

How to Cite (APA Style):

Fatimah, S., Rochman, F., Pramono, S.E., Subali, B., & Widiarti, N. (2026). Implementation of differentiated learning to improve critical thinking in elementary school students. *Jurnal Ilmiah Pendidikan Dasar*, 13 (1), 175-196. <http://dx.doi.org/10.30659/pendas.13.1.175-196>



Implementation of differentiated learning to improve critical thinking in elementary school students

Siti Fatimah^{1*}, Fathur Rokhman², Suwito Eko Pramono³, Bambang Subali⁴, Nuni Widiarti⁵.

¹Universitas Negeri Semarang, Semarang, Indonesia

²Teacher Professional Education Study Program, Graduate School, Universitas Negeri Semarang, Indonesia

³Educational Management Study Program, Graduate School, Universitas Negeri Semarang, Indonesia

⁴Master's Program in Physics Education, Faculty of Mathematics and Natural Sciences, Universitas Negeri Semarang, Indonesia

⁵Master's Program in Chemistry Education, Faculty of Mathematics and Natural Sciences, Universitas Negeri Semarang, Indonesia

*Corresponding author's e-mail: sitifatimah240687@students.unnes.ac.id

Submitted: December 19th, 2025

DOI: 10.30659/pendas.13.1.175-196

Revised: January 28th, 2026

Accepted: January 31st, 2026

Keywords:	Abstract
differentiated learning; critical thinking; elementary school; systematic review; merdeka curriculum	<i>Critical thinking skills are one of the key 21st-century skills that need to be developed from primary education onwards, requiring a learning approach tailored to students' needs and characteristics, one of which is differentiated learning. This study aims to analyse the application of differentiated learning in developing critical thinking skills in elementary school students, identify the challenges of its implementation, and explore learning adaptation strategies during the 2020–2024 period. The study used a qualitative approach with a systematic review method of relevant national and international journal articles, which were collected through structured literature searches, selected based on specific criteria, and analysed thematically. The results of the study show that differentiated learning generally contributes positively to increasing student engagement, conceptual understanding, and critical thinking skills because it allows teachers to tailor learning to the readiness, interests, and learning styles of students. However, its implementation still faces various obstacles, such as limitations in teachers' pedagogical competencies, planning time, and learning facility support, especially in the context of online and hybrid learning. This study concludes that differentiated learning has great potential as an adaptive learning strategy in improving the critical thinking skills of elementary school students. Therefore, policy</i>

Jurnal Ilmiah Pendidikan Dasar Vol. XIII, No. 1, January, 2026, Page. 175-196

doi: 10.30659/pendas.13.1.175-196

© The Author(s). 2026



This work is licensed under a [Creative Commons - Attribution-NonCommercial-ShareAlike 4.0 International License](https://creativecommons.org/licenses/by-nc-sa/4.0/)

support, ongoing training, and professional guidance are needed to ensure optimal and sustainable implementation.

INTRODUCTION

Background of the Study

In recent years, critical thinking skills have been increasingly discussed as one of the key competencies in 21st-century education. Amid rapid technological developments and an increasingly open flow of information, it is no longer enough for students to simply memorise subject matter. They also need to have the ability to understand information in depth, assess its validity, and make rational and responsible decisions (Arifin & Mu'id, [2024](#); Pare & Sihotang, [2023](#)). This condition shows that the development of critical thinking from elementary education is very important as a foundation for long-term learning.

Attention to higher-order thinking skills is also evident in various international education assessments. The Programme for International Student Assessment (PISA) consistently shows that students' problem-solving and critical thinking skills remain a challenge in many countries. In Indonesia, student achievement in this area is still below the international average. These findings indicate that the learning process in elementary schools has not been fully able to facilitate the optimal development of critical thinking (Faruliansyah et al., [2025](#); Susanta et al., [2023](#)).

When viewed from a learning theory perspective, the development of critical thinking is closely related to the constructivist approach. In this approach, students are viewed as individuals who actively construct their knowledge through experience, discussion, and reflection. The learning process does not only take place through teacher explanations, but also through questioning, discussion, and relating concepts to everyday life. In addition, humanistic theory emphasises the importance of paying attention to the needs, interests, and potential of each student. Both theories show that effective learning needs to be flexible, student-centred, and respectful of individual differences (Jumaah, [2024](#); Mishra, [2023](#)).

At the elementary school level, the development of critical thinking plays a very strategic role. This period is the initial stage of forming thinking habits, learning attitudes, and how students view the learning process. The habit of analytical, reflective, and evaluative thinking from an early age will affect students' readiness to face more complex learning at the next level (Cahyaningsih & Nadi, [2025](#)). In addition,

spatial abilities also contribute to supporting critical thinking processes, especially in understanding visual and conceptual information (Aminah et al., [2025](#)). Interactive visual experiences developed in various regions of Indonesia also strengthen this learning process (Sulianto et al., [2025](#)).

