

Transforming Pedagogical Practices through Deep Learning in Elementary Education

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ABSTRACT

Despite growing interest in deep learning pedagogy as a means of fostering meaningful and student-centered learning, limited empirical research has examined how pedagogical practices are reshaped through its implementation in authentic elementary school classrooms, particularly within the Indonesian context. This study investigated how deep learning pedagogy was perceived to support changes in teaching practices and meaningful learning experiences in an international elementary school setting. A single-site qualitative case study was conducted at Fatimah International Elementary School, Indonesia, involving 13 participants consisting of three teachers, nine students, and one academic coordinator. Data were collected through classroom observations, semi-structured interviews, and document analysis and were analyzed using thematic analysis. The findings suggest that deep learning pedagogy supported a shift from transmission-oriented teaching toward more student-centered, reflective, and collaborative classroom practices. Meaningful learning emerged when instructional activities were connected to students' everyday experiences and supported through inquiry, discussion, and authentic learning tasks. Reflective learning practices appeared to strengthen learner agency, metacognitive awareness, and self-regulated learning, while collaborative activities enhanced students' cognitive, emotional, and social engagement. However, implementation required careful instructional preparation, classroom management, and institutional support. These findings contribute to the growing discourse on deep learning pedagogy by providing contextual evidence from elementary education and highlighting its potential to foster meaningful learning environments. The study suggests that teachers and school leaders should promote reflective, collaborative, and contextually relevant learning experiences while ensuring adequate pedagogical and organizational support for sustainable implementation.

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1. INTRODUCTION

The rapid transformation of education in the twenty-first century has challenged schools to move beyond content transmission and prioritize learning experiences that foster critical thinking, collaboration, reflection, and learner autonomy. As educational systems increasingly emphasize competencies required for complex and dynamic societies, there is growing recognition that students need opportunities to engage deeply with knowledge rather than merely acquire information. This shift has stimulated interest in pedagogical approaches that support meaningful learning, active participation, and the development of higher-order thinking skills. Among these approaches, deep learning pedagogy has emerged as a promising framework for creating learning environments that encourage inquiry, reflection, and authentic engagement with knowledge.

The importance of deep learning pedagogy is particularly evident in elementary education. Elementary school represents a foundational stage in which students develop learning habits, cognitive dispositions, social interaction skills, and attitudes toward learning that may influence their future educational trajectories. Traditional transmission-oriented instruction, characterized by teacher-dominated explanations and memorization-based learning, may limit students' opportunities to develop conceptual understanding, learner agency, and reflective thinking. Consequently, pedagogical approaches that promote meaningful engagement, collaborative learning, and active knowledge construction are increasingly considered essential in supporting holistic student development during the early years of schooling.

Although frequently discussed within contemporary educational discourse, several concepts associated with this study require conceptual clarification. Deep learning as meaningful learning refers to students' ability to develop deep conceptual understanding, connect knowledge to authentic contexts, and engage in reflective meaning-making beyond surface-level memorization (Mystakidis, 2021). Deep learning pedagogy, in contrast, refers to the instructional approaches and classroom practices designed to facilitate such learning outcomes through inquiry, collaboration, reflection, and authentic learning tasks. Learner-centered pedagogy represents a broader educational orientation that positions students as active participants in the learning process rather than passive recipients of knowledge. Meanwhile, pedagogical transformation refers to the process through which teachers reconstruct instructional roles, classroom interactions, and learning environments in response to evolving educational goals. In this study, deep learning pedagogy is conceptualized as a pedagogical mechanism through which pedagogical transformation may occur and meaningful learning may emerge.

Recent educational research has highlighted the potential of learner-centered and deep learning approaches to improve student engagement, motivation, and conceptual understanding (Blinkoff et al., 2023; Parker et al., 2022). Studies have shown that meaningful learning is more likely to occur when students actively participate in inquiry-based activities, collaborate with peers, and connect classroom learning to real-life experiences (Polman et al., 2020; Roelle & Richter, 2025). Furthermore, reflective learning practices have been associated with increased metacognitive awareness and self-regulated learning, enabling students to become more active participants in their own educational development (Chang et al., 2024). These findings suggest that deep learning pedagogy has considerable potential to support both academic and holistic educational outcomes.

The growing interest in deep learning pedagogy also reflects broader educational reform agendas worldwide. Educational systems increasingly recognize that preparing students for contemporary social, technological, and economic challenges requires instructional approaches that extend beyond content mastery and standardized assessment performance. As a result, schools are encouraged to create learning environments that foster collaboration, creativity, problem-solving, and learner agency (Tangney et al., 2023). Deep learning pedagogy has therefore gained increasing attention as a framework capable of supporting these educational aspirations through meaningful and contextually relevant learning experiences.

