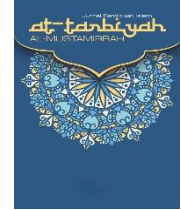




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Article

## THE INTEGRATION OF DEEP LEARNING IN THEMATIC LEARNING AT ELEMENTARY SCHOOLS: A CASE STUDY AT SD NEGERI 03 RAWAHENG BANYUMAS

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### Abstract

This study aims to explore the process of integrating a pedagogical deep learning approach into integrated thematic learning design in elementary schools. This research employed a qualitative case study conducted at SD Negeri 03 Rawaheng Banyumas from January to February 2026. The participants included the principal, teachers, and students selected through purposive sampling. Data were collected through in-depth interviews, participatory observation, and documentation, including lesson plans and student work. The data were analyzed using thematic analysis through data reduction, data display, and conclusion drawing, supported by source and technique triangulation. The findings reveal that the integration of deep learning is implemented through structured stages of stimulus, exploration, discussion, and reflection. Contextual stimuli encouraged students to identify real-life problems, exploratory activities enabled direct interaction with the learning environment, collaborative discussions facilitated the exchange of ideas, and reflective sessions helped students connect concepts with personal experiences. These processes fostered contextual learning experiences and strengthened students' cognitive, emotional, and social engagement, leading to deeper meaning-making. The findings support constructivist and meaningful learning theories by demonstrating that reflection plays a crucial role in helping students internalize and apply knowledge contextually. This study implies that deep learning-based thematic instruction can serve as an effective strategy for promoting meaningful and student-centered learning in elementary education.

**Keywords:** pedagogical deep learning; thematic learning; meaningful learning; student engagement; elementary school

### PUBLISHER'S NOTE

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## INTRODUCTION

The development of digital technology over the past decade has fundamentally transformed the landscape of education, particularly in the ways students access, process, and

construct knowledge. This transformation demands that the education system no longer focus solely on the transfer of knowledge, but on the development of higher-order thinking skills, active engagement, and the formation of character that is adaptable to change (Handayani & Warohmah, 2025; Mardiana & Herlambang, 2025; Musonif, et al., 2026). In a global context, deep learning-based approaches are gaining increasing attention as they are considered capable of fostering deeper and more meaningful conceptual understanding compared to surface learning approaches (Azis et al., 2026; Feri et al., 2025; Haq & Prasetyo, 2025; Maulidya et al., 2025). This approach is also viewed as part of the 21st-century pedagogical transformation that emphasizes the integration of cognitive, social, and emotional aspects in the learning process (Maharani & Musonif, 2026; Ramadona et al., 2026; Saifudin et al., 2026; Sari & Arta, 2025). In addition, the implementation of deep learning in education encourages students to become more reflective, collaborative, and independent in constructing knowledge through meaningful learning experiences. Therefore, educators are required to design innovative and student-centered learning environments that are able to respond to the challenges and opportunities presented by rapid technological advancement.

In Indonesia, the implementation of the Merdeka Curriculum serves as a policy response to these demands by emphasizing student-centered, flexible, and contextual learning. This curriculum provides space for teachers to develop learning designs that are not only integrative but also relevant to students' real-world experiences. One potential form of implementation is integrated thematic learning in elementary schools, which integrates various subjects within a single contextual theme (Ambarita & Purnamasari, 2025; Darmayanti & Yudianto, 2025; Fahrezi, et al., 2026; Musonif, et al., 2026). Several studies indicate that the Merdeka Curriculum promotes experience-based and exploratory learning innovations; however, its implementation still faces challenges regarding learning design and practices that have not yet been fully developed (Hidayat & Haryati, 2025; Saifudin et al., 2026; Zulela, 2025). Nevertheless, in practice, thematic learning is still often carried out procedurally and has not yet been fully able to provide deep and reflective learning experiences (Marzius & Syaiful, 2025; Musonif, et al., 2026; Zainil et al., 2025).

