Therefore, AI-supported collaboration does not necessarily weaken interpersonal learning; when appropriately structured, it can create additional opportunities for students to communicate, compare perspectives, and develop shared understanding.

Observation of the learning activities showed that students generally worked in small groups and divided responsibilities when completing AI-supported tasks. Some students searched for information using AI, while others compared the generated responses with learning materials, discussed differences, and prepared the final group response. The researcher also observed that students frequently asked one another questions when AI-generated information appeared unclear or inconsistent. Rather than accepting AI outputs immediately, several groups engaged in short discussions before reaching collective decisions. This observation indicates that the learning process involved interaction among three elements: students, peers, and AI. The pattern demonstrates that AI functioned as an informational stimulus, whereas peers remained important for interpretation and validation. Nevertheless, the intensity of collaboration varied between groups, particularly according to students' willingness to communicate and their ability to critically evaluate AI-generated content.

The data can therefore be restated as follows: AI-enhanced collaborative learning at the research site involved students using artificial intelligence to support, rather than replace, group learning activities. Students accessed AI to obtain information or ideas, but subsequent interpretation and decision-making occurred through peer interaction. The essential finding is that collaboration emerged when students were required to question, compare, verify, and discuss AI-generated information before using it. This process positioned technology as a resource within the learning process while preserving human interaction as the foundation of knowledge construction. The finding also indicates that effective AI-supported collaboration depends on pedagogical structures that establish collective responsibility. Without such structures, AI may encourage individual consumption of information; with them, AI can become a stimulus for discussion, negotiation, and joint problem solving.

The pattern emerging from the data demonstrates a progression from AI access information exploration peer discussion verification collective decision-making. This pattern suggests that collaborative learning was not produced simply by providing students with access to AI. Instead, collaboration developed through instructional expectations requiring students to interact with peers and collectively evaluate technological outputs. Three recurring patterns were particularly evident: the distribution of responsibilities among group members, the use of peer discussion to validate AI-generated information, and the collective construction of final learning products. These patterns demonstrate that AI-supported collaboration is fundamentally relational and pedagogical rather than purely technological. The findings therefore indicate that the effectiveness of AI in collaborative learning depends on how teachers organize tasks and assign responsibility. When AI is embedded within structured group processes, students have greater opportunities to communicate, evaluate information, and construct knowledge collectively.

Student Agency in AI-Enhanced Learning

Student agency in AI-enhanced learning was operationally defined as students' capacity to initiate learning activities, make decisions, evaluate information, regulate

their learning strategies, and take responsibility for learning outcomes while interacting with AI-supported resources. In the research setting, agency was identified through students' initiative in formulating questions, selecting appropriate AI-generated information, questioning technological outputs, determining learning strategies, and deciding how information should be incorporated into collaborative tasks. Agency therefore extended beyond students' ability to operate AI tools. It concerned how actively students exercised judgment and responsibility during the learning process. The findings indicate that AI provided students with greater opportunities to access information independently, but meaningful agency emerged when students critically evaluated that information and made decisions about its relevance. Thus, technology served as an enabling resource, whereas students retained responsibility for directing and evaluating their learning.

One teacher explained, "Students are now more willing to look for explanations by themselves. However, I always remind them that AI can provide an answer, but they have to decide whether the answer is correct and suitable for the assignment." This statement demonstrates an important transformation in the teacher's pedagogical role. Instead of functioning primarily as the sole provider of information, the teacher increasingly acted as a facilitator of students' independent inquiry and critical evaluation. The statement also indicates that student agency was not equated with unrestricted technological autonomy. Students were encouraged to initiate searches and explore explanations independently, but they remained responsible for evaluating the credibility and relevance of the information obtained. From the researcher's perspective, this represents a shift from dependence on teacher-provided knowledge toward shared responsibility for learning. AI consequently expanded students' opportunities to act independently while pedagogical guidance maintained academic accountability.