However, the development of critical thinking skills cannot be separated from the quality of learning designed by teachers. Teachers have an important role in creating a learning environment that encourages students to actively think and explore. Studies on teacher professionalism show that the quality of learning is greatly influenced by the ability of teachers to design learning that is responsive to student needs (Rifaudin et al., [2025](#)). On the other hand, the family environment also shapes students' learning habits through democratic parenting patterns that encourage independence and active participation in the learning process (Prananto et al., [2025](#)).

One learning approach that is in line with the constructivist and humanistic frameworks is differentiated learning. This approach emphasises the adjustment of learning content, processes, and products based on students' readiness, interests, and learning styles (Azmy & Fanny, [2023](#)). Through differentiated learning, students are not treated uniformly but are viewed as individuals with unique characteristics. Thus, each student has the opportunity to learn in a way that is more suited to their needs.

In practice, elementary schools have a high degree of diversity in student characteristics. Each student has a different background, abilities, and learning style. Conventional learning models, which are uniform in nature, are often unable to accommodate these differences, resulting in low participation and underdeveloped critical thinking skills among students. Differentiated learning is a strategic alternative because it allows teachers to design challenging learning activities while providing support according to the students' level of readiness, as applied in mathematics learning (Fidiasih et al., [2025](#); Lestari et al., [2024](#)).

The 2020–2024 period has been a critical phase in education due to the COVID-19 pandemic. The shift to online and hybrid learning has significantly changed the pattern of interaction between teachers and students (Wang et al., [2021](#)). Many students experienced limited access to technology, a lack of learning support, and decreased motivation. These conditions widened the learning gap and increased the risk of learning loss.

In this situation, differentiated learning became increasingly relevant because it was able to accommodate differences in students' learning conditions. Teachers are

required to be more creative in adapting materials, methods, and assessments to the students' situations. However, the implementation of this approach still faces various obstacles, such as limited time, resources, and teachers' pedagogical competencies (Navisa et al., [2025](#)). This shows that the application of differentiated learning still requires more in-depth study in order to contribute optimally to the development of critical thinking in elementary school students.

Problem of The Study

Critical thinking skills are one of the key skills needed by students to face the challenges of the 21st century. Through these skills, students are expected to be able to analyse information, evaluate various points of view, and make logical and responsible decisions. However, various reports indicate that the critical thinking skills of elementary school students in Indonesia are still not optimally developed (Hidayat et al., [2025](#)).

In daily learning practices, many teachers still apply a relatively uniform and material-oriented learning pattern. Learning is more often focused on achieving curriculum targets and completing material, while opportunities for students to think deeply, discuss, and explore ideas are still limited. This condition causes students to tend to be passive and less trained in developing critical thinking skills (Santri, [2023](#); Susanti, [2022](#)).

Differentiated learning is seen as one approach that has the potential to overcome these problems. By adjusting learning based on students' readiness, interests, and learning styles, this approach is believed to increase student engagement while encouraging critical thinking. However, the implementation of differentiated learning in elementary schools has not been fully optimised.

In the field, teachers still face various obstacles in implementing differentiated learning. Limited training, high administrative burdens, and the complexity of managing heterogeneous classes are the main challenges. In addition, not all teachers have an adequate understanding of the concepts and strategies of differentiated learning, so its implementation is often not in accordance with its basic principles.

The COVID-19 pandemic situation in the 2020–2024 period has further exacerbated these problems. The shift to online and hybrid learning has caused many students to experience limited access to technology, a lack of learning support at home, and a decline in motivation to learn. This situation has resulted in increased learning loss and widened learning gaps (Wang et al., [2021](#)). In such circumstances,

teachers are required to be more adaptive in adjusting their learning strategies, including in implementing differentiated learning.

Although differentiated learning is considered relevant in addressing these challenges, to date, there have been limited studies that systematically discuss how this approach is implemented in elementary schools during and after the pandemic, as well as its impact on the development of students' critical thinking skills. Most studies only discuss the effectiveness of differentiated learning in general, without linking it in depth to the context of changes in the learning system and student conditions.

Based on the above description, it can be concluded that there is a gap between the need to develop critical thinking skills in elementary school students and the limitations of implementing effective differentiated learning in the field, especially in the period 2020–2024. Therefore, a more comprehensive study is needed to understand the effectiveness, challenges, and strategies for implementing differentiated learning in various learning contexts.

In line with these issues, this study aims to answer the following questions:

1. How is differentiated learning applied in developing critical thinking skills in elementary school students?
2. What are the main challenges faced by teachers in implementing differentiated learning in the 2020–2024 period?
3. What are the strategies for adapting differentiated learning in face-to-face, online, and hybrid learning?

Research's State of the Art

If we look at research developments in recent years, it is clear that critical thinking skills are receiving serious attention. Many global studies show that when the learning process provides space for students to think actively, for example, through discussions, problem solving, or higher-order thinking activities, students' critical thinking skills tend to improve (Pare & Sihotang, [2023](#); Rosa et al., [2024](#)). This is not just a repeated finding, but a consistent result seen in various educational contexts.