Indonesia represents an important context for examining these developments. Recent educational reforms, particularly the implementation of the Merdeka Curriculum, have emphasized meaningful learning, learner agency, differentiated instruction, reflective teaching, and competency-based education. These reforms encourage teachers to create flexible and student-centered learning environments that support students' cognitive, social, and emotional development. More recently, discussions surrounding deep learning pedagogy have gained increasing attention within Indonesian educational discourse as policymakers and educators seek to strengthen educational quality beyond curriculum coverage and examination-oriented instruction. However, despite these policy developments, translating pedagogical ideals into authentic classroom practice remains a significant challenge.

Previous studies have examined deep learning pedagogy from various perspectives. Tobin et al. (2024) explored collaborative reflective practice as a mechanism for improving teaching and learning, highlighting the importance of reflective engagement in educational improvement. Mystakidis (2021) conceptualized deep meaningful learning as an educational framework that promotes authentic understanding and learner engagement. In the Indonesian context, Sudirman and Pandang (2025) investigated teachers' perspectives on implementing deep learning pedagogy within curriculum reform and reported generally positive attitudes toward its adoption. While these studies provide valuable theoretical, policy, and perceptual insights, they offer limited understanding of how deep learning pedagogy is enacted in everyday classroom practice.

A critical review of the literature reveals three important gaps. First, existing studies predominantly focus on policy discourse, conceptual frameworks, or teacher perceptions rather than examining how deep learning pedagogy is enacted through authentic classroom interaction and instructional practices. Second, relatively little research has investigated how teachers and students experience pedagogical transformation associated with deep learning approaches within elementary education settings. Third, empirical evidence from Indonesian elementary schools remains limited, particularly within international school contexts where global pedagogical innovations intersect with national curriculum reform initiatives. Consequently, there is insufficient understanding of how deep learning pedagogy operates as a practical pedagogical process capable of shaping classroom interaction, instructional design, and students' learning experiences.

To address these gaps, this study focuses on Fatimah International Elementary School, Indonesia. The school provides a particularly relevant case because it explicitly promotes inquiry-based learning, collaborative classroom activities, reflective practices, and authentic assessment approaches that align with contemporary deep learning principles. As an international elementary school operating within the Indonesian educational system, it represents a unique educational setting where international pedagogical influences intersect with national curriculum reform priorities. This combination makes the school an information-rich context for examining how deep learning pedagogy is translated into everyday classroom practices.

This study contributes by examining how deep learning pedagogy is enacted in classroom interaction, instructional design, and students' learning experiences within a single Indonesian international elementary school. Rather than focusing solely on policy discourse or teacher perceptions, the study explores how pedagogical transformation emerges through everyday teaching and learning practices. By providing contextual evidence from an elementary school setting, this research contributes to the growing body of knowledge concerning deep learning pedagogy, meaningful learning, and learner-centered educational reform in developing-country contexts.

Accordingly, this study seeks to explore how deep learning pedagogy is enacted in elementary classroom practice and how it contributes to pedagogical transformation and meaningful learning experiences. The study is guided by the following research questions: 1. How is deep learning pedagogy enacted in classroom interaction and instructional practices at Fatimah International Elementary School? 2. How do teachers and students perceive the role of deep learning pedagogy in shaping meaningful learning experiences? 3. In what ways does deep learning pedagogy contribute to

pedagogical transformation, learner engagement, and reflective learning processes in elementary education?

2. METHODS

2.1 Research Design

This study employed a qualitative case study design to investigate how deep learning pedagogy was enacted in classroom interaction, instructional practices, and students' learning experiences within an elementary school context. A qualitative approach was considered most appropriate because the study sought to understand participants' experiences, interpretations, and pedagogical practices rather than measure predetermined variables or instructional outcomes quantitatively. The research questions focused on how deep learning pedagogy was implemented and experienced by teachers and students in everyday classroom settings, requiring an in-depth exploration of naturally occurring educational processes.

The study adopted an instrumental case study approach (Stake, 1995), in which a specific case was examined to provide broader insights into the implementation of deep learning pedagogy and pedagogical transformation in elementary education. The case itself was not the primary object of interest; rather, it served as a vehicle for understanding how deep learning pedagogy operates in authentic classroom contexts. This design enabled the researchers to generate rich contextual descriptions of classroom practices, teacher decision-making, learner engagement, and reflective learning processes.

The study was informed by an interpretivist paradigm, which assumes that educational realities are socially constructed through interaction and experience. This perspective allowed the researchers to explore how teachers and students interpreted meaningful learning experiences and how pedagogical transformation emerged through daily instructional practices.