A student stated, "If I do not understand the material, I can ask AI first and then look for another explanation. Sometimes I compare several answers before choosing the one that makes the most sense." This response indicates that students were beginning to exercise greater control over their learning processes. Rather than waiting for the teacher to provide clarification, the student initiated an independent search, compared information, and made a judgment regarding the most appropriate explanation. The researcher interprets this behavior as evidence of emerging learning agency because the student demonstrated initiative, choice, evaluation, and responsibility. Importantly, the student did not simply accept the first AI-generated answer. The comparison of multiple explanations suggests an evaluative process in which AI becomes one of several resources used to support decision-making. Therefore, the presence of AI can create opportunities for students to regulate learning more actively when tasks require them to make informed choices.

Observation showed that several students independently initiated questions to AI when encountering difficulties during learning activities. Some students experimented with different prompts to obtain clearer explanations, while others compared AI responses with textbooks, teacher explanations, and peer opinions. The researcher observed that students who actively questioned AI tended to participate more frequently in group discussions because they brought additional information into the collaborative process. However, differences in agency were also visible. Some students used AI primarily to obtain immediate answers, whereas others used it to explore alternative explanations and formulate follow-up questions. This variation indicates that access to

the same technology does not automatically produce the same level of agency. Student agency depends on how learners interpret the function of AI and whether learning activities require them to exercise judgment. The observation therefore reinforces the importance of pedagogical design in transforming technological access into meaningful learner autonomy.

The data can be restated to clarify the central finding: AI created additional opportunities for students to initiate learning, seek explanations, compare information, and make decisions independently. However, agency became visible only when students actively controlled these processes rather than merely receiving AI-generated answers. The findings demonstrate that students could move from asking “What is the answer?” toward asking “Which answer is appropriate, why is it appropriate, and how can I use it?” This shift represents a qualitative transformation in the learning role of students. They were no longer positioned exclusively as recipients of information but increasingly as evaluators and decision-makers. Nevertheless, the emergence of agency remained dependent on instructional expectations, teacher guidance, and students’ critical engagement. AI therefore functions as a potential catalyst for agency, but its pedagogical effect depends on whether students are required to exercise judgment and assume responsibility.

The pattern of the data can be represented as initiative → exploration → comparison → evaluation → decision-making → responsibility. This sequence demonstrates that student agency developed through a series of interconnected learning behaviors rather than through technology access alone. The first pattern was students’ willingness to initiate learning activities independently. The second was their exploration of multiple sources, including AI, teachers, textbooks, and peers. The third involved evaluation and comparison, through which students determined the credibility and relevance of information. The final pattern concerned decision-making and responsibility for the resulting learning product. These findings suggest that AI-enhanced learning can support a transition from passive learning toward agentic participation when students are given meaningful opportunities to make choices. Thus, the central pedagogical challenge is not providing more AI tools, but designing learning environments in which students must actively direct, question, evaluate, and take responsibility for their learning processes.

Discussion

The findings demonstrate that AI-enhanced collaborative learning can transform students’ participation when AI is positioned as a mediating resource rather than a replacement for peer interaction (Gallagher-Ford et al., 2025; Stokstad et al., 2026; Wolyniak et al., 2026). This finding is consistent with previous research showing that AI can facilitate communication, cooperative learning, learner engagement, and personalized support when integrated with appropriate pedagogical strategies. However, the present findings extend this literature by showing that the value of AI does not primarily emerge from its capacity to generate information, but from its ability to stimulate discussion, verification, comparison, and collective decision-making. Students in the present study did not simply consume AI-generated responses; they discussed, compared, and evaluated them with peers before incorporating information into learning products (Kircova et al., 2026; Muzingili, 2026; Putra et al., 2024; Qatrunnada, 2023). This pattern suggests that collaborative pedagogy remains central even in AI-rich

environments. Theoretically, the finding strengthens a human-centered perspective in which technology mediates social learning rather than displacing interpersonal knowledge construction.

The findings concerning student agency are also broadly consistent with literature emphasizing autonomy, self-regulation, and active participation in technology-enhanced learning. Previous studies have reported that AI can provide students with immediate explanations, adaptive assistance, and opportunities for independent exploration. The present study confirms these benefits but identifies an important condition: access to AI alone does not automatically produce learner agency (Cipta et al., 2026; Meliala et al., 2026; Nazib et al., 2024; Rojak, 2025). Agency became visible when students initiated inquiries, compared multiple sources, evaluated AI-generated information, and assumed responsibility for their decisions. This finding partially differs from technologically deterministic perspectives that associate greater access to intelligent tools with greater learner independence. Instead, the evidence indicates that agency is pedagogically constructed through tasks that require judgment and accountability (Anwar et al., 2026; Giraldi et al., 2024; Hasrimy & Abdullah, 2025; Kholid, 2023). Theoretically, this contributes to student agency perspectives by emphasizing that autonomy in AI-enhanced learning is relational and mediated through interaction with technology, teachers, peers, and learning resources rather than being an isolated individual capacity.