The deep learning approach in education, grounded in the principles of mindful learning, meaningful learning, and joyful learning, offers a conceptual framework that can enhance the quality of thematic learning. This approach emphasizes students' holistic cognitive, emotional, and social engagement through a reflective, contextual, and enjoyable learning process (Musonif, et al., 2026; Rohmah & Widiarti, 2026; Sudarmono, 2025). Several studies indicate that the implementation of deep learning can enhance students' critical thinking skills, collaboration, and learning motivation at the elementary school level (Aryanto et al., 2025; Cahyanto, 2025; Luthfiyah et al., 2025). Furthermore, this approach also contributes to strengthening students' literacy and numeracy through authentic and meaningful learning experiences (Ginting, 2025; Kholid et al., 2025; Latifah & Irawan, 2025; Musonif, et al., 2026). In addition, deep learning encourages students to actively connect prior knowledge with new experiences, enabling them to develop deeper conceptual understanding and long-term retention of learning materials. Therefore, the integration of deep learning principles into thematic learning is expected to create a more interactive, student-centered, and sustainable learning environment in elementary education.

Nevertheless, most previous research has focused primarily on conceptual or evaluative aspects, such as the impact of deep learning on learning outcomes or specific skills, and has not yet explored in depth how the integration of this approach into integrated thematic learning design unfolds in real classroom contexts. Furthermore, studies that specifically highlight students' learning experiences, classroom interaction dynamics, and the meanings constructed by students during the learning process remain limited (Fahrezi et al., 2026;

Maknun & Niswar, 2025; Ricita et al., 2025; Saifudin et al., 2026). This gap indicates the need for more comprehensive studies that examine how deep learning principles are implemented within thematic learning practices and how students interpret their learning experiences in authentic classroom settings. Therefore, research focusing on the integration process, interaction patterns, and students' meaning-making in thematic learning is important to provide a deeper understanding of the effectiveness of deep learning approaches in elementary education.

Preliminary findings at SD Negeri 03 Rawaheng Banyumas indicate that thematic learning has been implemented in an integrated manner, but has not yet fully optimized students' active engagement and deep understanding. Based on the results of initial observations and interviews, some students still exhibit a tendency toward passive learning and struggle to connect learning materials to the context of daily life. On the other hand, when teachers began integrating activities based on exploration, discussion, and reflection, there was a significant increase in student participation and understanding. This indicates the potential for applying a deep learning approach, which warrants further in-depth study. Furthermore, the learning process that incorporates reflective and collaborative activities appears to create a more interactive classroom atmosphere and encourages students to express their ideas more confidently. Therefore, SD Negeri 03 Rawaheng Banyumas provides a relevant context for examining how the integration of deep learning principles can strengthen the effectiveness of thematic learning at the elementary school level.

Based on the conceptual and empirical analysis presented above, studies on pedagogical deep learning in elementary education have primarily focused on conceptual discussions, instructional effectiveness, learning outcomes, or teachers' perceptions of implementation (Musonif & Azis, 2026; Saputra & Ridha, 2025). Although several studies have employed qualitative approaches, in-depth exploration of how deep learning is integrated into thematic learning practices in actual classroom settings remains relatively limited. In the context of integrated thematic learning, meaning construction refers to the process through which students connect concepts across subject areas with prior knowledge and everyday experiences through exploration, interaction, and reflection. However, the dimensions of students' lived learning experiences, the dynamics of pedagogical interactions, and the processes through which students construct meaning during thematic learning activities have not been comprehensively examined. Previous studies tend to emphasize instructional outcomes rather than investigating how contextual experiences, collaborative dialogue, and reflective practices shape students' understanding in thematic classrooms (Fahrezi, et al., 2026; Maknun & Niswar, 2025; Musonif & Misbah, 2026; Ricita et al., 2025). These limitations indicate a gap in understanding how pedagogical deep learning is enacted, experienced, and interpreted by teachers and students within authentic elementary school learning contexts.

In this context, this study seeks to explore in greater depth the process of integrating the deep learning approach into integrated thematic learning design in elementary schools, placing student experiences and engagement at the center of the analysis. The focus of the study is not directed solely at measuring outcomes, but rather on how learning practices unfold, how interactions between teachers and students are established, and how students construct understanding and meaning from the learning experiences they undergo. Thus, this study prioritizes an interpretive perspective that enables a more contextual and reflective understanding of learning phenomena. Furthermore, this study is expected to provide insights into how deep learning-based thematic learning can create more meaningful, participatory, and student-centered learning experiences in elementary schools. The findings of this study may also contribute to the development of innovative learning designs that support the

implementation of the Merdeka Curriculum and strengthen the quality of primary education in the digital era. Therefore, this study is expected to serve as a relevant academic reference for educators and researchers in developing more adaptive and reflective learning practices in elementary education.

