



Implementation of Deep Learning: An Effort to Strengthen the Character Quality of Elementary School Students

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Abstract

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This study aims to analyze the implementation of deep learning, its supporting factors, as well as obstacles and solutions. This type of research is descriptive qualitative; the research location is Muhammadiyah 1 Elementary School in Tegal City; data sources include informants, activities, documents. The research results in three points: the implementation of deep learning, its supporting factors, as well as obstacles and their solutions. First point, the implementation of deep learning at Muhammadiyah 1 Elementary School was effective in strengthening character quality. The learning is meaningful, reflective, and value-based. In addition to being academically intelligent, students' characters meet Islamic values and national education goals. Second, several factors support the effectiveness of deep learning. Two of these are strong school vision and leadership, i.e., the principal's commitment as an agent of change who inspires the entire school community. The next factor is the character curriculum development team. Two other factors are teacher quality and competence, i.e., understanding of deep learning concepts, pedagogical skills, role models, and ongoing professional training and development. Other factors include integrated curriculum design, a conducive school environment and culture, active parent and community involvement, authentic and ongoing assessment, and the use of technology. Third, the following are obstacles and their solutions. For the constraint of limited teacher understanding and competence, the solution is regular practice. The solution to teachers' time constraints and administrative tasks is to reduce and simplify non-essential administrative tasks. So, teachers can focus on learning. The lack of parental support and involvement can be overcome by holding seminars, workshops, or regular meetings with parents. Limited facilities and infrastructure can be overcome by maximizing the use of existing facilities or recycling them for projects.

Keywords:

Deep Learning, Character Quality, Elementary School Students

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INTRODUCTION

Article 3 of the National Education System Law No. 20 of 2003 states that the goal of national education is to develop the potential of students to become individuals who believe in and fear God Almighty, possess noble character, are healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens. This educational goal is the primary objective in strengthening Indonesia's human resources, improving their spiritual, cognitive,



affective, emotional, social, and independent qualities, which embody the nation's character (Hendrawan et al., 2025).

The Ministry of Primary and Secondary Education is currently implementing a deep learning approach in the national education system. Deep learning emphasizes in-depth conceptual understanding and mastery of competencies within a narrow range of material. Its implementation aims to increase students' knowledge and develop 21st-century skills, including foundational literacies, competencies, and character qualities. Students need skills such as curiosity, initiative, persistence, adaptability, leadership, and social and cultural awareness (Agenda, 2016). Schools must develop these skills through intracurricular, extracurricular, and school culture activities. The goal is to transform students into the desired future generation: individuals who understand, internalize, apply, and cultivate the character values of Pancasila in their daily lives. Learning not only produces academic achievement but also character development in students. Students are expected to possess not only intellectual intelligence but also emotional and social intelligence. Character education plays a vital role in shaping a child's personality, starting as early as elementary school. At this age, students are at a developmental stage that is crucial for forming habits, attitudes, and ways of interacting with their environment. Instilling positive values early on can lay the foundation for sound personal development in the future. Through consistent practice, children learn to understand values such as honesty, discipline, responsibility, caring, cooperation, tolerance, and respect for others. These values cannot simply be taught in theory; they must be applied in daily life, whether during classroom lessons or in activities outside the classroom. Developing a good personality also helps children navigate various social situations. They become better able to exercise self-control, respect rules, collaborate with others, and consider the consequences of their actions. Thus, educational success is measured not only by academic achievement but also by a student's ability to demonstrate behaviour that reflects moral values in their daily lives.

Character education is an integral part of the learning process in elementary schools. Through continuous habituation—fostered by leading by example, school activities, classroom instruction, and collaboration with families—it is hoped that a generation will emerge possessing a balanced blend of knowledge, attitudes, and behaviours and capable of making positive contributions to their environment and society.