2.2 Research Context

The study was conducted at Fatimah International Elementary School, Sumenep, East Java, Indonesia. The school was selected purposively because it explicitly promotes inquiry-based learning, collaborative learning activities, reflective practices, and authentic assessment approaches that align with contemporary deep learning principles. Fatimah International Elementary School implements the Indonesian Merdeka Curriculum while integrating international educational practices emphasizing learner agency, project-based learning, and reflective learning. The school serves approximately 180 students from Grades 1–6. Classroom instruction is delivered primarily in Bahasa Indonesia, with selected learning activities conducted bilingually in Bahasa Indonesia and English. Class sizes range from 20 to 28 students per classroom.

The study focused on upper elementary grades (Grades 4–6), where students were considered developmentally capable of participating in reflective interviews and collaborative inquiry activities. Classroom observations were conducted across science, social studies, Bahasa Indonesia, and project-based learning sessions because these subjects provided opportunities to observe inquiry, collaboration, and authentic learning activities associated with deep learning pedagogy.

As an international elementary school operating within the Indonesian educational system, the school represents a unique educational setting where global pedagogical innovations intersect with national curriculum reform initiatives. This context provided an information-rich case for examining how deep learning pedagogy is translated into everyday classroom practice.

2.3 Participants

Participants were selected using purposive sampling to ensure that information-rich cases were included in the study. The final participant group consisted of thirteen individuals: three classroom teachers, nine students, and one academic coordinator. The teacher participants were selected based on

four criteria: (1) a minimum of two years of teaching experience, (2) active implementation of student-centered instructional approaches, (3) involvement in reflective teaching practices, and (4) willingness to participate in classroom observations and interviews. The teachers had teaching experience ranging from three to nine years and represented different upper-elementary grade levels.

Nine students were selected from Grades 4–6 to represent diverse levels of classroom participation and academic engagement. The inclusion of students with varying participation profiles enabled the researchers to capture multiple perspectives regarding meaningful learning experiences and classroom interaction. The academic coordinator was included to provide institutional perspectives concerning curriculum implementation, pedagogical supervision, and instructional innovation.

Table 1. Participant Characteristics

Participant Group	Number	Selection Criteria
Teachers	3	Student-centered teaching experience
Students	9	Diverse engagement levels (Grades 4–6)
Academic Coordinator	1	Curriculum and pedagogical leadership

2.4 Data Collection

Data were collected over a three-month period from February to April 2026 through classroom observations, semi-structured interviews, and document analysis. The use of multiple data sources enabled methodological triangulation and strengthened the credibility of findings.

2.4.1 Classroom Observations

A total of twelve non-participant classroom observations were conducted. Each teacher was observed during four separate instructional sessions. Observation sessions lasted between 60 and 90 minutes depending on classroom schedules, resulting in approximately 18 hours of observation data. The observation protocol was developed from key constructs identified in the literature on deep learning pedagogy, meaningful learning, learner-centered pedagogy, and reflective learning (Mystakidis, 2021; Parker et al., 2022; Roelle & Richter, 2025). Observation indicators included student participation, collaborative interaction, inquiry processes, authentic problem-solving, teacher facilitation, formative feedback, learner autonomy, and reflective learning opportunities. Field notes and structured observation sheets were used to document instructional activities, teacher-student interaction patterns, classroom discourse, and student engagement.

2.4.2 Semi-Structured Interviews

Semi-structured interviews were conducted with all participants. The interview process consisted of three teacher interviews, nine student interviews, and one interview with the academic coordinator, resulting in thirteen interviews overall. Interviews were conducted primarily in Bahasa Indonesia to ensure participant comfort and depth of response. Each interview lasted between 30 and 60 minutes and was audio-recorded with participants' consent.

Teacher interviews explored instructional planning, classroom implementation, reflective teaching practices, learner engagement, and challenges associated with deep learning pedagogy. Student interviews focused on classroom experiences, participation, collaboration, motivation, and perceptions of meaningful learning. The academic coordinator interview examined curriculum implementation, pedagogical leadership, and institutional support.

All interview recordings were transcribed verbatim in Bahasa Indonesia. The transcripts were subsequently reviewed alongside audio recordings to ensure accuracy before analysis. Quotations included in the findings were translated into English by the researchers and reviewed for semantic equivalence.

2.4.3 Document Analysis

Document analysis was conducted to complement observational and interview data and to examine how deep learning principles were reflected in instructional planning and assessment practices. A total of 31 documents were analyzed, including: 12 lesson plans, 6 teaching modules, 4 teacher reflective journals, 5 classroom assessment records, 4 samples of student learning products. The documents were examined for evidence of inquiry-based learning, collaborative activities, reflective practices, authentic assessment, learner agency, and meaningful learning experiences.

2.4.4 Data Analysis

Data were analyzed using thematic analysis following Braun and Clarke's (2021) six-phase framework. The analysis began with repeated reading of interview transcripts, observation field notes, and documentary materials to achieve data familiarization. Initial coding was subsequently conducted using a combination of inductive and theoretically informed coding procedures. Meaningful segments of data were assigned descriptive codes representing observed pedagogical practices, classroom interactions, and learning experiences. Examples of initial codes included "student questioning," "peer discussion," "teacher scaffolding," "reflection activity," "real-life connection," "collaborative problem-solving," and "student decision-making." These codes were then grouped into broader categories and subsequently developed into higher-order themes.