Accordingly, this study aims to gain an in-depth understanding of the dynamics of implementing the deep learning approach in integrated thematic learning through a qualitative case study approach. This approach was chosen to capture the complexity of the phenomenon holistically, including the processes, experiences, and meanings that emerge in classroom learning interactions. This study not only captures observable practices but also seeks to interpret the meanings constructed by students and teachers within the context of ongoing learning. Furthermore, the qualitative case study approach allows the researcher to explore classroom realities in a more natural and contextual manner, thereby providing a richer understanding of the implementation of deep learning in thematic learning. Through this approach, the study is expected to reveal various challenges, strategies, and forms of interaction that emerge during the learning process. Therefore, the findings of this study are expected to contribute both theoretically and practically to the development of innovative and student-centered learning practices in elementary schools.

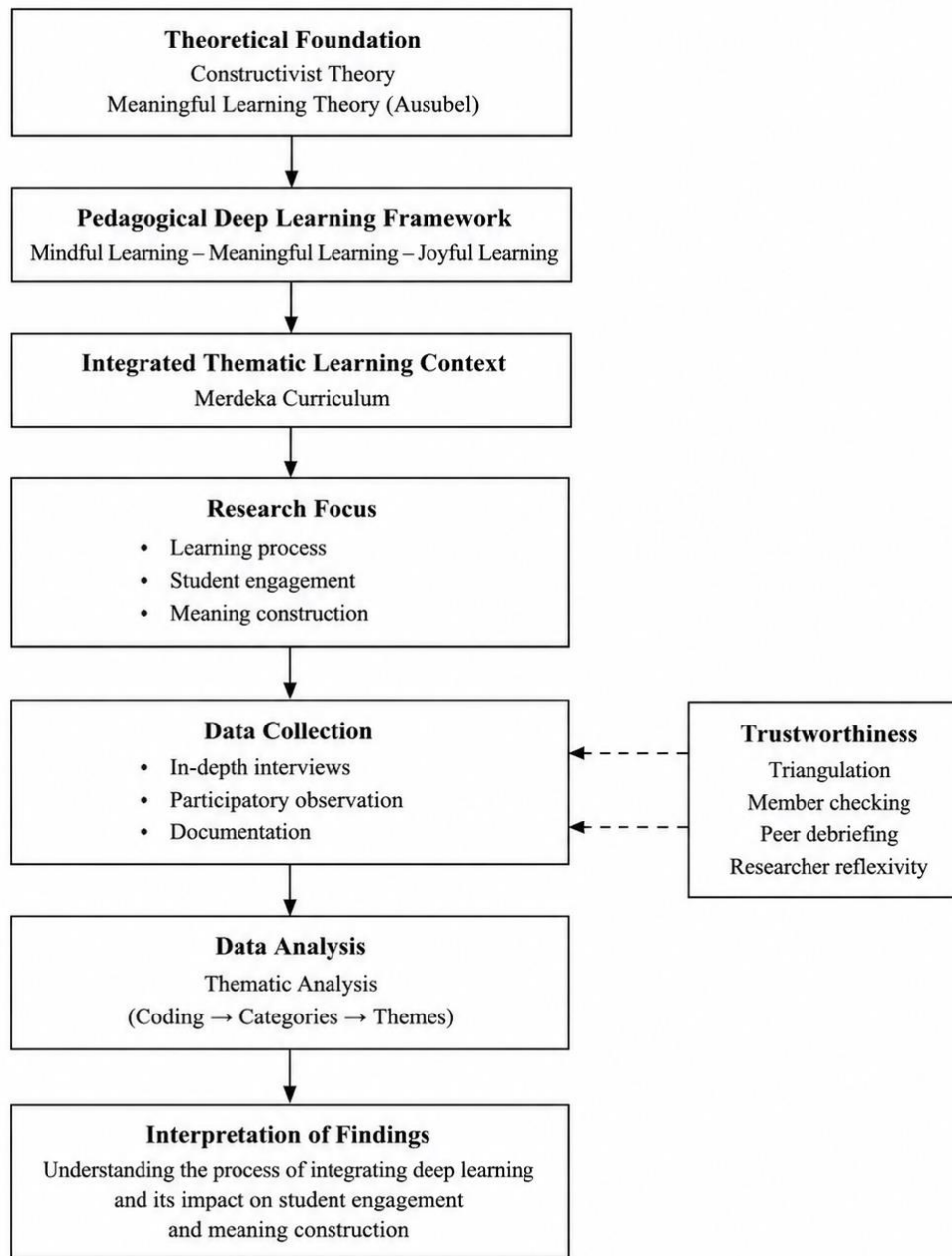
Academically, this study is expected to contribute to the development of research on deep learning in elementary education, particularly by offering an empirical perspective that focuses on learning processes and experiences within the context of integrated thematic learning. Furthermore, this study contributes to enriching our understanding of how instructional designs that integrate the principles of mindful, meaningful, and joyful learning can be implemented in a contextual and meaningful manner. The findings of this study are also expected to serve as a conceptual and practical reference for the development of learning models that are more adaptive, reflective, and oriented toward student learning experiences in the era of contemporary education. In addition, this study may provide insights for educators in designing thematic learning activities that encourage active participation, critical thinking, and meaningful student engagement in classroom learning. This research is also expected to strengthen the implementation of the Merdeka Curriculum by emphasizing learning practices that are student-centered and responsive to the challenges of the digital era. Therefore, the results of this study are anticipated to become an important foundation for future educational innovations and further research related to deep learning approaches in elementary schools.

