

Implementing Differentiated Learning to Achieve Deep Learning Within the Context of the Merdeka Curriculum

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Keywords	Abstract
differentiated learning; deep learning; Merdeka Curriculum; learning styles; elementary education	In the era of 21st-century education, the global challenge of achieving deep learning has become increasingly critical, as many education systems continue to struggle with surface-level learning approaches that prioritize memorization over conceptual understanding and critical thinking. This study aims to describe the implementation of differentiated learning as an effort to achieve deep learning within the context of the Merdeka Curriculum in elementary schools. The research was grounded on the premise that each student possesses distinct characteristics, interests, and learning styles, requiring adaptive teaching approaches to optimize their potential. Differentiated learning aligns with the principles of the Merdeka Curriculum, which emphasizes flexibility, meaningful learning, and learner autonomy. This research employed a qualitative method with a case study design conducted in a fifth-grade elementary classroom. Data were collected through observation, interviews, and documentation, and were analyzed descriptively to obtain a comprehensive picture of differentiated learning practices. The findings reveal that instructional differentiation accommodating visual, auditory, and kinesthetic learning styles enhances students' active engagement, motivation, and conceptual understanding. Moreover, teachers are better supported in managing inclusive classrooms through varied and meaningful learning strategies. The study concludes that differentiated learning plays a vital role in realizing deep learning, in line with the educational transformation agenda of the Merdeka Curriculum.

INTRODUCTION

The contemporary global education landscape faces a fundamental challenge in fostering deep learning among students across diverse educational contexts (Assefa, 2024; Sathya, 2026; Zebua, 2025). International assessments such as the Programme for International Student Assessment (PISA) and Trends in International Mathematics and Science Study (TIMSS) consistently reveal that students in numerous countries, including both developed and developing nations, demonstrate weak performance in higher-order thinking skills, problem-solving abilities, and the application of knowledge to real-world contexts (OECD, 2019). Research conducted by Hattie and Donoghue (2016) indicates that surface learning characterized by rote memorization and reproduction of facts without meaningful understanding remains the dominant approach in many classrooms worldwide. This phenomenon is particularly concerning in elementary education, where foundational cognitive patterns are established (Allport, 2025).

The National Research Council (2018) emphasizes that the transition from surface to deep learning requires systematic pedagogical interventions that recognize individual learner differences and promote metacognitive development. In Southeast Asian contexts, studies by

UNESCO (2020) highlight significant disparities in learning quality, with many students' achieving basic literacy and numeracy but failing to demonstrate critical thinking, creativity, and reflective capacities essential for 21st-century competencies. These global trends underscore the urgency of implementing instructional approaches that prioritize deep, meaningful learning experiences tailored to diverse student needs.

Basic education plays a strategic role in shaping students' academic abilities, character, and basic values (Ansori et al., 2024; Hanafiah et al., 2024; Hang, 2025; Hasibuan et al., 2026; Saryanto et al., 2023). At this level, the learning process becomes the foundation for the cognitive, affective, and psychomotor development of students at the next level. One of the main challenges in the implementation of education in elementary schools is the diversity of student characteristics, both in terms of readiness, interests, and learning styles. Each student has a different way of receiving, processing, and remembering information, so a uniform approach to learning is no longer adequate to optimize their potential.

In line with the direction of national education transformation, the Independent Curriculum launched by the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek) emphasizes the importance of deep learning as the core of a meaningful learning process. Deep learning encourages students to understand concepts in their entirety, relate knowledge to real life, and develop critical and reflective thinking skills. To realize this, teachers need to apply a student-centered approach and respect diversity, one of which is through differentiated learning.

According to Tomlinson (2014), differentiated learning is a systematic process carried out by teachers to adjust learning content, processes, and products by considering students' readiness, interests, and learning profiles. The learning profile includes learning styles, namely individual preferences in receiving and processing information, both visually, auditory, and kinesthetic. This approach is considered effective in creating inclusive and adaptive learning to the needs of students in heterogeneous classrooms.