Table 2. Illustration of Coding Process

Initial Codes	Categories	Final Theme
Student questioning, inquiry tasks, exploration	Inquiry-oriented learning	Student-centered pedagogy
Real-life connection, authentic examples	Contextual learning	Meaningful learning
Reflection journals, self-assessment	Reflective practices	Reflective learning
Peer discussion, collaborative projects	Social interaction	Student engagement
Teacher scaffolding, adaptive instruction	Instructional flexibility	Pedagogical adaptation

The themes were reviewed iteratively against the dataset to ensure coherence, internal consistency, and conceptual distinctiveness. Final themes were interpreted in relation to deep learning pedagogy, meaningful learning theory, and learner-centered educational literature.

2.5 Researcher Reflexivity and Trustworthiness

Data coding and interpretation were conducted by the first author. Because a single coder was involved, several strategies were implemented to minimize potential researcher bias. First, methodological triangulation was employed by comparing evidence across observations, interviews, and documents. Second, member checking was conducted with participating teachers to verify the accuracy of interpretations. Third, peer debriefing sessions were conducted with two educational researchers experienced in qualitative research and elementary education. Fourth, an audit trail documenting coding decisions, analytical memos, and theme development was maintained throughout the research process.

Trustworthiness was established using the criteria of credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985). Credibility was enhanced through prolonged engagement, triangulation, member checking, and peer debriefing. Transferability was supported through thick descriptions of the research setting and participants. Dependability was maintained through systematic documentation of research procedures. Confirmability was strengthened through reflexive journaling and transparent reporting of analytical decisions.

2.6 Ethical Considerations

Ethical approval was obtained from the university research committee and school administration prior to data collection. All participants received information regarding the study's objectives,

confidentiality procedures, voluntary participation, and their right to withdraw at any stage. Written informed consent was obtained from teachers and school authorities, while parental consent and student assent were secured for all student participants. Pseudonyms were used throughout the study to protect participant identities, and all data were stored securely and used solely for research purposes.

3. FINDINGS AND DISCUSSION

Thematic analysis generated five interconnected themes illustrating how deep learning pedagogy was enacted in classroom practice and how it contributed to pedagogical transformation and meaningful learning experiences at Fatimah International Elementary School. The findings presented below are grounded in classroom observations, semi-structured interviews, and document analysis. Collectively, the findings suggest that deep learning pedagogy was experienced not as a discrete instructional strategy but as a pedagogical process involving inquiry, contextual learning, reflection, collaboration, and continuous instructional adaptation.

3.1 Theme 1: Inquiry-Oriented Classroom Interaction

Classroom observations indicated that deep learning pedagogy was primarily enacted through inquiry-oriented classroom interaction. Across the observed lessons, teachers frequently initiated learning through questions, problem scenarios, and exploratory activities rather than direct explanation. Students were encouraged to formulate questions, investigate ideas, discuss alternative perspectives, and justify their responses through collaborative dialogue.

The data suggest that classroom interaction shifted from predominantly teacher-directed communication toward a more dialogic learning environment. Teachers appeared to function as facilitators who guided inquiry processes rather than solely transmitting information. Observation field notes indicated that students were regularly invited to explain their reasoning, challenge ideas, and participate in collective problem-solving activities. One teacher explained: T1: "In the past, I spent most of the lesson explaining concepts. Now I begin with questions and encourage students to investigate ideas before I provide explanations. This approach changes the way students participate in learning because they become more responsible for developing their own understanding."

Similarly, another teacher noted: T2: "*Students often understand concepts more deeply when they discover patterns and relationships themselves. My role is not to provide all the answers immediately but to guide the process of exploration.*" Document analysis further indicated that inquiry activities, collaborative discussion tasks, and reflective questioning were consistently embedded within lesson plans and teaching modules. These findings suggest that inquiry-oriented interaction functioned as a central mechanism through which deep learning pedagogy was implemented.

However, classroom observations also revealed variation in students' responses to inquiry-based activities. While many students actively participated in questioning and discussion, some initially relied heavily on teacher guidance before becoming comfortable expressing ideas independently. This finding suggests that inquiry-oriented learning required gradual adaptation and instructional scaffolding, particularly for students accustomed to more teacher-directed learning environments.

3.2 Theme 2: Contextualization of Learning Experiences

Another prominent theme concerned the contextualization of learning experiences. Classroom observations and student interviews indicated that teachers regularly connected instructional content to students' everyday experiences, local environments, and authentic situations. Rather than presenting knowledge as abstract information, teachers frequently encouraged students to explore how concepts related to real-life issues and practical situations.