## **METHOD**

This study employs a qualitative approach using a case study design to gain an in-depth understanding of the process of integrating the deep learning approach into integrated thematic learning in elementary schools. This approach was chosen because it is capable of revealing learning phenomena in a contextual, holistic, and meaning-oriented manner, as constructed by the research subjects in real-life situations (Creswell & Poth, 2021). The case study allows researchers to explore the dynamics of interaction, learning experiences, and pedagogical practices that cannot be reduced to quantitative variables, making it relevant to the research objectives that emphasize understanding the process and construction of meaning in learning (Yin, 2021).

To ensure conceptual coherence between the theoretical framework and the research procedures, this study was guided by a research flow integrating constructivist learning theory, meaningful learning theory, and pedagogical deep learning principles. The research flow illustrates how the theoretical concepts informed the formulation of the research focus,

data collection process, thematic analysis, and interpretation of findings related to student engagement and meaning construction in integrated thematic learning.



**Figure 1. Research Flow of Pedagogical Deep Learning Integration in Thematic Learning**

The study was conducted from January to February 2026 at SD Negeri 03 Rawaheng, Banyumas, Indonesia. The school was selected purposively because it had begun implementing pedagogical deep learning practices within integrated thematic learning under the Merdeka Curriculum framework. Preliminary observations indicated that teachers at the school had incorporated contextual exploration, collaborative discussion, and reflective activities into classroom instruction, making the school a relevant and information-rich case for examining how deep learning principles are enacted in authentic elementary classroom settings. In addition, the school represents a typical public elementary school context in which

teachers are actively adapting to student-centered learning reforms while still facing challenges in fostering meaningful learning experiences. The research participants consisted of one principal, two classroom teachers, and 18 fourth-grade students who were directly involved in thematic learning activities. To maintain participant confidentiality, pseudonym codes were used in reporting the findings, such as GR-1 for teachers and S-1, S-2, and S-3 for students. Participants were selected purposively based on their active involvement and experience in the implementation of thematic instruction. This sampling strategy aimed to obtain information-rich data relevant to the research focus and to facilitate an in-depth exploration of learning processes, pedagogical interactions, and students' meaning-making experiences (Patton, 2020). Therefore, this study was not intended for statistical generalization but for developing a contextual and interpretive understanding of the phenomenon under investigation.

Data collection was conducted through in-depth interviews, participatory observation, and documentation as a form of methodological triangulation. Interviews were used to explore the perspectives, experiences, and interpretations of teachers, students, and school principals regarding the implementation of deep learning. Observations were conducted to capture learning practices firsthand, including pedagogical interactions, student engagement, and the application of the principles of mindful, meaningful, and joyful learning in the classroom. Meanwhile, documentation in the form of lesson plans, student work, and photos of activities was used to strengthen the validity of the data and provide empirical evidence of the observed practices. This triangulation aimed to enhance the credibility and validity of the findings through the comparison of various sources and data collection techniques (Nowell et al., 2021).

