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Implementation of the Deep Learning Approach in 7th Grade Mathematics Learning At Al-Ikhlas Islamic SMP

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Abstract

This study was conducted to describe how the Deep Learning Approach (DLA) was implemented in seventh-grade mathematics instruction at Al-Ikhlas Islamic Junior High School, while also examining student responses, emerging challenges, and its effectiveness in improving conceptual understanding. The study used a qualitative approach with a case study design through in-depth interviews, classroom observations, and documentation. The results showed that teachers had implemented most of the DLA principles, including apperception, media use, contextual problem presentation, discussion, and providing reflection and feedback. Student engagement was highest in discussions (34%), followed by answering teacher questions (28%) and solving problems (24%), while questioning remained low (14%) due to a lack of confidence on the part of some students. Observations also showed that collaboration occurred but was not optimal due to the dominance of certain students, and some students remained passive. Overall, the implementation of DLA was proven to help increase student engagement, clarify concepts through real-life contexts, and reduce boredom, although obstacles such as math anxiety and low self-efficacy were still encountered. These findings confirm that DLA has the potential to improve the quality of mathematics learning if supported by the strengthening of collaborative strategies and ongoing mentoring.

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INTRODUCTION

Mastery of mathematics material is highly significant in developing logical and analytical thinking capacity and problem-solving skills. However, classroom teaching methods generally still revolve around a procedural approach that prioritizes memorization of stages and algorithms. This results in students facing challenges in internalizing conceptual understanding comprehensively. This situation was recorded in the 2022 Programme for International Student Assessment (PISA) evaluation, which ranked Indonesia 68th out of 81 countries, with a mathematics score of 379, substantially below the global average. This deficit in conceptual understanding is also correlated with the phenomenon of math anxiety, an emotional state that causes fear, avoidance tendencies, and low self-confidence in students when interacting with mathematics subjects (Suci & Miatun, 2022). To mitigate this anxiety, more interactive and participatory learning strategies, such as cooperative learning models, are essential to empowering students' self-confidence (Lanani, k, 2014).

This situation indicates that mathematics instruction is inadequate if it relies solely on procedural methods. A method is needed that can encourage students to deeply internalize concepts, form connections between ideas, and feel psychologically comfortable while exploring the material. Consequently, learning strategies that focus more on the process, rather than solely on the output, are essential. Within this framework, an approach that aligns with these requirements is the Deep Learning Approach (DLA).

The Deep Learning Approach (DLA) is essentially a learning paradigm that emphasizes the process of building comprehensive understanding, going beyond simply implementing a specific instructional model. Thus, DLA does not only prioritize practices such as debate, problem resolution, or the use of visual materials, but rather focuses on how these practices are implemented to establish correlations between concepts, strengthen substantive understanding, and motivate proactive student participation. These principles are consistent with Ausubel's theory of meaningful learning and Vygotsky's constructivism, which both emphasize the crucial role of activating prior knowledge and facilitating social interaction in the process of acculturating new knowledge.

Theoretically, Deep Learning (DLA) shows significant potential. However, empirical investigations examining its application in mathematics learning at the junior high school (SMP) level, particularly in the context of enhancing conceptual understanding and mitigating math anxiety, are still limited (Dahroni et al., 2025). This research gap is crucial, given that mathematics is often perceived as a challenging subject and a source of anxiety. Therefore, implementing a deep learning approach is essential for fostering solid conceptual understanding. The majority of previous studies tend to focus on specific learning models or technical aspects of teaching, rather than on how deep learning approaches can be comprehensively integrated into the mathematics classroom environment.

Following up on this, the limitations of previous studies provide rational justification for adopting Deep Learning Approach (DLA) in this research. DLA was considered because it contains attributes that are in line with the demands of mathematics learning, including the capacity to link various concepts, facilitate problem solving, and produce reflective and meaningful learning experiences. If these competencies are improved, this inherently has the potential to reduce mathematical anxiety because deeper mastery of concepts will erode anxiety, strengthen self-confidence, and give students a better perception of competence in facing mathematical tasks (Suci & Miatun, 2022); Lanani, k (2014). Thus, the issue of minimal conceptual understanding and high levels of anxiety in arithmetic are the main arguments underlying the urgency of implementing DLA.

Responding to the existing needs, this research was conducted to comprehensively explore the implementation of DLA in teaching mathematics to seventh grade students at Al-Ikhlas Islamic Junior High School. The main study includes: (1) the methods used by educators in applying DLA, (2) the obstacles faced during the teaching and learning process, and (3) students' reactions to the methods applied, especially regarding learning motivation and anxiety towards mathematics. This research is relevant because it has the potential to provide real evidence regarding the effectiveness of DLA in improving the quality of mathematics teaching and becoming a basis for developing more flexible, significant, and human-centered learning practices Wulandari & Fatonah (2024). Therefore, the findings of this research are expected to contribute to the innovation of teaching strategies that are more sensitive to student demands, in line with the principles of humanistic learning theory Rahmat, et al (2023).