For example, science lessons incorporated environmental observations, while language activities encouraged students to reflect on personal experiences and community issues. Students appeared more engaged when they perceived learning activities as relevant to their daily lives. One student stated: S3:

"When teachers ask us to connect lessons with situations around us, it becomes easier to understand because we can see why the topic is important in real life. It feels different from just memorizing information."

Another student commented: S6: *"I enjoy learning when we discuss things that actually happen around us. It makes the lesson more meaningful because I can relate it to my own experiences."* The findings illustrate that meaningful learning emerged when students perceived classroom content as relevant to their personal experiences and social realities. Classroom observations indicated that contextualized learning activities increased participation, questioning, and collaborative discussion.

Nevertheless, teachers also reported challenges in contextualizing certain curricular topics. Some abstract concepts required additional instructional effort to establish meaningful connections with students' everyday experiences. This suggests that contextualization, while beneficial, requires careful instructional design and pedagogical creativity.

3.3 Theme 3: Reflection as a Mechanism for Learner Agency

The third theme concerned the role of reflective learning in supporting learner agency. Reflection activities were observed across classrooms through reflective questioning, self-assessment tasks, learning journals, and end-of-lesson reflection sessions. Teachers perceived reflection as helping students evaluate their learning processes and identify areas for improvement. Rather than focusing exclusively on learning outcomes, reflective activities encouraged students to consider how they learned, what challenges they encountered, and what strategies they could use in future learning situations.

One teacher explained: T2: *"Reflection activities help students think about how they learn, not only what they learn. Many students become more aware of their strengths and the areas they need to improve. This awareness is important because it encourages them to take greater responsibility for learning."* Student interviews provided similar insights: S4: *"After reflection sessions, I can see what I understood and what I still need to work on. It helps me plan what I should do next."*

The data suggest that reflective learning functioned as a mechanism for strengthening metacognitive awareness and learner agency. Observation data further indicated that some students gradually assumed greater responsibility for monitoring their learning progress. Several students independently identified learning goals, monitored task completion, and actively sought feedback from teachers, suggesting emerging forms of self-regulated learning.

At the same time, classroom observations indicated that not all students immediately engaged in reflective practices. Some students initially struggled to articulate their learning experiences and required structured prompts from teachers. This finding suggests that reflective learning skills are developed progressively rather than emerging automatically.

3.4 Theme 4: Collaborative Knowledge Construction

Collaborative learning emerged as another important feature of deep learning pedagogy. Across the observed classrooms, students frequently participated in group discussions, collaborative inquiry tasks, peer feedback activities, and project-based learning experiences. The data suggest that learning was frequently constructed through social interaction rather than individual knowledge acquisition alone. Students exchanged ideas, negotiated understanding, and collectively explored solutions to problems.

One student explained: S5: *"Working in groups helps us hear different opinions. Sometimes my friends explain ideas in a way that makes them easier to understand. We learn from each other."* Another student stated: S8: *"When we solve problems together, everyone contributes something different. It makes learning more interesting because we are not working alone."* Teachers similarly perceived collaboration as supporting both academic and social development. Classroom observations indicated that collaborative activities encouraged communication, peer support, and collective meaning-making.

However, collaborative learning did not automatically ensure equal participation. Observation data revealed that some students tended to dominate discussions, while quieter students occasionally

assumed more passive roles. Teachers, therefore, played an important role in facilitating balanced participation and creating opportunities for all students to contribute meaningfully to group activities.

3.5 Theme 5: Institutional Support and Implementation Constraints

Although participants generally perceived deep learning pedagogy positively, the findings also revealed several implementation challenges and tensions. Teachers reported that designing inquiry-oriented, collaborative, and reflective learning experiences required substantial preparation, instructional flexibility, and ongoing adaptation. One teacher explained: T3: *“Creating meaningful and interactive learning activities requires more preparation than traditional lessons. Teachers need time to design tasks, facilitate discussion, and respond to different student needs.”*

Similarly, the academic coordinator emphasized the importance of organizational support: AC1: *“Deep learning practices require teachers to redesign lessons, assessment, and classroom interaction. This process takes time and continuous professional support. Without a supportive school culture, it would be difficult to sustain these practices consistently.”* The findings further suggest that the international school context may have influenced implementation. Smaller class sizes, organizational flexibility, collaborative professional culture, and access to instructional resources appeared to provide favorable conditions for experimentation with inquiry-based and reflective teaching practices. At the same time, participants acknowledged that these enabling conditions may not be equally available across all Indonesian elementary schools. As a result, the findings should not be interpreted as evidence that similar implementation processes would necessarily occur in different institutional contexts. Overall, the data suggest that successful implementation depended not only on teachers’ pedagogical practices but also on organizational support, professional collaboration, student readiness, and broader contextual conditions.