The interviews were conducted in a semi-structured format and lasted approximately 30–45 minutes for each participant. Classroom observations were carried out six times during thematic learning sessions, with each observation lasting approximately 70–90 minutes. The observations focused on instructional stages, pedagogical interactions, student engagement, and reflective learning activities. Documentation data included lesson plans, students' worksheets, reflective notes, and photographs of classroom activities. Data collection was continued until thematic saturation was reached, indicated by the recurrence of similar interaction patterns and the absence of substantially new themes.

Data analysis was conducted inductively through a cyclical and reflective process of data reduction, data presentation, and drawing conclusions. The researcher not only described the data but also interpreted the meanings that emerged from the research subjects' learning interactions and experiences. The analysis process involved several stages of thematic analysis, including open coding, categorization, theme development, and interpretive analysis to identify recurring patterns related to instructional processes, student engagement, pedagogical interaction, and meaning construction in thematic learning. The researcher repeatedly reviewed interview transcripts, observation notes, and documentation data to ensure consistency and depth of interpretation. Through this process, broader themes were generated inductively from participants' experiences and classroom practices (Braun & Clarke, 2021). The final stage of analysis involved synthesizing the relationships among themes to develop a conceptual interpretation of how pedagogical deep learning processes contributed to student engagement and meaning construction in integrated thematic learning.

To ensure the validity of the data, this study employed qualitative validation strategies, including triangulation of sources and methods, member checking, and peer debriefing. Triangulation was conducted by comparing data from various informants and data collection techniques, while member checking involved confirming the findings with the informants to ensure that the researcher's interpretations aligned with their experiences. Additionally, the

researcher's reflexivity was maintained to minimize bias in the data interpretation process. Consequently, the study's results are expected to demonstrate high levels of credibility, reliability, and confirmability in accordance with contemporary qualitative research standards (Lincoln & Guba, 2020).

## **FINDING and DISCUSSION**

### ***Findings***

The thematic analysis generated four interrelated themes regarding the integration of pedagogical deep learning in thematic instruction: (1) the process of integrating deep learning into thematic learning activities, (2) students' engagement and learning experiences, (3) students' meaning construction through contextual and reflective learning, and (4) the dynamics of classroom pedagogical interaction. These themes emerged inductively from repeated coding and categorization of interview transcripts, observation notes, and instructional documents.

### ***The Process of Integrating Deep Learning Approaches into Thematic Learning***

The research findings indicate that the integration of the deep learning approach into thematic instruction at SD Negeri 03 Rawaheng Banyumas begins with a structured planning phase. Teachers develop lesson plans by integrating multiple subjects into a single contextual theme, such as the environment. Based on an interview with a teacher (GR-1, January 20, 2026), integration is achieved by linking competencies from various subjects into a single sequence of learning activities.

"We organize learning around a single theme, then combine several subjects so that students can more easily understand the connections between the materials" (GR-1, January 20, 2026). Documentation of the lesson plans shows that learning is designed in sequential stages, ranging from stimulus, problem identification, exploration, discussion, to reflection. This structure not only demonstrates the integration of content but also directs the learning process toward active student engagement. Analytically, this pattern indicates that integration is not merely a combination of content but rather the organization of a continuous learning experience.

Observations conducted on January 25, 2026, revealed that the learning process began with a stimulus in the form of images depicting environmental conditions. The teacher posed a guiding question that encouraged students to identify problems independently. During the exploration phase, students conducted direct observations within the school environment and recorded their findings. This activity lasted approximately 30 minutes and was followed by a group discussion. From this sequence, it is evident that the learning integration process occurs through structured hands-on experiences. Students do not merely receive content but are actively engaged in the process of discovering and connecting concepts. This pattern indicates a shift in teaching practices from information delivery toward a more exploratory learning experience.

### ***Student Experience and Engagement in Learning***

The research findings indicate that students were actively engaged in various stages of the learning process, particularly during exploration and group discussion activities. Based on observations conducted on January 25, 2026, the majority of students participated in observing their surroundings, recording their findings, and discussing them with their group

members. The learning activities took place in a dynamic atmosphere with fairly intense interaction among students.

Interviews with students revealed that their engagement was influenced by the varied and contextual nature of the learning activities.

“I enjoy learning outside the classroom; it keeps me from getting bored and allows me to see real-world examples right away” (S-2, January 28, 2026). “When I learn through hands-on practice, I understand things faster” (S-3, January 28, 2026).

Teachers also noted that student engagement increases when learning is not limited to lectures but includes hands-on activities.