In Indonesia itself, the push for a more flexible learning approach is also growing stronger. In fact, through the Merdeka Curriculum, teachers are encouraged to implement learning models that are more responsive to the needs of students. This means that students are no longer forced to learn in the same way. Teachers have the

space to adjust their strategies, materials, and methods of evaluating students according to their needs.

Several local studies show that differentiated learning can indeed increase student engagement and understanding of the material, especially in subjects such as mathematics and science. These findings are important because they illustrate that learning that takes individual differences into account can facilitate more meaningful engagement in the classroom.

However, it should be noted that most of these studies were conducted under “normal learning” conditions, that is, before the COVID-19 pandemic drastically changed the face of education. In a full face-to-face learning environment, the challenges and dynamics of the classroom are certainly different from those that occurred during the pandemic.

When the pandemic forced the education system to shift to online and hybrid learning, new challenges emerged. Several international studies note that differentiated learning in an online context has not yet been explored in detail (Wang et al., [2021](#)). Not all teachers are ready for the technological demands, not all students have equal access, and effective learning models in face-to-face classrooms cannot always be directly translated to an online environment.

This is where an interesting fact that is often overlooked lies: although the concept of differentiated learning has been widely discussed, studies that combine this approach with the post-pandemic learning context are still relatively few. In other words, there is a gap between the strong conceptual ideas about differentiated learning and the contextual empirical evidence showing how this approach works in online or hybrid learning, especially in elementary schools.

In addition, there is still little research that explicitly links differentiated learning with the development of critical thinking in elementary school students in Indonesia. In fact, research tends to focus more on higher education or middle school levels, while empirical data on elementary schools tends to be more limited.

Thus, it is clear that although we have a lot of research discussing active or differentiated learning in general, there are still limitations when we want to understand how this approach plays a role in the development of critical thinking in elementary school students, especially in the context of learning that has changed due to the pandemic.

Novelty, Research Gap, & Objective

Based on a review of various studies that have been conducted, it can be seen that differentiated learning and the development of critical thinking skills have been widely discussed in educational studies. However, most of these studies still discuss these two concepts separately or only focus on certain aspects, such as improving learning outcomes or student engagement. Studies that directly integrate differentiated learning with the development of critical thinking in elementary schools are still relatively limited.

In addition, much of the previous research was conducted in the context of normal face-to-face learning, before the COVID-19 pandemic. In fact, the shift to online and hybrid learning systems has brought new dynamics to the teaching and learning process. These changes have not only affected the way teachers teach but also the way students understand, process, and reflect on learning materials. Therefore, research findings before the pandemic cannot fully describe the current learning conditions.

The next gap is evident in the lack of studies that systematically discuss the real challenges faced by teachers in implementing differentiated learning in heterogeneous classrooms. Some studies only highlight the success of this approach, without delving deeply into practical obstacles such as time constraints, teacher readiness, administrative burdens, and differences in student backgrounds.

On the other hand, research mapping teachers' adaptation strategies in dealing with changing learning conditions, especially during and after the pandemic, is also still limited. In fact, teachers' ability to adjust methods, media, and learning interaction patterns is an important factor in the success of differentiated learning.

Based on these conditions, it can be concluded that there is still considerable room for more comprehensive and integrated studies. To date, there have been few studies that specifically synthesise various findings on differentiated learning, critical thinking development, and the dynamics of online, hybrid, and face-to-face learning within a single analytical framework, especially at the elementary school level.

The novelty of this research lies in its attempt to compile a systematic review that integrates various research results on differentiated learning and critical thinking skills development in the context of changes in the learning system during the 2020–2024 period. Unlike previous studies, which tended to be partial and fragmented, this study attempts to look at the phenomenon more comprehensively and contextually.

Through this approach, this study not only examines the effectiveness of differentiated learning but also identifies implementation patterns, obstacles faced by teachers, and adaptation strategies used in various learning situations. Thus, the results of this study are expected to not only enrich theoretical studies but also provide practical contributions to teachers, schools, and policymakers in developing more adaptive learning that is oriented towards strengthening students' critical thinking.

Based on the background, problems, and review of the current state of research described above, this study was designed to gain a deeper understanding of the application of differentiated learning in developing the critical thinking skills of elementary school students. This study focuses not only on the final learning outcomes but also on the process, dynamics, and context of their implementation in the field.

In general, the purpose of this study is to compile a comprehensive overview of how differentiated learning is applied in various learning situations and how this approach contributes to the development of students' critical thinking skills.

Specifically, this study aims to:

1. Systematically analyse the application of differentiated learning in developing critical thinking skills in elementary school students based on research results from 2020 to 2024.
2. Identify various challenges faced by teachers in implementing differentiated learning, both from pedagogical, technical, and classroom management aspects.
3. Explore the adaptation strategies used by teachers in applying differentiated learning in face-to-face, online, and hybrid learning.
4. Formulate evidence-based recommendations that can be used as a reference in the development of learning practices and educational policies in elementary schools.