Table 6. Final Themes Generated from Thematic Analysis

Theme	Evidence from Data	Interpretation
Inquiry-Oriented Classroom Interaction	Classroom questioning, exploration activities, dialogic discussion, student-generated questions	Deep learning pedagogy was enacted through inquiry and dialogic interaction
Contextualization of Learning Experiences	Real-life examples, local environmental issues, authentic learning tasks	Meaningful learning emerged through contextual relevance
Reflection as a Mechanism for Learner Agency	Reflection journals, self-assessment, reflective dialogue	Reflection supported metacognitive awareness and learner autonomy
Collaborative Knowledge Construction	Group discussion, peer feedback, collaborative projects	Knowledge was constructed through social interaction and collective meaning-making
Adaptive Pedagogical Facilitation	Scaffolding, differentiated support, instructional flexibility	Teachers continuously adapted instruction to students’ needs
Institutional Support and Implementation Constraints	Professional collaboration, resource availability, time limitations, classroom management challenges	Implementation depended on organizational support and pedagogical readiness

Table 7. Representative Participant Quotations

Theme	Participant	Representative Quotation
Inquiry-Oriented Classroom Interaction	T1	<i>“In the past, I spent most of the lesson explaining concepts. Now I begin with questions and encourage students to investigate ideas before I provide explanations. This approach changes the way students participate in learning because they become more responsible for developing their own understanding.”</i>

Theme	Participant	Representative Quotation
Contextual Learning	S3	"When teachers ask us to connect lessons with situations around us, it becomes easier to understand because we can see why the topic is important in real life. It feels different from just memorizing information."
Reflection and Learner Agency	T2	"Reflection activities help students think about how they learn, not only what they learn. Many students become more aware of their strengths and the areas they need to improve."
Collaborative Knowledge Construction	S5	"Working in groups helps us hear different opinions. Sometimes my friends explain ideas in a way that makes them easier to understand. We learn from each other."
Institutional Support	AC1	"Deep learning practices require teachers to redesign lessons, assessment, and classroom interaction. This process takes time and continuous professional support."
Implementation Challenges	T3	"Not all students immediately feel comfortable expressing opinions. Some need additional scaffolding before they are willing to participate actively."

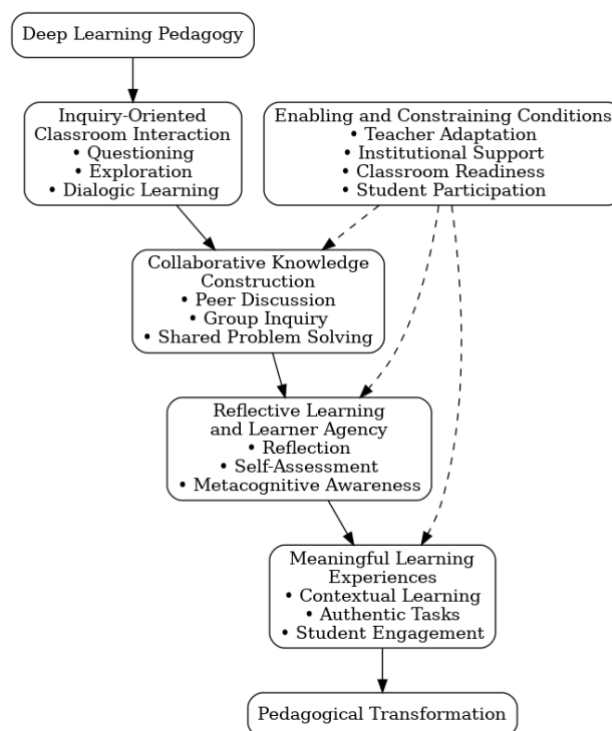


Figure 1. Conceptual Framework of Deep Learning Pedagogy and Pedagogical Transformation
Derived from the Findings

Figure 1 presents the conceptual framework generated from the thematic analysis. The findings suggest that deep learning pedagogy was enacted through inquiry-oriented classroom interaction, which created opportunities for collaborative knowledge construction. These collaborative processes were further strengthened through reflective learning activities that supported learner agency and metacognitive awareness. Together, these pedagogical processes contributed to meaningful learning experiences and broader pedagogical transformation. The framework also illustrates that implementation was influenced by enabling and constraining conditions, including teacher adaptation, institutional support, classroom readiness, and student participation.

3.6 Cross-Theme Synthesis

Across the five themes, the data suggest that deep learning pedagogy operated as an interconnected pedagogical process rather than a collection of isolated instructional techniques. Inquiry-oriented interaction created opportunities for exploration and dialogue, contextualized learning connected knowledge to authentic experiences, reflective practices supported learner agency, and collaborative activities facilitated collective meaning-making. These processes were further shaped by institutional conditions and teachers' adaptive pedagogical decisions.