The results of previous research show that the Independent Curriculum emphasizes the implementation of differentiated learning (Lestariani et al., 2023) The application of differentiation based on learning style in elementary school has a positive impact on narrative writing skills (Astuti et al., 2025) Teachers can choose and apply learning models that are more in line with students' learning styles, so that the subject matter is easier to understand and absorb (Riyanawati et al., 2025).

However, a number of studies (Newton, 2015) also highlight that the application of learning styles needs to be understood in a broader context, not simply matching the media to students' learning preferences, but integrating such approaches within a comprehensive differentiated learning framework. Therefore, it is important to examine how differentiation practices can support the realization of deep learning which is the main focus of the Independent Curriculum policy.

Despite the growing body of literature on differentiated instruction and deep learning separately, significant research gaps remain that this study addresses. First, there is limited empirical research specifically examining the integration of differentiated instruction with deep learning outcomes within the context of curriculum reforms in developing countries, particularly Indonesia's Merdeka Curriculum. Most existing studies on differentiation focus on Western educational contexts with different cultural, structural, and policy environments.

Second, while numerous studies examine cognitive outcomes of differentiated instruction, few investigate its impact on metacognitive and reflective dimensions—core components of deep learning as defined by contemporary learning theory (Marton & Säljö, 2005; Biggs & Tang, 2011). Third, existing research rarely positions differentiated instruction as an instrument of public policy implementation, examining how national curriculum mandates translate into classroom practices and student learning outcomes. This study fills these gaps by investigating how differentiated learning practices, specifically those accommodating diverse learning styles, facilitate the achievement of deep learning objectives within the Merdeka Curriculum framework, while simultaneously examining both cognitive and metacognitive dimensions of student learning.

The novelty of this research lies in three interconnected dimensions that distinguish it from previous studies. First, this study provides a unique theoretical contribution by integrating Tomlinson's differentiated instruction framework with contemporary models of deep learning (as conceptualized by Fullan & Langworthy, 2014; Mehta & Fine, 2019) specifically within the context of Indonesia's Merdeka Curriculum implementation—a policy environment that has received minimal scholarly attention. Second, methodologically, this research emphasizes not only cognitive learning outcomes but also metacognitive awareness, reflective capacity, and students' ability to connect personal experiences with academic content, thereby operationalizing deep learning in more comprehensive ways than previous studies that focus primarily on achievement scores. Third, this study positions differentiated instruction as a public policy instrument, examining the micro-level classroom practices that enable the realization of macro-level educational reform objectives, thereby contributing to implementation science and evidence-based policy development in education. By documenting how teachers translate policy mandates into effective pedagogical practices that foster deep learning through differentiation, this research offers practical insights for scaling educational innovations in similar developing-country contexts.

Based on this description, the main problem raised in this study is how the application of differentiated learning can support the realization of deep learning in elementary schools, especially through the management of students' learning styles in teaching and learning activities. The purpose of this study is to describe the implementation of differentiated learning based on student learning styles as an effort to realize deep learning in the context of the Independent Curriculum, as well as to identify its impact on students' motivation, engagement, and conceptual understanding in the learning process.

METHOD

This study used a qualitative approach with a case study design to gain an in-depth understanding of the application of differentiated learning in realizing deep learning in elementary schools. This approach was chosen because the research focuses on the meaning of the learning process that takes place naturally in the classroom, without manipulation of variables, by examining the real practices of teachers in the context of the Independent Curriculum.

Research Design

The case study design was used to explore the phenomenon of differentiated learning contextually and comprehensively. According to Creswell (2009), qualitative research allows

researchers to understand the meaning of individual or group experiences of a social phenomenon, while Yin (2018) emphasized that case studies are appropriately used to examine contemporary phenomena in real-life contexts. In this study, the focus is directed to teachers' strategies in managing the diversity of student learning styles to support the achievement of deep learning which is the goal of the Independent Curriculum.