METHOD

This research adopts a qualitative method through a case study design to explore in depth the implementation of the Deep Learning Approach (DLA) in mathematics learning for seventh-grade students at Al-Ikhlas Islamic Junior High School. The selected case study falls into the intrinsic case study category, meaning the focus of the research is an in-depth

understanding of the case itself in its context, without prioritizing broader generalizations. This approach facilitates researchers to analyze phenomena naturally, contextually, and intensively, while simultaneously exploring the meaning contained in the educational process, interactions between educators and students, and learning experiences that arise in the classroom as described by Gazali, R. Y., & Atsnan, M. F. (2022).

This research was conducted at Al-Ikhlas Islamic Junior High School, Pondok Gede, Bekasi, in October 2025. The period included the planning phase, permit processing, classroom observations, in-depth discussions, collection of supporting documents, and evaluation of research findings. Research participants were determined using a purposive sampling method, namely the process of selecting informants who are considered to have the most comprehensive understanding of the phenomenon being studied. The determination of teachers was based on parameters of experience teaching mathematics for more than five years, a track record of implementing learning components that focus on in-depth material, and active involvement in the use of teaching tools and interactive methodologies in the classroom. On the other hand, student selection took into account the diversity of academic achievement from the superior, middle, and basic categories as well as differences in levels of anxiety towards mathematics* as identified through initial observations and teacher input. Thus, the composition of informants involving one seventh-grade mathematics teacher and five students with different characteristics allows for the acquisition of rich, comprehensive, and diverse data.

The research instruments included semi-structured interview guidelines, observation sheets, and documentation checklists. Interviews were used to explore teachers' and students' experiences, perceptions, learning strategies, and perspectives on DLA. Observations were conducted in participatory and non-participatory ways to record learning activities, student collaboration, media use, teacher-student interactions, and the suitability of learning implementation to DLA principles. Documentation in the form of learning photos, videos, lesson plans, teaching modules, and student work results was collected to strengthen the interview data and provide authentic, verifiable evidence (Mustofa, M. (2024).

Data were analyzed using the interactive analysis model of Miles, Huberman, and Saldaña (2014), which includes data condensation, data presentation, conclusion drawing, and verification. In the data condensation stage, researchers conducted initial coding to highlight key elements from interviews, observations, and documentation. Examples of codes that emerged at this stage include "teacher strategies," "student responses," "learning barriers," "student collaboration," and "the influence of DLA on conceptual understanding and math anxiety." These codes were then grouped through pattern coding into broader themes to more clearly demonstrate the relationships between categories. The coded data were then presented in narrative form, summary tables, and a matrix of findings to facilitate the identification of patterns and trends that emerged during the learning process. The entire analysis process was iterative, going back and forth between the raw data, the coding results, and the interpretations to ensure consistency of meaning. Conclusions were then drawn gradually and verified through continuous comparisons across data sources, ensuring that the final interpretations truly reflected the empirical conditions in the field.

Data validity was maintained through triangulation of sources and methods, member checking, and peer discussions. Triangulation was carried out by comparing the results of interviews, observations, and documentation. Member checking was given to teachers and students to ensure that the researcher's interpretations were in accordance with the informants' intentions. Research dependability was maintained through an audit trail, which is a complete record of the entire research process that allows other researchers to trace the procedures and consistency of the analysis (Rahal, A., 2025). This study has a limited scope because it was only conducted in one class with a limited number of informants. Therefore, the results of the study are not intended for statistical generalization. However, the findings obtained provide an in-depth analytical understanding of the application of DLA in mathematics learning and can be a reference for similar research in other contexts (Al Ayyubi, et.al, 2024).

RESULT AND DISCUSSION

This section presents all research findings based on interviews, observations, and documentation. The data presentation includes tables and graphs so it can be understood without having to read the entire manuscript.

Table 1 Summary of Student Interview Findings

Aspect	Keys Finding	Interpretation
Experience using DLA	All students stated that they had participated in learning with DLA elements.	The implementation of DLA is quite even
The most difficult material	Decimal fractions	Abstract concepts require a meaningful approach
Boredom	Appears when the material is difficult	Variety of media & active activities required
Most favorite activity	Q&A, quiz	Interactive activities increase motivation
Preferred question type	Multiple choice	Need to get used to open-ended questions

The results of the student interviews above indicate that although all students had experienced learning with DLA elements, some still struggled with abstract material such as decimal fractions. This difficulty was related to some students' tendency to be passive, as shown in the table below.