“When students are invited to practice, they become more active and ask more questions” (GR-1, January 20, 2026).

However, the observations also revealed variations in the level of participation among students. Some students were dominant in the discussions, while others tended to follow along. This indicates that student engagement is not uniform but is influenced by individual characteristics and group dynamics.

Overall, students’ learning experiences indicate that engagement occurs when instruction provides opportunities for interaction, exploration, and active participation. This engagement is evident not only physically but also through responses, questions, and contributions during discussions.

### *Meaning of Learning Constructed by Students*

The research findings indicate that students are able to develop an understanding based on their real-life experiences. Based on interviews conducted on January 28, 2026, students were able to explain the concepts they had learned using examples relevant to their daily lives.

“Now I know that plastic waste doesn’t break down easily, so it has to be disposed of properly” (S-1, January 28, 2026).

In addition to understanding the concepts, students also demonstrated a shift in their perspective toward the surrounding environment.

“I want to keep the classroom clean so it doesn’t get dirty again” (S-4, January 28, 2026).

Observations during the reflection phase showed that students were able to verbally express their learning experiences. The teacher posed reflective questions that encouraged students to recall what they had learned and connect it to actions they would take.

Documentation of students’ work, such as posters and observation notes, shows that students do not merely copy information but process it into more personal representations. This finding indicates that students actively reconstructed meaning by relating classroom concepts to environmental experiences encountered in their daily lives. Meaning-making emerged not merely through conceptual comprehension, but through reflective interpretation of real-world situations and personal responsibility toward the environment.

Analytically, the meaning of learning constructed by students is evident in their ability to connect concepts with experiences and in the emergence of an awareness to apply that knowledge. This meaning develops through the interaction between learning activities, direct experiences, and reflection carried out during the learning process.

### *The Dynamics of Classroom Instruction*

The classroom instruction demonstrated active, dynamic interaction between the teacher and students. The teacher acted as a facilitator, guiding the learning process through

questions, instructions, and feedback. Based on observations, the teacher did not dominate the lesson but allowed students space to participate. This facilitative interaction pattern shifted the classroom from a teacher-centered environment toward a dialogic learning space in which students were encouraged to negotiate ideas, articulate experiences, and participate actively in knowledge construction.

The interactions in the classroom followed a two-way communication pattern. Students did not merely listen but also expressed their opinions, asked questions, and responded to the teacher's questions. The teacher provides positive reinforcement for students' contributions, such as: "That's a great idea" and "Try explaining it again to your classmates."

However, there are several challenges in the implementation of the learning process. Based on an interview with the teacher: "Sometimes there isn't enough time because there are quite a lot of learning activities" (GR-1, January 20, 2026).

In addition to time constraints, differences in student characteristics also influence the learning process. Observation results indicate that not all students exhibit the same level of engagement, so teachers need to make adjustments in managing the classroom.

Analytically, the dynamics of learning reveal a balance between the planned curriculum and the reality of classroom implementation. Learning proceeds flexibly, adapting to student needs and classroom conditions, so the learning process is not entirely linear.

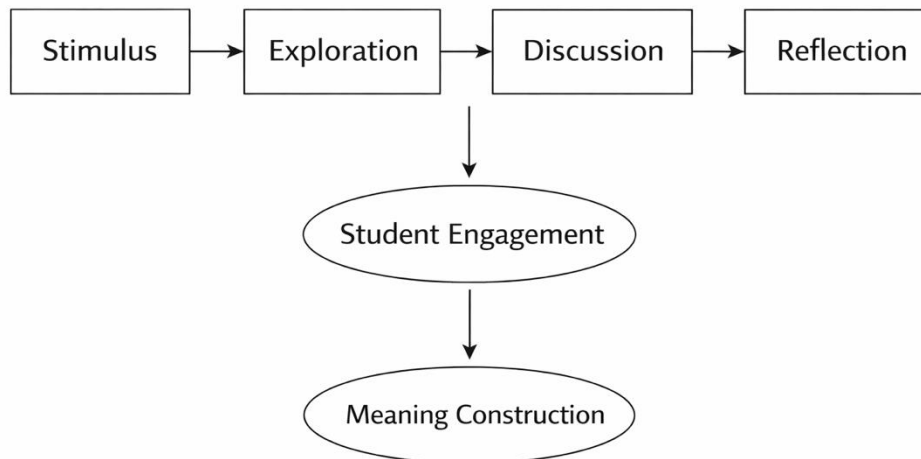
### ***General Patterns of Research Findings***