Place and Time of Research

The research was carried out at SD Negeri Rejosari III Semin, Gunungkidul Regency, Special Region of Yogyakarta, which has implemented the Independent Curriculum in stages. This school was chosen because it has a high diversity of student characteristics and teachers who actively develop differentiated learning practices. The research lasted for three months, from August to October 2025, covering the stages of preparation, data collection, analysis, and preparation of reports.

Population and Sample

The population of this study is all grade V students of SDN Rejosari III Semin which totals 24 children. The sample was determined using purposive sampling techniques, taking into account the representation of learning styles (visual, auditory, kinesthetic), the level of learning ability (high, medium, low), and variations in learning interests and motivations. Grade V teachers act as supporting subjects who provide in-depth information about the planning and implementation of differentiated learning. The selection of this sample was not done for generalization, but to obtain a representative picture of the phenomenon being studied.

Data Collection Techniques

Data is collected through three main techniques, namely:

Participatory observation is carried out to observe the learning process before and after the implementation of differentiated learning. Observations include teacher activities, student participation, class dynamics, and interaction between students. In-depth interviews were conducted with teachers and some students using semi-structured guidelines to explore their learning experiences, perceptions, and motivations for learning.

The documentation study includes the analysis of the Learning Implementation Plan (RPP), student assignment results, teacher assessment rubrics, and visual documentation during teaching and learning activities. The main instrument of this research is the researcher himself, who plays the role of a planner, collector, analyst, and data reporter (Sugiyono, 2022). In addition, auxiliary instruments are used in the form of observation sheets, interview guidelines, and document analysis sheets. Observation indicators include variations in teacher strategies, student involvement, and learning suitability with deep learning principles.

Data Analysis Techniques

The data were analyzed qualitatively descriptively with the interactive model of Miles, Huberman, and Saldana (2014) which included three stages:

1. Data reduction, which is selecting and focusing data that is relevant to the research objectives.
2. Data presentation, through narratives, tables, and matrix to see patterns of relationships between learning styles, teachers' strategies, and deep learning outcomes.
3. Conclusion drawing and verification, carried out repeatedly to ensure consistency of the meaning and findings of the research.

The analysis was carried out simultaneously during the data collection process, in line with the principle of cyclical qualitative research.

Data Validity Test

The validity of the data is maintained through triangulation of sources and techniques, member checks, and peer debriefing. Triangulation was carried out by comparing the results of observations, interviews, and learning documents. The validity of the study was also tested based on four data reliability criteria from Lincoln and Guba (1985), namely:

- a) credibility (Truth of the data),
- b) transferability (applicability of results in other contexts),
- c) dependability (consistency of data), and
- d) confirmability (objectivity of the findings).

Research Ethics

This research pays attention to ethical principles by obtaining official permission from the principal and informed consent from teachers and students. The researcher guarantees the confidentiality of the data and ensures that research activities do not interfere with the learning process in the classroom. The data obtained is used only for academic and scientific publication purposes.

RESULT AND DISCUSSION

1. An Overview of the Implementation of Differentiated Learning

This research was carried out for three months in grade V of SDN Rejosari III Semin, Gunungkidul, with a focus on the application of differentiated learning to realize deep learning. Based on the results of observations and interviews, teachers have applied the principles of differentiation in learning planning, processes, and assessments.

Before interventions, learning tended to be uniform and teacher-centered. After the implementation of differentiated learning, learning activities are more diverse, participatory, and student-centered. Teachers identify learning styles through initial observation and discussion with students, then group them into three categories: visual, auditory, and kinesthetic.

The teacher then designs the appropriate activities:

1. Visual learners use mind maps, concept maps, and image media;
2. Auditory learners are involved in discussions and reading aloud;
3. Kinesthetic learners participate in simulations, role-playing, and physical activity.

This approach creates a more dynamic learning atmosphere, where students actively participate and show enthusiasm in learning to write narratives.