Table 2 Summary of Teacher Interview Findings

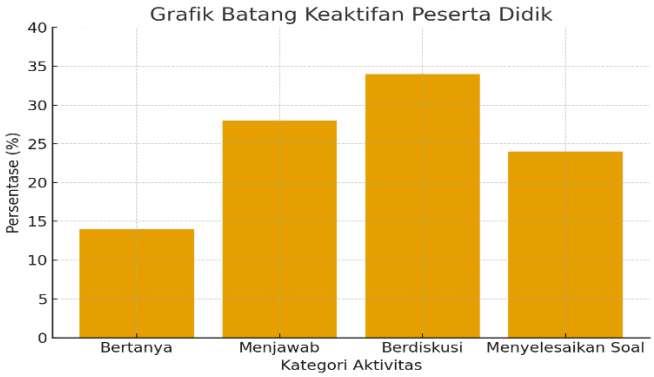
Aspect	Findings	Meaning/Interpretation
Implementation of DLA	It has been implemented since the previous year	Teachers and schools are quite ready
Dominant method	Lectures and practice questions	The initial stage of learning is still surface learning
Difficulty	Passive students	DLA needs assistance & motivation
Student response	Enthusiastic in discussion	DLA provides space for collaboration

Based on teacher interviews, this passive attitude can be linked to low self-efficacy, which is students' belief in their ability to understand and complete math assignments. When self-efficacy is low, students tend to be reluctant to ask questions, hesitate to express their opinions, and prefer to remain silent even when confused.

Furthermore, findings regarding students' most preferred activities, such as Q&A sessions and quizzes, indicate that they are more responsive to interactive activities. This aligns with the principles of DLA, which emphasize active engagement, exploration of concepts, and participation in in-depth thinking processes. Students' active participation in discussions, as expressed by teachers, reflects that interactive strategies in the classroom can encourage students to build more meaningful understanding.

Differences in academic ability and math anxiety levels among students also influence their responses to learning. Students with higher academic ability or lower levels of anxiety tend to be more engaged, while those with higher levels of math anxiety are more likely to experience boredom and struggle to follow the learning flow. These differences highlight the importance of differentiating strategies in implementing DLA so that each student can engage according to their needs and abilities.

Graph 1 Level of Student Activity in DLA Learning



The graph above displays four types of student activities during the Deep Learning Approach (DLA) learning process:
(1) asking questions, (2) answering teacher questions, (3) discussing, and (4) solving problems. The percentages in the graph indicate the extent of student involvement in each activity.

1. Questioning Activities (14%)
   Questioning activities are the category with the lowest percentage. This may indicate that:
   - Some students may still lack confidence in asking questions.
   - Students are not yet accustomed to independently identifying confusion or information needs.
   - Teachers need to provide scaffolding or additional stimulation, for example through provocative questions or worksheets that encourage students to ask questions.
2. Answering Teacher Questions (28%)
   This category has a fairly high level of activity. This means:
   - Students feel more comfortable when asked questions directly by the teacher.
   - The teacher's directed communication pattern still dominates learning.
   - The teacher's role as a facilitator is well established, but there is still room for spontaneous student responses to be improved.
3. Discussion (34%) Highest Activity
   Discussion activities show the highest percentage. This indicates:
   - DLA learning successfully creates a collaborative atmosphere.
   - Students are more active when learning in groups, exchanging ideas, and solving problems together.
   - Discussions provide the most comfortable space for students to express their opinions, thus encouraging deeper engagement.
4. Solving Problems (24%)
   The level of participation in solving problems is in the moderate category. This finding means:
   - Most students have demonstrated the ability to complete tasks independently.
   - However, some students may still need guidance or conceptual reinforcement to gain confidence in solving problems independently.
5. Analytical Summary
   Overall, the graph shows that learning using the DLA approach has encouraged students to actively participate, especially through discussion activities. However, questioning activity is still low, so teachers need to add strategies that encourage students to ask questions.

Table 3 Observation Results of DLA Implementation

Observation Aspect	Observed	Description
Apperception & Motivation	✓	The teacher opens the lesson with an introductory and ice-breaking activity.

Media Use	✓	Teaching modules & PPT are used to clarify concepts
Collaboration	±	Occurs, but not optimal (dominance of certain students)
Problem solving	✓	Students are faced with contextual questions
Reflection & Feedback	✓	The teacher gives direct feedback
Obstacle	±	Some students are passive and lack self-confidence

The observation results of the implementation of DLA in the learning process in the table above indicate that the teacher has implemented apperception and motivation effectively through sparking and ice-breaking activities, so that students are better prepared to follow the material. The use of media such as teaching modules and PPTs has also been effective in helping clarify concepts. Collaborative activities have emerged, but are not optimal because they are still dominated by only a few students. In the problem-solving aspect, the teacher successfully presented contextual questions that encouraged students to think critically. The teacher also provided reflection and direct feedback as part of the learning reinforcement. However, obstacles were still found in the form of some students who were passive and lacked confidence, so additional support was needed so that all students could be more evenly involved.