By achieving these objectives, this study is expected to make a tangible contribution not only to the development of academic research but also to improving the quality of learning in elementary schools, particularly in supporting the continuous development of students' critical thinking skills.

METHOD

Type and Design

This study uses a qualitative approach with a systematic literature review method. This approach was chosen because the main objective of the study was not to test hypotheses directly through experiments, but to gain an in-depth understanding of the patterns, trends, and findings of previous studies related to differentiated learning and the development of critical thinking skills in elementary schools.

Through a systematic review, researchers attempt to collect, select, and analyse various scientific articles in a structured and transparent manner. In this way, the results obtained are not only descriptive but also reflect a logical and academically accountable synthesis.

The research design refers to the main stages of a systematic literature review, which include formulating research questions, searching for literature, selecting articles, analysing data, and synthesising research results. These stages are arranged systematically so that the research process runs in a focused manner and reduces the potential for bias in the selection of sources.

In the initial stage, researchers formulated the focus of the study based on the research problem, namely, the application of differentiated learning in developing critical thinking skills in elementary school students. This focus became the basis for determining keywords and literature search strategies.

Next, the researchers searched for scientific articles through various relevant national and international journal databases. The articles obtained were then selected based on predetermined inclusion and exclusion criteria, so that only studies relevant to the research objectives were analysed further.

At the analysis stage, the researcher examined each selected article by considering the research context, methods used, main findings, and their implications for differentiated learning and critical thinking development. The results of the analysis were then synthesised to find patterns, similarities, differences, and general trends in previous studies.

Using this research design, it is hoped that the study will provide a comprehensive, objective, and evidence-based overview of differentiated learning practices in elementary schools, particularly in the context of changes to the learning system during the 2020–2024 period.

Data and Data Sources

The data in this study is secondary data obtained from various scientific articles, research reports, and academic publications discussing differentiated learning and the development of critical thinking skills in elementary schools. Secondary data was chosen because this study focused on reviewing and synthesizing the results of previous studies through a systematic review approach, enabling researchers to obtain a broader and deeper understanding of the phenomenon under study.

The main data sources came from national and international journals relevant to the fields of basic education, pedagogy, and 21st-century skills development. These sources were selected to ensure that the articles analyzed were of good methodological quality and scientifically accountable.

In the data collection process, researchers used keywords related to differentiated learning, critical thinking, basic education, and online and hybrid learning. This search strategy was developed based on the research focus and adjusted to developments in educational issues during the research period.

The data sources used included research results discussing the implementation of differentiated learning, the development of students' critical thinking skills, teacher professionalism, and learning environment factors. These articles were selected because they were relevant to the research objectives and provided comprehensive information on learning practices in elementary schools.

In addition to journal articles, this study also utilized supporting documents in the form of policy reports and official publications in the field of education as supplementary data. These documents were used to strengthen the analysis of the policy context and learning practices that were in effect during the 2020–2024 period.

All data sources collected were then systematically documented in the form of a reference list and an article summary table. This documentation is aimed at facilitating the analysis and retraceability processes, as well as to maintain research transparency.

By using carefully selected and relevant data sources, this study is expected to produce an accurate, contextual synthesis that reflects the empirical conditions of differentiated learning in developing critical thinking skills in elementary school students.

Data Collection Technique

The data collection technique in this study was conducted through a systematic literature review and collection. This method was chosen because the study aimed to examine, compare, and synthesise the results of previous studies relevant to differentiated learning and critical thinking skills development in elementary schools.

The data collection process began with determining keywords that were relevant to the research focus, such as differentiated learning, critical thinking, basic education, and online and hybrid learning. Determining these keywords was an important step to ensure that the articles obtained were truly relevant to the issues being studied.

Next, researchers searched for articles through various national and international journal databases that can be accessed online. The articles found were then collected and documented in the form of a temporary list to facilitate the further selection process. At this stage, researchers also considered the year of publication, journal reputation, and the suitability of the research topic with the study objectives (Fatmawati et al., [2025](#)).

After the articles were collected, the researchers conducted an initial screening by reading the titles, abstracts, and keywords. This screening aimed to eliminate articles that were irrelevant, duplicates, or not in line with the context of basic education. This process was carried out carefully so that the data analysed was of high quality and relevance.

Articles that passed the initial selection were then read thoroughly to identify the research focus, methods used, main findings, and learning implications. At this stage, the researchers recorded important information from each article in the form of tables or systematic summaries to facilitate the subsequent analysis process.

In addition, researchers also cross-checked sources to ensure data consistency and reduce potential interpretation bias. This step is important so that the results of the study are not only descriptive but also reflect an objective and accountable synthesis (Fatmawati et al., [2025](#)).

Through this systematic and structured data collection technique, the study is expected to produce a comprehensive picture of the application of differentiated learning in developing critical thinking skills in elementary school students.