A significant contribution of the study lies in connecting collaborative learning and student agency within a single AI-enhanced pedagogical process. Existing research frequently examines AI personalization, self-regulated learning, collaborative learning, or student engagement as relatively separate dimensions. The present findings demonstrate a sequential relationship in which AI-supported exploration generates information, peer interaction facilitates comparison and interpretation, and collective evaluation supports decision-making (Ameen et al., 2026; Garritzmman et al., 2023; Ramovš & Milfelner, 2023). This pattern suggests that AI can become a catalyst for both collaboration and agency when learning activities deliberately connect technological assistance with social negotiation. Theoretically, the findings extend collaborative learning perspectives by incorporating AI as a mediating element while simultaneously extending agency theory by recognizing technology-mediated interaction as part of students' agentic action. Practically, this implies that lecturers should design AI-supported tasks requiring students to formulate questions, compare outputs, justify choices, provide peer feedback, and produce collective conclusions rather than merely submit AI-assisted answers.

The findings also have important implications for higher-education practice, particularly for lecturers, curriculum designers, and institutions developing AI-enhanced online learning environments (Al-Shawabkeh & Aljasmī, 2025; Langer, 2024; Mark & Morison, 2025; Wirtz et al., 2020). The observed variation in students' use of AI demonstrates that identical technological access can produce different learning behaviors. Some students used AI primarily for immediate answers, whereas others used it to explore alternatives, verify information, and develop follow-up questions. This indicates that pedagogical design is more consequential than technological availability alone. Lecturers therefore need to establish explicit guidelines for AI use, design collaborative assignments around verification and reasoning, and assess students' processes of inquiry rather than only their final products. Institutions should also provide professional development that enables lecturers to integrate AI with collaborative and

agentic pedagogies. These practices can reduce passive dependence on AI while strengthening critical digital literacy, collaboration, autonomy, and accountability. The practical contribution is consequently a set of pedagogical principles for converting AI access into meaningful learning participation.

Overall, the study contributes to the reimagining of AI-enhanced education by proposing a shift from an assistance-centered model toward an agency-centered collaborative model. The findings indicate that students become learning agents when AI-supported activities require them to initiate inquiry, interact with peers, evaluate information, negotiate meaning, and take responsibility for decisions. This contribution responds to concerns that generative AI may encourage cognitive outsourcing and passive learning (Al-Shawabkeh & Aljasmi, 2025; Cojocar, 2025; Hadi et al., 2025; Langer, 2024; Li, 2025; Mark & Morison, 2025; Pasupuleti, 2026; Roehl & Hansen, 2024; Wirtz et al., 2020). Rather than rejecting AI, the study demonstrates how its pedagogical role can be reconstructed through structured collaboration and critical evaluation. Theoretically, the study brings together technological mediation, collaborative learning, and learner agency into an integrated perspective. Practically, it offers a foundation for designing AI-enhanced learning activities that prioritize human judgment and collective knowledge construction. The broader implication is that successful AI integration should be evaluated not by how efficiently technology produces answers, but by whether it enables learners to ask better questions, collaborate meaningfully, exercise judgment, and become responsible agents of their learning.

CONCLUSION

This study concludes that AI-enhanced collaborative pedagogy can transform students from passive recipients of information into active learning agents when artificial intelligence is positioned as a mediating resource rather than a substitute for human interaction. The most important lesson is that access to AI alone does not create meaningful learning; agency emerges when students are required to initiate inquiry, collaborate with peers, evaluate AI-generated information, negotiate meaning, and take responsibility for learning decisions. The main scholarly contribution lies in integrating AI-supported learning, collaborative pedagogy, and student agency into a unified conceptual perspective that emphasizes human judgment and social knowledge construction. Nevertheless, the study is limited by its qualitative case-study design and focus on a single educational context, which restricts broader generalization. Future research should examine multiple institutions and educational levels, employ longitudinal or mixed-method designs, and investigate how different AI tools and pedagogical strategies influence the sustained development of learner agency and collaborative competence.