Overall, participants perceived deep learning pedagogy as supporting changes in classroom interaction, instructional practice, and students' learning experiences. However, the findings also indicate that such pedagogical transformation was gradual, context-dependent, and shaped by both enabling conditions and implementation challenges.

Discussion

The findings of this study demonstrate that deep learning pedagogy significantly transformed pedagogical practices in elementary education by reconstructing classroom interaction, learner participation, reflective engagement, and meaningful knowledge construction. This transformation reflects a broader shift from transmission-oriented instruction toward participatory and student-centered learning environments. The findings reinforce the argument that contemporary educational transformation requires pedagogical practices capable of fostering learner agency, collaboration, critical reflection, and contextual understanding rather than merely emphasizing procedural knowledge acquisition.

The transformation identified in this study aligns with current educational discourse emphasizing pedagogical reconstruction in response to twenty-first-century learning demands. Deep learning pedagogy enabled teachers to reposition students as active meaning-makers who collaboratively construct understanding through inquiry, dialogue, and authentic learning experiences. This finding supports previous research arguing that student-centered pedagogy strengthens learner autonomy and promotes more meaningful educational experiences (Polman et al., 2020; Rehman et al., 2025). Similarly, the findings confirm that transformative pedagogical practices emerge when teachers shift instructional authority from rigid teacher control toward collaborative facilitation and reflective learning processes (Bremner et al., 2022).

Importantly, this study demonstrates that pedagogical transformation is not limited to methodological variation but involves deeper changes in classroom epistemology and social interaction. Teachers no longer functioned solely as instructional transmitters but became facilitators of collaborative inquiry, reflective discussion, and experiential learning. This pedagogical repositioning reflects broader educational reform movements emphasizing learner-centered instructional ecosystems and adaptive teaching practices (Bremner et al., 2023; Hasanah et al., 2022). The findings, therefore, extend previous discussions on pedagogical transformation by showing how deep learning pedagogy operates as a relational and socially situated educational framework within elementary classrooms.

Another important finding concerns the emergence of meaningful learning through contextual and experiential instructional practices. The study revealed that students developed deeper conceptual understanding when classroom learning was connected to their daily experiences, local environments, and social realities. This supports the argument that meaningful learning is strengthened when students actively relate instructional content to lived experience and authentic social contexts (Puspitasari, 2024; Sudirman & Pandang, 2025). The findings further demonstrate that authentic learning activities fostered stronger emotional engagement, participation, and learner motivation, reinforcing studies emphasizing the role of experiential learning in supporting holistic student development (Aravantinos et al., 2024).

The contextualization of learning experiences also contributed to the development of socially situated understanding. Students became more engaged when learning activities involved

collaborative exploration, real-life problem-solving, and inquiry-oriented tasks. This finding supports previous studies suggesting that collaborative and inquiry-based learning environments enhance cognitive engagement and strengthen learners' social interaction skills (Parker et al., 2022). Furthermore, the findings indicate that meaningful learning in deep learning pedagogy extends beyond academic achievement toward emotional, reflective, and interpersonal dimensions of education.

Reflective learning emerged as another central dimension of pedagogical transformation. Reflection activities enabled students to evaluate their learning processes, monitor conceptual understanding, and develop self-regulated learning behaviors. This finding aligns with previous studies emphasizing that reflective pedagogical practices strengthen metacognitive awareness and learner autonomy (Roelle & Richter, 2025). Reflection also enabled teachers to continuously adapt instructional practices according to students' needs and classroom dynamics, suggesting that reflective teaching functions as a mechanism for pedagogical adaptability and continuous instructional improvement.

The findings further reveal that reflective learning contributed significantly to the development of learner agency. Students became increasingly confident in expressing opinions, participating in collaborative activities, and taking responsibility for their learning processes. This supports previous research arguing that learner-centered pedagogical environments strengthen students' confidence, participation, and self-regulated learning behaviors (Chang et al., 2024; Fitrah et al., 2025). The findings therefore suggest that deep learning pedagogy contributes not only to conceptual understanding but also to the formation of active and autonomous learners capable of participating meaningfully in collaborative learning communities.

Another notable finding concerns the multidimensional nature of student engagement. The study demonstrates that student engagement within deep learning pedagogy involved cognitive, emotional, behavioral, and social dimensions simultaneously. Collaborative inquiry, peer interaction, and participatory learning activities enabled students to feel intellectually valued and socially connected within classroom environments. This finding reinforces previous research suggesting that collaborative learning environments significantly influence student motivation, emotional participation, and classroom engagement (El-Hamamsy et al., 2024).

Importantly, the findings reveal that engagement was generated not merely through enjoyable activities but through meaningful pedagogical relationships and participatory classroom culture. Students became more engaged because they perceived themselves as legitimate contributors to classroom knowledge construction rather than passive listeners. This finding extends current discourse on learner engagement by emphasizing the relational and dialogic dimensions of classroom participation within deep learning pedagogy.