Data Analysis

Data analysis in this study was conducted qualitatively through a process of reviewing and synthesising selected articles. Qualitative analysis was chosen because

this study aimed to understand the meaning, patterns, and trends of previous research findings in depth, rather than simply counting data frequencies (Rifa'i, [2023](#)).

The analysis process began with rereading all articles that had passed the selection stage. At this stage, the researchers sought to understand the research context, background of the problem, methods used, and main findings of each study. The reading was done carefully to avoid misinterpretation of the research content.

Next, the researchers grouped the data based on the main themes relevant to the research focus, such as differentiated learning strategies, critical thinking development, implementation challenges, and learning adaptation during the pandemic. This grouping aims to facilitate the process of comparing research results (Avandra, [2022](#)).

After the data were grouped, the researchers carried out the categorisation and interpretation process by comparing findings from various sources. At this stage, the researchers identified similarities, differences, and general trends that emerged in previous studies. This process helped the researchers compile a comprehensive and logical synthesis (Rifa'i, [2023](#)).

Furthermore, the results of the analysis are integrated with relevant theoretical frameworks, particularly constructivism and humanistic theory, so that the research findings are not only descriptive but also have a strong conceptual basis. The integration of these theories aims to strengthen the argumentation and improve the academic quality of the research (Hidayat et al, [2025](#)).

To maintain data validity, researchers also rechecked the sources and interpretation results by comparing various references used. This step was taken to minimise subjective bias and increase the credibility of the research results (Navisa et al, [2025](#)).

Through this systematic and reflective data analysis technique, the study is expected to produce accurate, contextual conclusions that can be used as a reference for the development of differentiated learning practices in elementary schools.

RESULTS

Based on a review of various literature discussing the application of differentiated learning in elementary schools, it can be seen that this approach generally has a positive impact on the learning process and outcomes. Most studies

show that differentiated learning can increase student engagement, tailor learning to individual needs, and encourage the development of higher-order thinking skills, including critical thinking (Afriani et al., 2024).

However, despite these positive findings, the literature also shows that the implementation of differentiated learning does not always run optimally. Teachers and students still face various challenges, both in terms of pedagogical readiness, time constraints, and differences in student learning conditions. Therefore, the results of this study not only show the success of the implementation but also reveal various obstacles that need attention.

The results of the literature review analysed in this study are presented in Table 1. The table contains a summary of the authors, research topics, and research objectives related to differentiated learning and the development of critical thinking skills.

Table 1. Literatur Review

Author	Topic	Objective
Desy Wahyuningsari Yuniar Mujiwati Lailatul Hilmiyah Febianti Kusumawardani Intan Permatas Sari Kelimanya berasal dari Universitas PGRI Wiranegara	This research discusses the application of differentiated learning in the context of the Merdeka Belajar policy, which focuses on student needs based on readiness, interests, and individual learning styles.	This research aims to analyse the application of differentiated learning to realise the concept of Merdeka Belajar. This research focuses on teaching strategies that adapt learning to students' individual abilities, interests, and needs, so that they can learn without feeling pressured or failing.
Adela Intan Rosiyani Aqilah Salamah Chindy Ayu Lestari Silva Anggraini Winsi ab	This research focuses on the application of differentiated learning in the context of the Merdeka Curriculum in IPAS (Natural and Social Sciences) subjects in elementary schools.	The research aims to analyse the implementation of differentiated learning in the Merdeka Curriculum in IPAS subjects, as well as its impact on students in primary schools.
Meria Ultra Gusteti Neviyarni (Universitas Negeri Padang	This research discusses the application of differentiated learning in mathematics subjects in the Merdeka Curriculum.	The research aims to describe the concepts, principles, and opportunities for implementing differentiated learning in

		mathematics learning, as well as how this approach can accommodate students' learning needs based on their interests, learning styles, and readiness.
Aiman Faiz Anis Pratama Imas Kurniawaty (Universitas Muhammadiyah Cirebon, SMAN 1 Sumber, Universitas Pendidikan Indonesia)	This research discusses differentiated learning in the context of the Driver Teacher Program in Module 2.1, which is designed to improve the quality of education by taking into account students' interests, talents and individual needs.	The purpose of the research is to explain the concept of differentiated learning and how teachers can implement it in learning to suit students' individual needs.
Dea Alziani	The use of SLAMAT (Snake Ladder and Math Game) learning media in improving critical thinking skills of junior high school students on social arithmetic material.	Knowing the effect of SLAMAT learning media implementation on improving students' critical thinking skills in social arithmetic material.
Sindi Safiranti	Development of critical thinking through thematic learning based on HOTS (Higher Order Thinking Skills) in class V MI Ya Bakii Kalisabuk 02, Kesugihan District, Cilacap Regency.	This study aims to describe the development of critical thinking through HOTS-based thematic learning in grade V MI Ya Bakii Kalisabuk 02, Kesugihan District, Cilacap Regency.
Nuraini dan Zaka Hadikusuma Ramadan	Implementation of Differentiated Learning in Merdeka Curriculum in Grade One Elementary School	Describe the implementation of differentiated learning in the Merdeka Curriculum in grade one elementary school.
Lisda Minangkabau, Putriyani S, Suarti Djafar, dan Nurdin	Differentiated learning to improve critical thinking skills in mathematics	Evaluate the literature on the use of differentiated learning to improve critical thinking skills in mathematics learning.