Based on the overall data from interviews, observations, and documentation, it was found that thematic learning based on a deep learning approach unfolds through a structured yet flexible series of processes, beginning with the provision of contextual stimuli, followed by active exploration and collaborative discussion, and concluding with reflection. This pattern indicates that the learning process does not proceed in a purely linear manner, but forms a cycle of learning experiences that allows students to continuously construct their understanding step by step. Student engagement appears to be more intense in activities that are hands-on and contextual, such as environmental observation and group discussions. The data indicates that such engagement is influenced not only by the design of the activities but also by the relevance of the material to students' experiences. In this context, engagement is not merely physical participation but rather cognitive and emotional engagement that arises when students feel a connection to the material being studied.

The meaning of learning is formed through a process of repeated interaction between experience, social dialogue, and individual reflection. Students not only understand concepts intellectually but also relate them to real-life situations and demonstrate a tendency to apply that knowledge in their daily lives. This indicates that deep learning contributes to the development of understanding that is both practical and reflective. Data triangulation reveals consistency between lesson planning in the lesson plans, classroom implementation, and students' learning experiences. This alignment indicates that the instructional design created by teachers plays a crucial role in shaping meaningful learning experiences. In other words, the success of learning lies not only in classroom activities but also in the coherence between planning and implementation.

Overall, the findings of this study indicate that the integration of deep learning approaches into thematic learning is evident not only in the structure of instruction but also in the dynamics of student engagement and meaning-making. This pattern suggests a mutually reinforcing relationship among the learning process, student engagement, and meaning-making, resulting in a more holistic and contextual learning experience. Overall, the findings demonstrate that pedagogical deep learning in thematic instruction operates as an interconnected learning process in which contextual activities, collaborative interaction, and

reflective engagement mutually reinforce students' meaning-making experiences. The findings also indicate that instructional design, classroom interaction, and student participation cannot be separated, as each dimension contributes to the development of holistic and meaningful learning experiences. To clarify the relationship between the learning process, student engagement, and meaning construction, the findings of this study are visualized in the following conceptual model.



**Figure 2. A Conceptual Model of Deep Learning-Based Thematic Learning**

The figure illustrates that the learning process begins with the stimulus stage, followed by exploration, discussion, and reflection as an integrated learning cycle. All of these stages contribute to fostering student engagement, cognitively, emotionally, and socially. This engagement then serves as the foundation for the process of meaning construction, in which students not only understand concepts theoretically but are also able to relate them to real-life experiences in their daily lives

### *Discussion*

The findings of this study demonstrate that the integration of pedagogical deep learning into thematic learning occurs through a systematic yet flexible cycle consisting of stimulus, exploration, discussion, and reflection. This process positions students as active participants in constructing knowledge through contextual experiences and social interaction. Such findings align with constructivist learning theory, which views learning as an active process of meaning construction rather than passive knowledge transfer. The results also support Feri et al. (2025), who argue that deep learning in elementary education requires contextual and reflective engagement. However, this study extends previous research by showing that deep learning is not merely implemented through instructional stages, but through a continuous and interconnected learning process that fosters sustained engagement and reflective understanding.

Student engagement emerged most strongly during contextual and experiential learning activities, indicating that engagement in pedagogical deep learning is closely connected to the relevance of learning materials to students' everyday experiences. This finding reinforces the results of the study by Luthfiyah et al. (2025), which found that deep learning-based instruction enhances students' cognitive and emotional engagement when the material is linked to real-life situations. However, this study makes an additional contribution by

showing that such engagement is triggered not only by activities but also by the reflective space provided to students. Therefore, student engagement in deep learning should be understood as a multidimensional process involving cognitive participation, emotional connection, and social interaction.

From the perspective of meaning construction, the findings indicate that deep learning-based thematic instruction enables students to connect academic concepts with real-life experiences through reflective engagement. This finding supports the theory of meaningful learning, which emphasizes the integration of new knowledge with learners' prior experiences and cognitive structures. While Maknun & Niswar (2025) highlight the role of joyful learning in creating meaningful educational experiences, this study further demonstrates that reflective activities play a critical role in helping students internalize and apply knowledge contextually. In this sense, meaning construction emerges not only through conceptual understanding but also through students' reflective interpretation of their lived experiences.