The study also identified several pedagogical and institutional challenges influencing the implementation of deep learning approaches in elementary education. Teachers experienced difficulties related to instructional preparation, classroom management, time allocation, and the need for continuous pedagogical adaptation. These findings align with studies indicating that educational reform implementation often encounters structural and pedagogical barriers, particularly when teachers transition from traditional instruction toward student-centered pedagogical approaches (Gordon et al., 2022; Ramírez Ruiz et al., 2024).

Moreover, the findings demonstrate that sustainable pedagogical transformation requires institutional support, professional collaboration, and continuous teacher development. Teachers emphasized the importance of supportive school culture, instructional flexibility, and reflective professional learning communities in sustaining deep learning practices. This finding supports previous studies highlighting the significance of collaborative professional development and adaptive instructional leadership in supporting educational innovation (Gore et al., 2021). Similarly, research on teacher professional learning communities suggests that sustainable pedagogical change depends on reflective collaboration, institutional support, and continuous professional inquiry (Durdin-Myers et al., 2024).

The study further suggests that pedagogical transformation in elementary education is an adaptive and negotiated process rather than a linear implementation of instructional reform. Teachers continuously adjusted learning strategies, scaffolding practices, and classroom interaction according to students' learning readiness and participation levels. This finding aligns with previous studies emphasizing that differentiated and adaptive pedagogical approaches are essential in supporting inclusive and meaningful learning environments (Baharuddin & Burhan, 2025). Furthermore, adaptive teaching practices become increasingly important in contemporary educational contexts characterized by diverse learner needs and rapidly changing educational expectations.

The findings also contribute to current discourse regarding curriculum reform and pedagogical innovation in Indonesia. Although educational policies increasingly emphasize student-centered learning and meaningful education, classroom implementation often remains inconsistent due to institutional constraints and pedagogical readiness issues (Hardiansyah & Zainuddin, 2022). This study therefore provides empirical evidence showing that deep learning pedagogy can function as a practical pedagogical framework for translating curriculum reform into authentic classroom practices.

Theoretically, this study contributes to the growing discourse on deep learning pedagogy by conceptualizing pedagogical transformation as an interconnected process involving reflective teaching, collaborative interaction, learner agency, and meaningful learning construction. The findings suggest that deep learning pedagogy should be understood not merely as a set of instructional techniques but as a transformative educational ecosystem shaping classroom culture, social interaction, and students' holistic development. This extends previous conceptual discussions regarding meaningful learning and learner-centered pedagogy by demonstrating how such pedagogical principles operate dynamically within elementary classroom contexts.

Practically, the findings provide important implications for teachers, school leaders, and policymakers. Teachers should prioritize reflective and collaborative instructional practices that promote authentic learning experiences and learner participation. Schools should support professional learning environments that encourage pedagogical innovation, collaborative reflection, and instructional flexibility. Policymakers should also recognize that meaningful educational reform requires sustained pedagogical support rather than solely curriculum policy changes.

Finally, this study demonstrates that deep learning pedagogy possesses significant potential to transform elementary education into a more reflective, participatory, and meaningful educational experience. The transformation identified in this study suggests that future elementary education should prioritize not only academic achievement but also learner agency, reflective awareness, collaborative engagement, and socially meaningful learning experiences capable of supporting holistic student development in increasingly complex educational environments.

4. CONCLUSION

This study explored how deep learning pedagogy was enacted within classroom practice and how it contributed to pedagogical transformation and meaningful learning experiences at Fatimah International Elementary School, Indonesia. Drawing on classroom observations, interviews, and document analysis, the findings suggest that deep learning pedagogy supported changes in classroom interaction, instructional roles, learner participation, and meaningful knowledge construction. Inquiry-oriented interaction, contextualized learning experiences, reflective practices, and collaborative knowledge construction emerged as interconnected processes that appeared to support learner engagement, metacognitive awareness, and learner agency. The findings also indicate that the implementation of deep learning pedagogy was shaped by institutional support, teacher adaptation, and classroom conditions, highlighting the importance of contextual factors in pedagogical change.

This study contributes to the growing literature on deep learning pedagogy by providing empirical evidence of how it was enacted within an Indonesian international elementary school context. However, several limitations should be acknowledged. The study involved a relatively small number of participants, was conducted within a single institutional setting, and relied on a limited observation

period. As with all qualitative research, the findings may also reflect researcher interpretation despite the use of triangulation, member checking, and reflexive procedures. Consequently, the transferability of the findings to other educational contexts should be considered cautiously. Future research may examine deep learning pedagogy across multiple schools, explore longitudinal patterns of pedagogical transformation, and investigate how different institutional contexts influence implementation processes. Although the findings are context-specific, the study highlights the importance of reflective teaching, collaborative inquiry, and institutional support in implementing deep learning pedagogy in elementary classrooms.

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