In practice, teachers at Muhammadiyah 1 Elementary School in Tegal City have almost fully implemented deep learning, developing 21st-century skills in both learning and non-academic activities, however, it still faces obstacles. This school requires an analysis of the development of 21st-century skills in learning to shape students into democratic, competent, and productive Indonesian citizens. One of the 21st-century skills is student character development (Jose, 2021). The research questions are as follows: How is deep learning implemented as an effort to strengthen the character of students at Muhammadiyah 1 Elementary School in Tegal City, What are the supporting factors, and What are the obstacles and solutions. This study aims to analyze the implementation of deep learning, its supporting factors, as well as obstacles and solutions.

The novelty of this research lies in strengthening the quality of students' character through a deep learning instructional approach. This implementation extends beyond classroom instruction to include non-instructional activities. Previous research on the deep learning approach has typically focused on improving student learning outcomes rather than strengthening character. Deep learning has been shown to enhance student learning outcomes (Zafirah, Wijaya & Rohyana, 2025). Mardatillah, Wulandari, and Zulfianti (2025) conducted a literature review on the implementation of deep learning within the Project-Based Learning model and finding that this model is capable of strengthening the quality of students' character.

METHODS

This research is a descriptive qualitative study. Qualitative research produces data in the form of descriptive words and sentences (Moleong, 2018). The subjects were the principal, teachers, and students at Muhammadiyah 1 Elementary School in Tegal City. Subjects were selected using purposive sampling. The object of the study was the social situation at school, including the location, actors, and activities carried out by the principal, teachers, students, and parents.

The subjects of this study were the principal, a fourth-grade teacher, and several fourth-grade students at Muhammadiyah 1 Elementary School in Tegal City. The number of fourth-grade students is 28. Subjects were selected using purposive sampling, which involves selecting data sources based on the researcher's specific considerations, and snowball sampling, which involves initially collecting small amounts of data and gradually increasing the number.

Data collection used participant observation, in-depth interviews, and documentation (Sugiyono, 2023). The researcher conducted direct observations of classroom instruction (intracurricular activities) and out-of-class learning activities (extracurricular activities). In-depth interviews were also conducted with informants; the key informant was the school principal, while the primary informants were teachers and fourth-grade students. Documentation was carried out to gather data such as instructional materials, student records, and photographs of school learning activities.

Data validity techniques included credibility (internal validity), transferability (external validity), dependability (reliability), and confirmability (objectivity) testing (Sugiyono, 2023). Credibility testing involved triangulation and member checking, and dependability testing involved auditing the entire research process. Confirmability testing examines the objectivity criteria to determine if the research results are agreed upon by many people. Confirmability testing was conducted on the principal and fourth-grade teachers to obtain agreement. Qualitative data analysis techniques were adapted from the Miles & Huberman interactive model. The following is the data analysis model used.

Based on Figure 1, the data analysis technique employed encompasses the stages of data collection, data presentation, data condensation (or reduction), and conclusion drawing. Data collection techniques include participant observation, in-depth interviews, and document analysis. Data condensation is the process of

selecting, focusing, simplifying, abstracting, and transforming data obtained from interviews, observations, and documentation (Septiana & Khoiriyah, 2024).

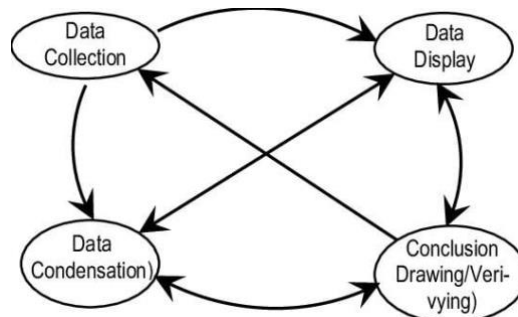


Figure 1. Components of Data Analysis (Miles, Huberman & Saldana, 2020)

This stage aims to identify information relevant to the research focus, thereby making the data more targeted. Data presentation involves organizing information into narrative descriptions, tables, matrices, charts, or other visual formats (Wahid et al., 2023). Systematic presentation assists the researcher in understanding patterns, relationships, and trends emerging from the data. Drawing and verifying conclusions involves interpreting the meaning of the data, identifying patterns, and establishing relationships between findings.