The consistency between lesson planning, classroom implementation, and students' learning experiences highlights the importance of instructional coherence in deep learning-based thematic instruction. These findings suggest that meaningful learning experiences are not produced solely through classroom activities, but through the alignment between pedagogical design, learning interaction, and reflective practice. Although previous studies have emphasized teachers' pedagogical competence in designing deep learning instruction (Setiyowati & Puspita, 2025), this study extends the discussion by demonstrating that the relationship between planning, implementation, and student experience forms an interconnected pedagogical system that supports holistic learning.

Theoretically, this study contributes to the growing discussion on pedagogical deep learning by proposing a conceptual interpretation of the relationship between learning processes, student engagement, and meaning construction in thematic instruction. The findings suggest that deep learning should not be understood merely as an instructional strategy, but as a relational learning ecosystem in which contextual experience, collaborative interaction, and reflective practice interact dynamically to support holistic understanding. This interpretation complements the perspective of Fitrah et al. (2025), who emphasize the integration of instructional design, 21st-century competencies, and meaningful learning experiences in deep learning pedagogy.

Practically, these findings imply that teachers need to move beyond content-oriented instruction by designing learning experiences that encourage contextual exploration, collaborative interaction, and reflective engagement. The findings also indicate that meaningful thematic learning depends not only on curriculum structure but also on teachers' ability to facilitate active participation and reflective dialogue. Therefore, schools should support the development of teachers' pedagogical competencies in designing adaptive and student-centered deep learning practices.

Based on these findings, it can be concluded that the integration of deep learning approaches into thematic learning in elementary schools is evident not only in the structure of learning but also in the dynamics of student engagement and meaning-making. A cyclical learning process, multidimensional engagement, and continuous reflection are key factors in shaping a deep learning experience. Overall, the findings indicate that pedagogical deep learning in thematic instruction is characterized by cyclical learning processes, multidimensional student engagement, and continuous reflection. These interconnected dimensions contribute to the development of contextual and meaningful learning experiences in elementary classrooms.

Future studies are recommended to investigate the implementation of pedagogical deep learning across broader educational contexts, including different school characteristics, grade

levels, and technology-supported learning environments. Additionally, quantitative research could be conducted to measure the impact of this approach on learning outcomes more objectively. Further research could also examine in greater depth the dynamics of social interaction in deep learning-based learning, particularly in the context of collaboration and project-based learning.

## CONCLUSION

This study demonstrates that the integration of deep learning approaches into integrated thematic learning design in elementary schools occurs through a structured and cyclical learning process, namely through the stages of stimulus, exploration, discussion, and reflection. This process serves not only as a learning sequence but also as a space for the construction of students' active, contextual, and meaningful learning experiences. The research findings indicate that student engagement increases significantly when learning is linked to real-world experiences and facilitated through collaborative and reflective activities. Furthermore, the meaning of learning is not only formed through conceptual understanding but also through students' ability to connect and apply knowledge in their daily lives.

Theoretically, this study reinforces and simultaneously expands the concept of deep learning in the context of elementary education, particularly in integrated thematic learning. These findings support constructivist theory and meaningful learning, which emphasize the importance of experience and active engagement in the learning process, and expand upon them by demonstrating that reflection is a key element in the construction of learning meaning. Thus, deep learning is understood not merely as a cognitive approach, but as a holistic process that integrates students' cognitive, emotional, and social aspects. The practical implications of this study suggest that teachers need to design instruction that is not only focused on delivering content but also on creating meaningful learning experiences through the integration of contextual, collaborative, and reflective activities. Thematic instructional design based on deep learning can serve as a strategic alternative for improving the quality of learning in elementary schools, particularly in supporting the implementation of the student-centered Merdeka Curriculum.

However, this study has limitations, particularly in that its scope is limited to a single school using a case study approach, meaning that the findings cannot be widely generalized. Furthermore, this study focuses primarily on the learning process and experiences, and thus has not yet examined in depth the long-term impact on students' academic achievement. Given these limitations, future research is encouraged to examine the implementation of deep learning in broader and more diverse contexts, as well as to integrate quantitative approaches to measure its impact on learning outcomes more comprehensively. Additionally, the development of more systematic and validated deep learning-based learning models represents an important direction for future research.

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