2. Distribution of Student Learning Styles

Identification of students' learning styles is carried out through observation and brief interviews. The results are presented in Table 1 as follows:

Table 1. Distribution of Learning Styles of Grade V Students at SDN Rejosari III Semin

No	Learning Style	Number of Students	Percentage (%)	Main Characteristics
1	Visual	10	41.7	Easier to understand information through images, colors, and diagrams.
2	Auditory	8	33.3	Learn better through listening and discussion.
3	Kinaesthetic	6	25.0	Learn through physical activities and hands-on practice.
Total		24	100	

These results show that the majority of students (41.7%) have visual learning style tendencies. This condition indicates the need to use visual media such as images, videos, and graphics in learning activities. However, the existence of students with auditory and kinesthetic learning styles demands a diversity of strategies so that no student is neglected.

This distribution is visualized in the following Figure 1:

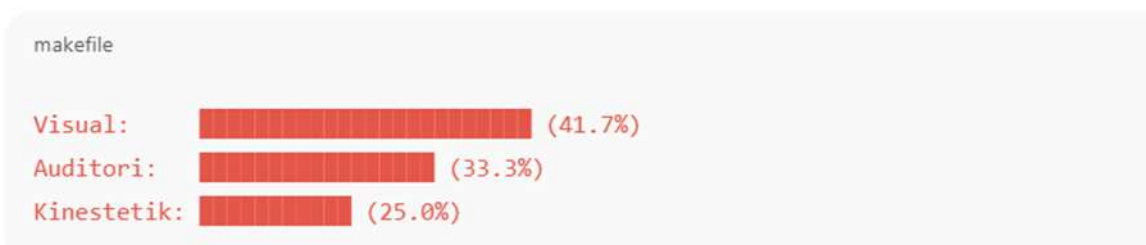


Figure 1. Distribution Diagram of Student Learning Style

Elementary school students generally have a strong visual tendency to process information. Learning style is one of the factors that can affect learning success. Learning style can be part of a teacher's teaching method. There are many studies on teaching methods whose success is still doubtful because each teaching method depends on learning needs or what is commonly referred to as the learning style of students, their personalities and abilities. (Andriani & Nugraheni, 2024)

In the context of public policy, this data reinforces the urgency of implementing differentiated learning that adjusts the learning profile of students as mandated in the Independent Curriculum (Ministry of Education and Culture, 2022).

3. Increased Student Engagement and Motivation

One of the indicators of the success of differentiated learning is increased student engagement and motivation. The results of the observation show a significant increase in student activity in the classroom as presented in Table 2.

Table 2. Improvement of Student Engagement Before and After Differentiation

Engagement Aspect	Before Differentiation (%)	After Differentiation (%)	Improvement (%)
Participation in discussion	55	87	+32
Enthusiasm towards writing assignments	60	89	+29
Collaboration in groups	65	91	+26

Ability to reflect on learning outcomes	52	82	+30
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Student engagement increased by an average of +29% after the implementation of differentiated learning. The most significant improvement occurred in the reflective aspect of learning outcomes, which showed that students began to understand and evaluate their own learning process.

This is in accordance with Tomlinson's (2014) theory which emphasizes that differentiation can foster students' autonomy and responsibility for their learning. In addition, increased engagement also shows progress towards achieving deep learning, where students not only memorize, but also interpret, connect, and reflect on knowledge.

4. Improvement of Learning Outcomes for Writing Narratives

The improvement in student learning outcomes is measured based on four aspects of writing assessment: content, organization of ideas, grammar, and writing mechanics. The results of the analysis are shown in Table 3 below.

Table 3. Comparison of Learning Outcomes Based on Student Narratives

Assessment Aspect	Before Differentiation	After Differentiation	Improvement
Content	70	82	+12
Idea Organization	68	80	+12
Language Usage	72	84	+12
Writing Mechanics	74	86	+12
Average	71	83	+12

This improvement in learning outcomes is visualized in Figure 2 below.