ACKNOWLEDGEMENT

The authors would like to express their sincere gratitude to all individuals and institutions who contributed to the completion of this study. Special appreciation is extended to the administrators, teachers, and students of MTs Nurul Jadid for their valuable participation, openness, and support throughout the research process. The authors also thank colleagues and academic peers who provided constructive insights, suggestions, and encouragement during the development of this research. Their contributions were essential in strengthening the interpretation of the findings and

improving the quality of the manuscript. Finally, the authors gratefully acknowledge everyone who supported this research directly or indirectly and contributed to its completion.

REFERENCES

- Agonafir, A. M. (2023). Using cooperative learning strategy to increase undergraduate students' engagement and performance. *Educational Action Research*, 31, 981–997. <https://doi.org/10.1080/09650792.2023.2231512>
- Al-Shawabkeh, F. A.-H., & Aljasmi, K. (2025). Artificial Intelligence and Transparency Management in the Public Sector: A Comparative Legal Study on Accountability and Oversight in European and American Laws. *Journal of Posthumanism*. <https://doi.org/10.63332/joph.v5i5.1619>
- Ameen, K. S., Towfiq, T. A., Mousa, K., & Pooyanmehr, M. (2026). Judicial review of algorithmic administrative systems legality evidence and remedies in the smart city state. *Frontiers in Artificial Intelligence*, 9. <https://doi.org/10.3389/frai.2026.1802986>
- Anwar, Z., Sumbulah, U., Tharaba, M. F., Wahyudin, A., & Akbar, F. (2026). Professional Development and Digital Governance in One-Stop Service Transformation: An Educational Perspective. *AL-ISHLAH: Jurnal Pendidikan*, 18(2).
- Benson, H., Williams, K., & Heggart, K. (2024). Quality assurance interventions in blended learning design: A systematic review of the literature. *Australasian Journal of Educational Technology*. <https://doi.org/10.14742/ajet.9362>
- Chen, C.-M., & Huang, M.-Y. (2024). Enhancing programming learning performance through a Jigsaw collaborative learning method in a metaverse virtual space. *International Journal of STEM Education*, 11. <https://doi.org/10.1186/s40594-024-00495-2>
- Chen, L. (2025). A Protocol for Evaluating Learning Outcomes Using Reverse Jigsaw and Edpuzzle in Doctoral Business Education: A Q-Methodology Study. *International Journal of Qualitative Methods*, 24. <https://doi.org/10.1177/16094069251326412>
- Chugh, R., Turnbull, D., Cowling, M., Vanderburg, R., & Vanderburg, M. (2023). Implementing educational technology in Higher Education Institutions: A review of technologies, stakeholder perceptions, frameworks and metrics. *Education and Information Technologies*, 28, 16403–16429. <https://doi.org/10.1007/s10639-023-11846-x>
- Cipta, A. S., Rusli, A. M., & Irwan, A. L. (2026). Governance and Policy in Public Service Institutions: Performance Analysis of DPMPSTP North Kalimantan, Indonesia. *World Conference on Governance and Social Sciences 2025 (WCGSS 2025)*, 1248–1270.
- Cojocaru, A. (2025). Governing AI with trust: an adaptive framework for institutional legitimacy in the UK public sector. *Transforming Government: People, Process and Policy*. <https://doi.org/10.1108/tg-05-2025-0125>
- Daniel, K., Msambwa, M., Fute, A., & Wan, X. (2024). Motivate students for better academic achievement: A systematic review of blended innovative teaching and its impact on learning. *Computer Applications in Engineering Education*, 32. <https://doi.org/10.1002/cae.22733>
- Darabi, F., Karimian, Z., & Rohban, A. (2024). Putting the pieces together: comparing the effect of jigsaw cooperative learning and lecture on public health students' knowledge, performance, and satisfaction. *Interactive Learning Environments*, 33, 495–512. <https://doi.org/10.1080/10494820.2024.2351157>
- Gallagher-Ford, L., Dean, J., Martini, K., & Thomas, B. (2025). Leveraging the Jigsaw Learning Strategy to Promote Competence, Confidence, and Efficiency in Evidence-Based Practice. *Worldviews on Evidence-Based Nursing*, 22 4. <https://doi.org/10.1111/wvn.70047>
- Garritzmann, J. L., Neimanns, E., & Busemeyer, M. R. (2023). Public opinion towards welfare state reform: The role of political trust and government satisfaction. *European Journal of Political Research*, 62(1), 197–220.
- Giraldi, L., Coacci, S., & Cedrola, E. (2024). How relational capability can influence the