RESULTS & DISCUSSION

Implementation of Deep Learning at Muhammadiyah 1 Elementary School in Tegal City

Based on interviews, observations, and documentation, data was obtained on the implementation of deep learning as an effort to strengthen the character of students at Muhammadiyah 1 Elementary School in Tegal City. This research focused on learning in fourth grade. Strengthening the character of fourth-grade students was carried out by integrating deep learning into learning tools and the learning process, both in and outside the classroom. A deep learning approach can enhance student engagement in the classroom (Ar-Rasyid et al., 2025). Deep learning addresses future challenges (Fullan, 2025). In this context, these challenges stem from technological advancements and the evolution of an increasingly modern era. Efforts must be made to ensure students possess critical thinking skills, strong character, and effective problem-solving abilities. The following is an overview of the implementation of deep learning at SD Muhammadiyah 01 in Tegal City.

Integration of deep learning in the learning process

The following are the activities of a fourth-grade teacher at Muhammadiyah Elementary School in Tegal City who is implementing a learning process with deep learning integration.

1) Integration of deep learning in the intracurricular learning process

Based on observations and interviews with the principal of Muhammadiyah Elementary School in Tegal City, the integration of a deep

learning approach into curricular activities is implemented through Natural and Social Sciences instruction. Integrating deep learning into the instructional process emphasizes the creation of learning experiences that are meaningful, profound, and relevant to students' lives. This implementation encourages students to gain a comprehensive understanding of concepts, connect knowledge with real-world experiences, and develop critical thinking, creative, collaborative, and communication skills (Quinn et al., 2019).

The deep learning approach in elementary schools is integrated with intracurricular activities (Hidayat et al., 2025). Intracurricular activities are learning activities carried out on a scheduled basis in the classroom, in accordance with the structure of the independent curriculum. The following is an activity of a fourth-grade science teacher at Muhammadiyah 1 Elementary School in Tegal City who is implementing a learning process that integrates deep learning. All students enthusiastically participated in the lesson by observing the teacher's experiments.



Figure 2. A fourth grade science teacher is implementing a learning process with deep learning integration

Based on Figure 2, it can be explained that instruction in Natural and Social Sciences is conducted using a deep learning approach. An experiment on the refraction of light conducted in a fourth-grade science lesson encouraged students to reflect, discuss, and express their opinions. This fostered a deeper understanding of the character value of critical thinking. Critical thinking is a skill that must be cultivated in students as a provision for facing problems in everyday life (Wahyuni, 2024). The science teacher stated that the learning process aligned with the Lesson Plan, which had been developed by integrating deep learning. The deep learning approach is not only implemented in a fun way but also engages students. Student-centered learning focuses more on the needs of students in the classroom (Thaariq & Karima, 2023). Students' needs are accommodated without discrimination.

Natural and Social Sciences instruction is guided by learner-centered principles. Teachers act as facilitators, designing contextual learning activities rooted in the local environment. These activities enable students to move beyond merely memorizing environmental concepts; instead, they foster an understanding of the interconnections between human actions, natural conditions, and social life.

Deep learning is integrated through methods such as problem-based learning, project-based learning, inquiry, discussion, and reflection. Teachers pose guiding questions that encourage students to seek underlying reasons, compare information, construct arguments, and generate evidence-based solutions. Digital technology is utilized judiciously as a supporting resource to explore information, visualize concepts, and help students develop ideas. Its use is intended to strengthen students' thinking processes rather than replace their ability to observe, analyze, and make decisions.

Integrating deep learning into Natural and Social Sciences instruction fosters a learning experience that is active, contextual, and focused on genuine understanding. Students have the opportunity to connect their knowledge of the natural and social worlds to their daily lives, build problem-solving skills, and cultivate a sense of care for the environment and society. This approach shapes students who not only possess knowledge but are also capable of applying it critically, creatively, responsibly, and meaningfully in their lives.

The following is an image of student learning in a fourth-grade classroom.