Elya Nusantara, Aryati Abdul, Insar Damopolii, Ali Salim Rashid Alghafri, dan Bakkar Suleiman Bakkar. Para penulis berasal dari Universitas Negeri Gorontalo (Indonesia), Universitas Papua (Indonesia), Sohar University (Oman), dan Sultan Qaboos University (Oman)	The topic of this research is the development of a learning tool that combines Discovery Learning (DL) with Metacognitive Knowledge Strategy (MKS) to improve students' critical thinking skills (CTS).	This research aims to develop a Discovery Learning-based learning tool combined with metacognitive strategies to improve students' critical thinking skills.
April Mercy E. Lapuz dan Marlon N. Fulgencio dari Filipina. Mereka berasal dari Gordon College dan President Ramon Magsaysay State University. Meria Ultra Gusteti dan Neviyarni	The topic of this research is the use of Problem-Based Learning (PBL) to improve secondary school students' critical thinking skills in economics subjects. Differentiated learning in mathematics learning in the Merdeka Curriculum	This study aims to determine whether the application of Problem-Based Learning (PBL) can improve students' critical thinking skills in secondary school. This study aims to: (1) describe the nature of differentiated learning, (2) explain the principles and characteristics of differentiated learning, and (3) analyse opportunities for implementing differentiated learning in mathematics learning in the Merdeka Curriculum.
Desy Wahyuningsari, Yuniar Mujiwati, Lailatul Hilmiyah, Febianti Kusumawardani, Intan Permatas Sari. Penulis berasal dari Universitas PGRI Wiranegara	Differentiated Learning in Realising Independent Learning	The purpose of this research is to explore how differentiated learning can be applied in the context of Merdeka Belajar, so that students can learn according to their level of readiness, interest, and learning style.
Nur Kholidah, Ika Maryani, Ashilatul Latifah. Penulis berasal dari Universitas Ahmad Dahlan dan SD Muhammadiyah Noyokerten	Effectiveness of Differentiated Learning Approaches Based on Learning Styles in Improving Science Learning Outcomes.	Determine whether a differentiated learning approach based on learning styles can improve students' science learning outcomes.
April Mercy E. Lapuz dan Marlon N. Fulgencio dari Filipina. Mereka berasal	The topic of this research is the use of Problem-Based Learning (PBL) to	This study aims to determine whether the application of Problem-

dari Gordon College dan President Ramon Magsaysay State University. Johana Kastanja dan Hamid Patilima, Universitas Panca Sakti Bekasi, Indonesia.	improve secondary school students' critical thinking skills in economics subjects Optimising early childhood learning interest through a differentiated learning approach.	Based Learning (PBL) can improve students' critical thinking skills in secondary schools. Optimising children's interest in learning through the application of differentiated learning and measuring its impact on increasing children's interest in learning.
Heather A. Butler, dari Departemen Psikologi, California State University, Dominguez Hills, USA.	Review of various critical thinking skills assessments and prediction of critical thinking outcomes in everyday life.	Review existing critical thinking skills assessments, assess their validity and reliability, and discuss the predictable outcomes of these assessments, especially in the context of everyday behaviour.

Based on an analysis of the studies listed in Table 1, several key findings can be identified. First, most studies emphasise that differentiated learning plays an important role in supporting the Merdeka Belajar (Freedom of Learning) policy and the Merdeka Curriculum. This is evident in studies conducted by Desy Wahyuningsari et al., Adela Intan Rosiyani et al., and Meria Ultra Gusteti and Neviyarni, which show that differentiated learning helps teachers tailor their teaching strategies to students' readiness, interests, and learning styles. Through this approach, students feel more comfortable learning and are less prone to academic pressure.

Second, several studies specifically highlight the application of differentiated learning in certain subjects, especially mathematics and science. Research by Meria Ultra Gusteti and Neviyarni, as well as Lisda Minangkabau et al., shows that differentiated learning can improve students' conceptual understanding and critical thinking skills in mathematics. This happens because students are allowed to learn according to their respective ability levels.

Third, research conducted by Aiman Faiz et al. shows that differentiated learning is also closely related to the development of teacher professionalism, particularly through the Teacher Activator Program. In this context, teachers are encouraged to be more reflective, creative, and responsive to the needs of students.

Fourth, several studies in the table also discuss the development of critical thinking through other approaches, such as the use of learning media (Dea Alziani),

HOTS-based learning (Sindi Safiranti), Discovery Learning and metacognitive strategies (Elya Nusantara et al.), and Problem-Based Learning (Lapuz & Fulgencio). Although they do not directly use differentiated learning, these studies reinforce the finding that active and student-centred learning approaches contribute greatly to the development of critical thinking.