- success of business partnerships. *International Journal of Productivity and Performance Management*, 73(2), 601–628.
- Hadi, I. A. A., Nastiti, L., Adnyani, N. K. N. S., Kusuma, P. R. A., Fajar, N. M. A. P., Widiyani, I. A. M., Holy, N. K. P. P., & Haura. (2025). Law and Policy on AI Utilization for Good Governance in Indonesia. *SHS Web of Conferences*. <https://doi.org/10.1051/shsconf/202522103010>
- Hasrimy, M. F., & Abdullah, A. (2025). Model of implementation of islamic communication values in public services: A participatory study at Haji Hospital Medan. *Journal Analytica Islamica*, 14(1), 644–656.
- Kebede, Y. A., Zema, F. K., Geletu, G., & Zinabu, S. (2025). Cooperative Learning Instructional Approach and Student's Biology Achievement: A Quasi-Experimental Evaluation of Jigsaw Cooperative Learning Model in Secondary Schools in Gedeo Zone, South Ethiopia. *SAGE Open*, 15. <https://doi.org/10.1177/21582440251318883>
- Kholid, I. (2023). Madrasah management based on total quality management in developing student character. *Journal of Educational Research*, 2(2), 347–364.
- Kilpeläinen-Pettersson, J., Koskinen, P., Lehtinen, A., & Mäntylä, T. (2025). Cooperative Learning in Higher Education Physics – A Systematic Literature Review. *International Journal of Science and Mathematics Education*, 23, 2707–2729. <https://doi.org/10.1007/s10763-024-10538-3>
- Kircova, I., Sağlam, M. H., Şenlik, A. C., Akdemir, D. M., & Enginkaya, E. (2026). The impact of PTSD symptoms on post-disaster consumption: tertiary victims of the 2023 Kahramanmaraş earthquakes in Türkiye. *Frontiers in Public Health*, 14, 1703071.
- Langer, C. (2024). Decision-making power and responsibility in an automated administration. *Discover Artificial Intelligence*, 4. <https://doi.org/10.1007/s44163-024-00152-1>
- Lee, G.-G., Mun, S., Shin, M.-K., & Zhai, X. (2023). Collaborative Learning with Artificial Intelligence Speakers. *Science & Education*, 34, 847–875. <https://doi.org/10.1007/s11191-024-00526-y>
- Li, C. (2025). AI-Driven Governance: Enhancing Transparency and Accountability in Public Administration. *Digital Society & Virtual Governance*. <https://doi.org/10.6914/dsvg.010101>
- Lin, C.-C., Han, C.-Y., Huang, Y.-L., & Chen, L.-C. (2024). Constructing learning confidence through jigsaw, concept maps and group cooperative learning: A qualitative study. *Nurse Education in Practice*, 82, 104239. <https://doi.org/10.1016/j.nepr.2024.104239>
- Mardiyah, S. U. K., Setyawan, H., García-Jiménez, J., Eken, Ö., Latino, F., Pranoto, N. W., Darmawan, A., Shidiq, A., Rahmatullah, M. I., Tafuri, F., & Anam, K. (2024). Differences in the Implementation of Physical Education (PE) Learning Management Based on Years of Work: Analysis of Differences in the Quality of Quality Assurance Culture. *Retos*. <https://doi.org/10.47197/retos.v55.104865>
- Mark, D., & Morison, J. (2025). Governing AI Decision-Making: Balancing Innovation and Accountability. *Politics and Governance*. <https://doi.org/10.17645/pag.10245>
- Meliala, D., Ritonga, S., & Muda, I. (2026). ONE-STOP INTEGRATED SERVICE SYSTEM TO IMPROVE COMMUNITY SERVICES IN PAYING VEHICLE TAXES AT SAMSAT KABANJAHE. *SOSIOEDUKASI: JURNAL ILMIAH ILMU PENDIDIKAN DAN SOSIAL*, 15(2), 735–744.
- Muzingili, T. (2026). An Evaluation of Factors Predicting the Resilience of Child Sexual Abuse Survivors in Rural and Urban Zimbabwe. *Adversity and Resilience Science*, 7(2), 33.
- Nazib, F. M., Ainissyifa, H., Anisah, A. S., Masripah, M., Yuliani, F., Mulqiah, A. R., Nazelita, N., & Tsuroya, R. N. (2024). Improving Digital Competence Madrasah Teachers Through the Ministry of Religion's Digital Platform (SIPINTAR). *International Conference on Islamic Education*, 2(1), 1–14.
- Pasupuleti, M. K. (2026). Toward Trustworthy Artificial Intelligence in Law and Public Administration: Transparency, Accountability and Decision Support. *International Journal of Academic and Industrial Research Innovations(IJAIRI)*. <https://doi.org/10.62311/nesx/rp-1-28-30032026>
- Putra, F., Wike, W., Nurani, F., Ulum, M. C., Salsabilla, S. A., & Ferdhianzah, H. J. (2024).