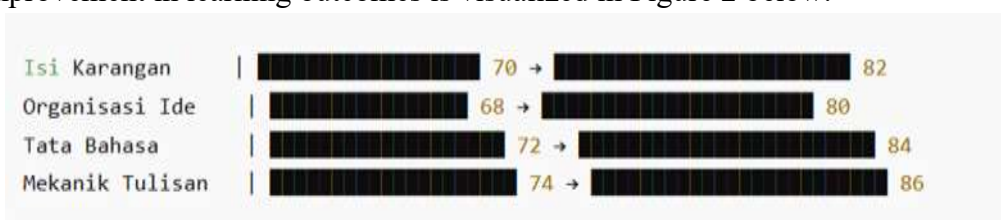


Figure 2. Student Learning Outcomes Improvement Bar Chart

These results show consistent improvement in all aspects. Students become better able to develop ideas, organize story structure, and pay attention to aspects of language. This is in line with the findings of Astuti et al., (2025) who affirm that the application of differentiation based on learning styles can improve the quality of students' narrative writing.

In addition, teachers stated that the variety of learning strategies makes classroom management easier and fosters an inclusive learning climate. Kinesthetic students who were previously passive now show higher enthusiasm after being included in hands-on experiential writing practice activities.

5. Implementation of Differentiation and Deep Learning Outcomes

Data analysis shows that the application of differentiated learning directly contributes to the achievement of deep learning. The following table 4 shows the relationship between the application of differentiation and the deep learning indicators observed during the study.

Table 4. The Relationship between the Implementation of Differentiation and Deep Learning Outcomes

Deep Learning Indicator	Differentiation Activity Example	Evidence of Achievement
Conceptual understanding	Use of concept maps, reflective discussion	Students are able to re-explain the content of the essay in their own words.
Connection between concepts	Relating personal experiences to essay themes	Students are able to write stories based on life experiences.
Reflection and metacognition	"Learning from writing experience" session	Students evaluate the strengths and weaknesses of their own writing.
Meaningful collaboration	Group discussion according to learning styles	Students provide input and collaborate in heterogeneous groups.

These results reinforce the opinion of Suryani, L. (2021) about meaningful learning, which emphasizes that deep learning occurs when students associate new knowledge with personal experiences and reflections.

In the context of education policy, these results support the direction of the transformation of the Independent Curriculum (Kemendikbudristek, 2022) which places deep learning as the core of 21st century competency development and the Pancasila Student Profile. Thus, differentiated learning has proven to be an important instrument in the realization of public policies at the grade level. Meaningful learning, which emphasizes that deep learning occurs when students associate new knowledge with personal experiences and reflections, Suryani, L (2021).

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Discussion

The findings of this study strengthen the understanding that differentiated learning is one of the effective strategies in realizing deep learning in elementary schools. The application of differentiation based on visual, auditory, and kinesthetic student learning styles is able to accommodate the diversity of student characteristics and encourage their active involvement in the learning process. This result is in line with the direction of the Independent Curriculum policy, which emphasizes learning flexibility and recognition of the uniqueness of each student.

1. Differentiated Learning as an Implementation of Independent Learning

The differentiated learning implemented by teachers at SDN Rejosari III Semin shows a paradigm shift from uniform learning to student-centered learning. Prior to the implementation of differentiation, learning activities tended to be teacher-centered and did not fully accommodate differences in students' abilities and learning preferences. After application,

students demonstrate increased participation, collaboration, and reflective ability in understanding the content of the material and relating it to personal experiences.

This is in line with the opinion of Tomlinson (2014) who affirms that differentiation is not just a variation of methods, but a conscious and systematic effort to ensure that each student acquires a learning experience that is appropriate to his or her readiness, interests, and learning profile. In the Indonesian context, this concept is in line with the value of Merdeka Learning (Kemendikbudristek, 2022), which encourages flexible, contextual, and student-centered learning.

Teachers in this study play the role of facilitators who adjust the content, processes, and learning products according to the needs of students. These adjustments have been proven to be able to increase student confidence and reduce achievement gaps between individuals. Thus, this practice makes a real contribution to the implementation of public policies in the field of basic education, especially in supporting the transformation of learning in the era of the Independent Curriculum.

2. Deep Learning as a Differentiation Achievement

The results showed a significant increase in students' ability to relate personal experiences to the material studied, indicating the occurrence of the deep learning process. This improvement is reflected in students' ability to write narratives that are more coherent, meaningful, and reflective.