Figure 3. Science learning in grade IV

Figures 2 and 3 illustrated a fourth-grade teacher implementing a science lesson integrating deep learning. Integrating deep learning into the learning process is mindful, meaningful, and joyful. In line with the Minister of Primary and Secondary Education's vision (2025), deep learning provides full attention, encourages meaningfulness, and creates a joyful learning atmosphere. These elements are essential for building strong character education. Students 1, 2, and 3 stated that through the teacher's experimental learning, students who were initially reluctant to participate became more engaged. Learning became enjoyable because they provided opportunities for reflection, discussion, and expression. Teachers use technology-based presentation materials as learning media. The use of learning media serves to concretize the subject matter (Siswanti et al., 2024). From interviews, the Islamic Religious Education teacher stated that the religious material in class is connected to students' daily lives. For example, when discussing honesty, the teacher presents real-life examples, such as losing an item, cheating, or helping a friend. The teacher then invites students to discuss and reflect on correct behavior according to Islamic rules. Such learning fosters a deeper understanding of religious values and character.

The following is a picture of learning Islamic religious education subjects in class 4.



Figure 4. The fourth grade Islamic Religious Education teacher carried out learning

Based on Figure 4, the fourth-grade Islamic Education teacher implemented the Problem-Based Learning model. Students enthusiastically engaged in group discussions to solve problems posed by the teacher. This demonstrates that, through solid collaboration based on the division of tasks for each student, Islamic Religious Education learning significantly supports the delivery of moral values to students, particularly the graduate profile dimension. Problem-based learning teaches students to think realistically (Halimah, Usman & Maryam, 2023). This realistic mindset is a valuable asset for students' lives.

The learning process not only prioritizes intellectual abilities but also expects students to behave and act in accordance with their intellectual abilities (Sumiyati et al., 2025). The following is an implementation of the social values students acquire at school. They implement these values in their community through activities such as sharing with others. The following is a picture of a social activity carried out by a student.



Figure 5. Islamic Religious Education teacher implemented

Based on the results of the observation, Islamic Religious Education teacher implemented Project-Based Learning in the form of real-life practice. Students were tasked with carrying out simple charity activities as a form of

practicing manners and morals. These activities fostered empathy, compassion, and social responsibility. Ilyas and Purnomo (2019:53), cited by Rajagukguk (2023), state that Project-Based Learning is a form of cooperative learning that directly involves students. They work on specific projects in learning activities to overcome their own learning problems. Project-based learning is an innovative learning model or approach that emphasizes contextual learning through complex activities (Nurazizah et al., 2025). Based on interviews with the fourth-grade teacher, it can be concluded that students do not merely learn theory in the classroom; rather, they apply the concepts they have acquired to their daily lives. This approach enables them to gain a deep understanding of the material and provides them with real-world experiences that are beneficial to their social lives.

2) Integration of deep learning in extracurricular activities

Extracurricular "outing class" activities—specifically educational visits to an orphanage—represent a form of learning outside the classroom designed to provide students with real-world experiences. These activities aim to broaden students' horizons while instilling character values through direct interaction with the social environment. Interviews with the school principal indicate that the orphanage was selected as a destination because it serves as a learning space that fosters students' understanding of diverse living conditions, social awareness, a sense of togetherness, and the importance of sharing with others.

The following is a picture of students participating in an outdoor class activity.



Figure 6. Educational visit activity

Fourth-grade students visited an orphanage. Afterward, they were invited to discuss and reflect on what they saw and felt. This activity broadened social and moral attitudes and fostered contextual religious awareness. These social activities are humanitarian in nature and aim to train students' social awareness. Social activities can develop students' social awareness (Fitri & Putri, 2024). These habits also serve as a means for students to socialize.

The activity begins with preparations involving teachers, orphanage staff, and students. Teachers brief the students on the visit's objectives, rules, communication etiquette, and appropriate conduct while at the orphanage. Students are guided to respect the residents, use polite language, avoid

discriminating against peers based on family background, and behave in a way that ensures everyone feels comfortable. Preparation may also include collecting donations—such as stationery, reading books, school supplies, food, or other necessities—agreed upon with the orphanage.