Fifth, research from abroad, such as that conducted by Lapuz and Fulgencio from the Philippines and Heather A. Butler from the United States, shows that the development of critical thinking is a global concern. This reinforces that the issues examined in this study are not only relevant nationally but also have international significance.

Although the majority of studies show positive results, some literature also reveals obstacles in the implementation of differentiated learning. These challenges include:

1. Teachers' limited understanding of the concepts and strategies of differentiated learning.
2. The high administrative and time burdens make it difficult for teachers to plan individualised learning.
3. Differences in student access and readiness, especially during online and hybrid learning.
4. Limited learning tools and media that support differentiation.

These conditions show that the success of differentiated learning is highly dependent on the support of the education system, teacher training, and the availability of resources.

Overall, the results of the literature review show that differentiated learning has great potential in improving the quality of learning and developing the critical thinking skills of elementary school students. This approach is able to create learning that is more inclusive, adaptive, and meaningful for students with diverse characteristics.

However, the effectiveness of differentiated learning has not been fully optimised due to various obstacles in its implementation. Therefore, mentoring strategies, training, and supportive policies are needed so that this approach can be applied consistently and sustainably.

The results of this study provide an important basis for further discussion on implementation patterns, challenges, and recommendations for the development of

differentiated learning in improving the critical thinking skills of elementary school students.

DISCUSSIONS

Based on the results of the literature review that has been analysed, it can be seen that differentiated learning plays a significant role in supporting the development of critical thinking skills in elementary school students. These findings show that when teachers are able to adjust learning strategies to students' readiness, interests, and learning styles, the learning process becomes more meaningful and encourages active student engagement.

These results are in line with constructivist theory, which emphasises that knowledge is constructed through active and reflective learning experiences. In differentiated learning, students do not just passively receive information, but are involved in various activities that require analysis, discussion, and problem-solving. Thus, students have the opportunity to develop more critical and systematic ways of thinking.

In addition, the research findings also support the humanistic perspective that places students as the main subjects in learning. Through differentiation, the individual needs and potential of students are given more attention, so that they feel valued and motivated to learn. This condition contributes to increased confidence and courage in students in expressing their opinions and questioning the information they receive.

However, the results of the study also show that the implementation of differentiated learning in elementary schools is not yet fully optimal. Many teachers still find it difficult to design learning that is truly tailored to the characteristics of diverse students. Time constraints, administrative burdens, and a lack of specialised training are factors that often arise in various studies. This means that in some cases, differentiated learning is still a formality and has not been implemented consistently.

In the context of changes to the learning system during the COVID-19 pandemic, differentiated learning has proven to be one of the relevant strategies for overcoming learning gaps caused by differences in students' access to technology and learning conditions. Adapting learning through online and hybrid approaches requires teachers to be more flexible in designing learning that remains inclusive and effective (Rosa et al., [2024](#)).

However, the results of this study also show that the implementation of differentiated learning still faces various challenges, such as limitations in teachers' pedagogical competencies, limited planning time, and a lack of learning support facilities. These conditions indicate that the successful implementation of differentiated learning depends not only on the individual abilities of teachers but also on the support of the education system as a whole (Mongkau et al., [2024](#)).

Therefore, continuous efforts are needed in the form of professional training, mentoring, and strengthening of education policies so that differentiated learning can be optimally implemented in elementary schools. In addition, the results of this study are expected to serve as a reference for teachers, principals, and policymakers in designing learning that is more adaptive, inclusive, and oriented towards developing students' critical thinking skills.

Overall, differentiated learning is a relevant and strategic approach in responding to the challenges of 21st-century education, particularly in developing a generation that is capable of critical thinking, independence, and readiness to face global changes (Wang et al., [2021](#)).

CONCLUSION

Based on the results of a systematic review of various studies discussing differentiated learning and the development of critical thinking skills in elementary schools, it can be concluded that this approach makes a significant contribution to improving the quality of the learning process and outcomes. Differentiated learning allows teachers to tailor learning strategies to the needs, interests, and readiness of students, making the learning process more meaningful and student-centred. The results of the study also show that differentiated learning plays an important role in supporting the development of higher-order thinking skills, particularly critical thinking. Through varied and challenging learning activities, students are encouraged to analyse, evaluate, and solve problems more independently. In the context of learning during the COVID-19 pandemic, these challenges have become even more complex. The shift to online and hybrid learning requires teachers to master technology while still paying attention to the individual needs of students. Based on the results of the study, not all teachers can adapt optimally, especially given the limited resources and internet access available to students. As a result, the potential of differentiated learning in developing critical thinking has not been fully realised. Overall, the results of the discussion show that differentiated learning is a potential

approach for developing critical thinking skills in elementary school students. However, its success greatly depends on teacher readiness, institutional support, and the social and technological conditions of students. Therefore, efforts to strengthen teacher capacity and the education support system are key to ensuring that this approach can be implemented sustainably and have a real impact.