According to Suryani, L. (2021), students are not only expected to understand factual knowledge, but also be able to relate to, organize, and internalize the concepts learned into daily experiences. This process occurs when learning encourages higher-level thinking activities, such as analyzing, assessing, and creating.

The application of differentiated learning facilitates this in three ways:

- a. Contextualizing students' learning experiences of writing essays based on real experiences, not just following examples from textbooks;
- b. Personal reflection students are invited to assess their writing and identify strengths and weaknesses;
- c. Collaboration and meaningful dialogue of heterogeneous learning groups allow students to exchange ideas and deepen their understanding of concepts.

Thus, this strategy creates more meaningful learning conditions and is oriented towards the formation of critical, creative, and reflective thinking competencies in the three main dimensions of the Pancasila Student Profile (Ministry of Education and Culture, 2022).

3. Relevance to Previous Research

Diversity of learning is a reference for teachers to pay attention to the needs of their students in learning. By grouping the learning styles in the students, the learning process does not force students to use only one specific learning method. (Andriani & Nugraheni, 2024)

In addition, that adapting teaching to students' learning styles (visual, auditory, kinesthetic) tends to improve their understanding and motivation to learn (Riyanawati et al., 2025).

However, in contrast to previous studies that focused solely on academic outcomes, this study highlights the link between differentiated learning and deep learning in the context of the Independent Curriculum policy. This means that differentiation not only has an impact on

cognitive achievement, but also on the development of students' character and metacognitive awareness.

4. Transformation of Teacher Roles and Implementation Challenges

The implementation of differentiated learning demands a fundamental change in the role of teachers. Teachers are no longer the main source of knowledge, but rather the designers of learning experiences that are adaptive to the needs of students. This process requires broader pedagogic competencies, including the ability to conduct diagnostic assessments, reflections, and learning media innovations.

Some of the challenges faced by teachers in the field include:

- a. Limited time in setting up varied learning tools;
- b. Limited technological facilities and learning resources;
- c. Not optimal teacher training support based on differentiation practices.

This finding is in line with the results of the Ministry of Education and Culture's evaluation (2024) which states that most teachers still need assistance to implement differentiated learning consistently. Therefore, the results of this research can be used as input for the formulation of advanced policies, such as increasing the capacity of teachers through the platform of the Teachers and Education Personnel (GTK) space or sustainable professional development programs based on good practices.

5. Implications for Public Policy in the Field of Education

More broadly, the results of this study have strategic implications for national education policy. First, these findings reinforce the urgency of implementing differentiated learning as the main instrument for the implementation of the Independent Curriculum, which emphasizes flexibility in achieving learning outcomes (CP). Second, this practice is a concrete means in growing the Pancasila Student Profile, especially in the dimensions of critical thinking, independence, and mutual cooperation.

In addition, the results of the study also support the direction of the national education transformation policy which is oriented towards improving the quality of teachers and meaningful learning. Based on the results of the study, the application of differentiated learning can be a replication model for other elementary schools, especially in areas with diverse student characteristics. The government can make this model one of the best practices in the preparation of technical guidelines for deep learning.

Thus, the results of this research not only provide academic contributions, but also support the policy agenda of the Ministry of Education and Culture in creating an adaptive, inclusive, and knowledge-oriented learning ecosystem that strengthens competencies in the 21st century.

CONCLUSION

The application of differentiated learning style-based learning has proven to be effective in improving deep learning in elementary schools, because it is able to accommodate the diversity of students, foster intrinsic motivation, and improve the ability to think critically, reflect, and express ideas. Differentiation also strengthens teachers' competence in designing adaptive learning that is in line with the Independent Curriculum and the Pancasila Student Profile. This research emphasizes the importance of diagnostic assessment, flexible planning, teacher learning community, use of varied media, and formative assessment. In addition,

further research, strengthening the LPTK curriculum, practice-based teacher training, collaboration between schools, and government policy and investment support are needed. Overall, differentiation is an important foundation in building an education ecosystem that is more equitable, adaptive, and oriented to the needs of students.

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