During the visit, students participate in various educational and social activities. The event starts with a welcome session and introductions among students, teachers, orphanage staff, and the children living there. Afterward, students engage in educational games, shared reading sessions, art activities, and group work. Teachers allow students to make simple observations of life at the orphanage without engaging in activities that expose the residents' private circumstances. Through these activities, students learn to communicate, collaborate, respect others, and demonstrate empathy.

The visit also serves as a learning opportunity for students to practice sharing with others. Students present the aid they prepared together, while remaining mindful of the recipients' comfort. Handing over donations is viewed not merely as a transfer of goods, but as a way to foster the understanding that every individual has diverse needs, experiences, and life circumstances. Teachers help students understand that social concern is not always expressed through material means; it can also be shown through attention, friendship, respect, and a willingness to help.

Following the visit, the activity concludes with a reflection session at school. Students are given the chance to share their experiences, discuss what they learned, and articulate the positive values gained during the activity. Teachers guide the reflection by asking questions about their interactions, forms of social concern applicable at school and home, and concrete actions they can take to help others. The results of this reflection can be expressed through writing, drawings, personal stories, posters, or simple presentations.

Based on interviews with the 4th-grade teacher, it can be concluded that the class outing to an orphanage holds significant educational value in supporting the character development of elementary school students; furthermore, the students were enthusiastic and enjoyed the activity. This hands-on experience helped the students understand the meaning of empathy, tolerance, mutual cooperation, responsibility, caring, and gratitude. In addition to enriching the learning experience, the activity strengthened social bonds among students and fostered more contextual learning. Interviews with the 4th-grade students revealed that they enjoyed the visit to the orphanage. This educational outing provided a meaningful experience that helped shape the students into individuals who are caring, polite, and confident, and who possess a keen awareness of their social environment (Jefrey et al., 2025).

In addition to social activities, there are also extracurricular activities aimed at strengthening students' character through the principles of in-depth learning. One such activity is *Hizbul Wathan*. The following is a picture of students participating in Hizbul Wathan activities.



Figure 7 Hizbul Wathan activity

Several of these programs support the implementation of deep learning to strengthen students' character. These programs are designed to help students not only understand character values theoretically but also experience, practice, and reflect on them directly in real life. *Hizbul Wathan* activities are mostly conducted outside the classroom. Students are trained to line up neatly and respond quickly to teacher commands. Hizbul Wathan fosters student discipline (Rizqillah, Syam & Sumaryanti, 2025). Students are not only taught subject matter in the classroom but also must be trained in discipline to become intelligent, disciplined, and well-rounded individuals.

Supporting factors for the success of implementing Deep Learning in strengthening the character quality of fourth grade students at Muhammadiyah 1 Elementary School in Tegal City

Based on interviews with teachers and fourth-grade students at Muhammadiyah 1 Elementary School, supporting factors for Deep Learning in strengthening character include school leadership and vision, as well as teacher quality and competence. Strong school leadership and vision are realized through the principal's commitment as an agent of change who inspires the entire school community and the support of the character curriculum development team. Firm leadership is demonstrated by the principal. The principal acts as a facilitator for teachers in implementing deep learning in schools (Tuningsih, 2026). Fadilah's (2025) research shows that the success of Deep Learning integration depends not only on technical aspects but also on visionary leadership, change management, and adaptive management of the educational ecosystem. In addition, teacher quality and competence factors include an understanding of deep learning concepts, pedagogical skills, role models, ongoing professional training and development, integrated curriculum design, a conducive school environment and culture, active parental and community involvement, authentic and ongoing assessment, and the use of technology. The use of technology in learning is a form of innovation in the digital era (Aisyah et al., 2024). Teachers not only innovate learning through the use of technology-based learning media, but also implement deep learning approaches and problem-based learning models. Teachers understand that all forms of innovation in learning must be implemented to make learning more meaningful. Students not only understand the subject matter by rote but also are able to grasp the meaning contained within the material. Meaningful learning is effectively implemented in elementary school students (Rahmawati et al., 2025).