The results above indicate that students' learning difficulties primarily arise with abstract material, such as decimal fractions. This type of material requires the ability to understand symbolic representations and concepts that are not entirely concrete, often triggering learning anxiety. This finding aligns with Hidayat et al. (2023) who stated that math anxiety tends to increase when students are confronted with abstract and complex mathematical concepts.

In this context, the application of the Deep Learning Approach (DLA) has been proven to help reduce the difficulties and anxiety experienced by students. DLA is not a learning model like Discovery Learning, but rather a learning approach that focuses on the search for meaning, interconnectedness between concepts, and deep understanding. Through the application of DLA principles, teachers connect new concepts with students' prior knowledge according to Ausubel's ideas, present concrete examples to bridge abstract material, and facilitate discussions and interactions that encourage students to build understanding reflectively. These strategies enable students to be more actively involved in the learning process, clarify the structure of the concepts being studied, and foster self-confidence in facing mathematical tasks. Thus, the findings of this study show that DLA can create a more meaningful learning experience, thereby directly helping to reduce anxiety and increase students' confidence when dealing with abstract material.

In its implementation, observations showed that teachers had applied most of the principles of the Deep Learning Approach (DLA), which is academically defined as a learning approach that emphasizes in-depth understanding, the application of concepts in real-world contexts, and the development of students' critical and reflective thinking skills. The implementation of DLA includes apperception and activation of prior knowledge, presentation of contextual problems, and reflection and feedback.

However, several aspects still require strengthening, including collaborative learning that is still dominated by certain students, teachers' reliance on lecture methods, which tends to lead to passive students, and the suboptimal use of learning media to build deeper understanding. This situation aligns with Biggs & Tang's opinion, which emphasizes that DLA requires a learning environment that supports exploration, discussion, and reflection (Sumartini, A. T., 2022). Therefore, further training and the development of more innovative learning strategies are essential to increase student engagement and learning effectiveness.

Factors that support the successful implementation of DLA include teacher motivation and school openness to new approaches, student enthusiasm for interactive activities, and the availability of digital learning media such as modules and presentations. Meanwhile, inhibiting factors found include limited learning facilities, the emergence of math anxiety in some students, student dependence on lecture methods, and imbalances in group collaboration

Lestari, F. D. (2025). Deep Learning Approach (DLA) is academically defined as a learning approach that emphasizes in-depth understanding, application of concepts in real contexts, and the development of students' critical and reflective thinking skills. Observations showed that teachers had implemented most of the principles of DLA, including apperception and activation of prior knowledge, contextual problem presentation, and reflection and feedback. Factors supporting the successful implementation of DLA included teacher motivation and the school's openness to new approaches, student enthusiasm for interactive activities, and the availability of digital learning media such as modules and presentations. Meanwhile, inhibiting factors identified included limited learning resources, the emergence of math anxiety in some students, student dependence on lecture methods, and imbalances in group collaboration (Lestari, F. D., 2025).

The impact of DLA implementation on students' learning experiences is evident in increased student engagement, growing self-confidence through discussions and questions and answers, improved understanding of basic concepts, and reduced boredom during the learning process. This approach encourages meaningful learning because students are able to connect the concepts learned with personal experiences, making learning more relevant and positively impacting the development of students' mathematical abilities (Yudha, et al., 2019). However, several aspects still require strengthening, including collaborative learning that is still dominated by certain students, teachers' reliance on lecture methods, and the less than optimal use of learning media. This condition aligns with the opinion of Biggs & Tang, who emphasize that DLA requires a learning environment that supports exploration, discussion, and reflection (Sumartini, A. T., 2022). Therefore, further training and the development of more innovative learning strategies are essential to increase student engagement and learning effectiveness.

CONCLUSIONS

Based on the results of interviews, observations, activity graphs, and documentation, it can be concluded that the implementation of the Deep Learning Approach (DLA) in seventh-grade mathematics learning has been quite effective and reflects most of the principles of deep learning. Teachers successfully carried out apperception, utilized learning media, presented contextual problems, and provided reflection and feedback consistently. Students demonstrated a good level of activity, especially in discussion activities, which are the main space for the development of conceptual understanding. However, questioning activity was still low and collaboration was not evenly distributed because some students dominated. Barriers such as passive behavior, lack of confidence, and math anxiety also affected student engagement. Overall, DLA had a positive impact on students' conceptual understanding, motivation, and learning experiences, but its implementation still requires strengthening aspects of collaboration, scaffolding, and a variety of strategies so that all students can be optimally involved.

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