- The determinants for policy implementation: A study of Public Service Mall program in Indonesia. *Jurnal Borneo Administrator*, 20(2), 159–170.
- Qatrunnada, A. U. (2023). Enhancing Public Service Quality through Information Systems: A Case Study of PD Pontren in Sleman's Ministry of Religious Affairs. *Journal of Islamic Education Management Research*, 1(2), 111–121.
- Ramovš, M., & Milfelner, B. (2023). The importance of educational service quality for customer satisfaction and organizational reputation. *Naše Gospodarstvo/Our Economy*, 69(2), 29–40.
- Roehl, U., & Hansen, M. (2024). Automated, administrative decision-making and good governance: Synergies, trade-offs, and limits. *Public Administration Review*. <https://doi.org/10.1111/puar.13799>
- Rojak, J. A. (2025). Reconstructing bureaucracy through agility and empathy in public service transformation. *Bulletin of Science, Technology and Society*, 4(1), 27–34.
- Solak, T. K., Solak, Ü., & Yurttaş, A. (2025). The effect of wound care education based on the Jigsaw IV learning technique on nursing students' knowledge, collaborative learning and motivation: A randomized controlled trial. *Nurse Education in Practice*, 90, 104677. <https://doi.org/10.1016/j.nepr.2025.104677>
- Stokstad, J. M., Nedrehagen, E., & Hufthammer, K. (2026). The Jigsaw teaching method compared to traditional teaching on anatomy and physiology knowledge in higher education – a randomised controlled trial. *BMC Medical Education*, 26. <https://doi.org/10.1186/s12909-026-08608-x>
- Townsend, C., Opsahl, A., & Geiselman, E. (2024). Using the Jigsaw Technique to Examine the RaDonDa Vaught Case. *Nurse Educator*, 49, 228–229. <https://doi.org/10.1097/nne.0000000000001676>
- Wirtz, B., Weyerer, J., & Sturm, B. (2020). The Dark Sides of Artificial Intelligence: An Integrated AI Governance Framework for Public Administration. *International Journal of Public Administration*, 43, 818–829. <https://doi.org/10.1080/01900692.2020.1749851>
- Wolyniak, M., Elgeddawy, M., Begum, G., Goud, B., Marakala, V., Hamad, N., Elizabeth, S., Khan, F., Agarwal, A., Khattak, O., Fareed, M., Alshammari, K., Desai, V., & Chaudhary, F. (2026). Enhancing medical students comprehension through active learning: implementing the jigsaw method to improve engagement. *Frontiers in Medicine*, 13. <https://doi.org/10.3389/fmed.2026.1732913>
- Zhan, Z., Li, T., & Ye, Y. (2024). Effect of jigsaw-integrated task-driven learning on students' motivation, computational thinking, collaborative skills, and programming performance in a high-school programming course. *Computer Applications in Engineering Education*, 32. <https://doi.org/10.1002/cae.22793>