Obstacles and solutions to the implementation of Deep Learning in strengthening the character quality of fourth grade students at Muhammadiyah 1 Elementary School in Tegal City

Based on interviews with teachers and fourth-grade students, various obstacles to implementing deep learning were found. The first is limited teacher understanding and competence. The results of research by Safiah et al. (2025) reveal that training and mentoring programs are effective in improving the competence of elementary school teachers, encouraging a digital learning culture, and can be replicated in other schools to support the Sustainable Development Goals agenda in the field of education. The second is the limited time and administrative burden on teachers. The results of research by Saepurrohman & Pitaloka (2025) confirm that teacher mental well-being can be improved by reducing administrative burdens, managing time pressure, and strengthening organizational support in the workplace. The third is a lack of parental support and involvement. Mardatillah et al. (2025) stated that the lack of parental support and limited resources can be overcome through collaboration between schools, parents, and the community. The final factor is limited facilities and infrastructure. Based on the research results by Nurhakim et al. (2025), strengthening teacher capacity and providing adequate infrastructure can lead to deep learning, which can be a strategic approach to developing a qualified, adaptive, and competitive generation in the global era.

Solutions to address these limitations are as follows. For limited teacher understanding and competency, the solution is regular training focused on practice. A solution to teacher time constraints and administrative burdens is to reduce and simplify non-essential administrative tasks. It makes teachers focus on the learning content. A solution to the lack of parental support and involvement is holding seminars, workshops, or regular meetings with students' parents. Parental support determines students' learning success at school (Saputri & Fauziddin, 2022). Parents and schools must collaborate well for the benefit of students. For limited facilities and infrastructure, the solution is to maximize the use of existing resources or recycle them for projects.

The limitations of this study are as follows. First, the application of deep learning is significantly influenced by school characteristics, teacher readiness, learning facilities, and student conditions. Variations in school environments can lead to differences in the quality and intensity of implementation, meaning the findings cannot necessarily be generalized to all elementary schools. Second, research on character strengthening presents challenges regarding measurement. Traits such as responsibility, discipline, cooperation, independence, empathy, and integrity cannot always be measured objectively within a short timeframe. Third, time constraints may affect the findings regarding changes in student behavior. Character strengthening is a long-term process; thus, results obtained during the study period may not fully reflect the long-term impact of deep learning. Fourth, the involvement of teachers and students can lead to varied responses during data collection. Individual perceptions, experiences, and levels of engagement differ, potentially influencing the results of observations and interviews.

CONCLUSION

The implementation of deep learning at Muhammadiyah 1 Elementary School has proven effective in strengthening character through meaningful, reflective, and values-based learning. In addition to academic excellence, students also develop noble character in accordance with Islamic values and national education goals.

Supporting factors include strong leadership and the school's vision, namely: the principal's commitment as an agent of change inspiring the entire school community; the existence of a character curriculum development team; teacher quality and competence, namely: understanding of deep learning concepts, pedagogical skills, role models, ongoing professional training and development, integrated curriculum design, a conducive school environment and culture, active parent and community involvement, authentic and ongoing assessment, and the use of technology.

Obstacles and solutions include: limited teacher understanding and competence; the solution is routine training focused on practice rather than theory; limited time and administrative burden on teachers; the solution is reducing/simplifying non-essential administrative formats to focus on the substance of learning; lack of parental support and involvement; the solution is holding seminars, workshops, or regular parent meetings; limited facilities and infrastructure, the solution is to maximize the use of existing facilities or recycling for the project.

Teachers should improve their abilities, skills, and motivation to integrate deep learning into both in-class and out-of-class learning. School principals should create policies that support the integration of deep learning into both in-class and out-of-class learning. The Tegal City Education Office should facilitate teachers' participation in scientific activities related to deep learning.

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