REFERENCES

- Afriani, I. S., Zawawi, I., & Huda, S. (2024). Implementation of Differentiated Learning on Mathematical Critical Thinking Ability. *Prisma Sains : Jurnal Pengkajian Ilmu Dan Pembelajaran Matematika Dan IPA IKIP Mataram*, 12(1), 61. <https://doi.org/10.33394/j-ps.v12i1.9600>
- Aminah, S., Rokhman, F., Pramono, S.E., Subali, B., & Widiarti, N. (2025). The use of geogebra interactive multimedia on spatial ability of elementary students in 2020-2024 Period. *Jurnal Ilmiah Pendidikan Dasar*, 12 (2), 318-342. <http://dx.doi.org/10.30659/pendas.12.2.318-342>
- Arifin, B., & Mu'id, A. (2024). Pengembangan kurikulum berbasis keterampilan dalam menghadapi tuntutan kompetensi abad 21. *DAARUS TSAQOFAH Jurnal Pendidikan Pascasarjana Universitas Qomaruddin*, 1(2), 118-128. <https://doi.org/10.62740/jppuqg.v1i2.23>
- Avandra, R. (2022). Implementasi pembelajaran berdiferensiasi terhadap keterampilan berpikir kritis siswa pada pembelajaran ipa kelas vi sd. *Didaktik: Jurnal Ilmiah PGSD STKIP Subang*, 8(2), 2944-2960. <https://doi.org/10.36989/didaktik.v8i2.618>
- Azmy, B., & Fanny, A. M. (2023). Literature review: pembelajaran berdiferensiasi dalam kurikulum merdeka belajar di sekolah dasar. *Inventa: Jurnal Pendidikan Guru Sekolah Dasar*, 7(2), 217-223. <https://doi.org/10.36456/inventa.7.2.a8739>
- Cahyaningsih, U. & Nahdi, D. S. (2025). Development of an interactive e-module based on PBL to Enhance elementary students' critical thinking. *Jurnal Ilmiah Pendidikan Dasar*, 12 (2), 251-270. <http://dx.doi.org/10.30659/pendas.12.2.251-270>
- Faruliansyah, Y., Agus Firmansah, Putri Mubarika, M., & Pitasari, K. (2025). The mathematical critical thinking ability of Mts Students reviewed from habits of mind. *Pasundan Journal of Mathematics Education: Jurnal Pendidikan Matematika*, 15(1), 32-47. <https://doi.org/10.23969/pjme.v15i1.24013>
- Fatmawati, T., Jaya, A., Rasid, R., & Abubakar, A. (2025). Transformasi Pendidikan Dasar melalui Kurikulum Merdeka: Analisis Dampak pada Kemampuan Berpikir Kritis dan Kreatif Siswa. *Jurnal Ilmu Manajemen Sosial Humaniora (JIMSH)*, 7(1), 14-30. <https://doi.org/10.51454/jimsh.v7i1.811>

-
- Fidiasih, L., Triwahyuni, E., & Emyus, A. Z. (2025). Enhancing Critical Thinking and Learning Outcomes: The Impact of Differentiated Learning Strategies in Elementary School. *Jurnal Penelitian Pendidikan IPA*, 11(4), 147–153. <https://doi.org/10.29303/jppipa.v11i4.10611>
- Hidayat, H., Suri, A., Yanre, M. A., Sari, N. P., & Sari, S. A. (2025). Perbedaan Individu Dan Pembelajaran Adaptif Menuju Pendidikan Yang Responsif Terhadap Kebutuhan Unik Peserta Didik. *Didaktik: Jurnal Ilmiah PGSD STKIP Subang*, 11(02), 301-309. <https://doi.org/10.36989/didaktik.v11i02.6547>
- Jumaah, F. M. (2024). Exploring Constructivist Learning Theory And Its Applications In Teaching English. *The American Journal of Social Science and Education Innovations*, 6(8), 7–19. <https://doi.org/10.37547/tajssei/Volume06Issue08-02>
- Lestari, F., Alim, J. A., & Noviyanti, M. (2024). Implementation of Differentiated Learning to Enhance Elementary School Students' Mathematical Critical and Creative Thinking Skills. *International Journal of Elementary Education*, 8(1), 178–187. <https://doi.org/10.23887/ijee.v8i1.64295>
- Mishra, N. R. (2023). Constructivist Approach to Learning: An Analysis of Pedagogical Models of Social Constructivist Learning Theory. *Journal of Research and Development*, 6(01), 22–29. <https://doi.org/10.3126/jrdn.v6i01.55227>
- Mongkau, J. G., & Pangkey, R. D. H. (2024). Kurikulum Merdeka: Memperkuat keterampilan abad 21 untuk generasi emas. *Journal on Education*, 6(4), 22018-22030. <https://doi.org/10.31004/joe.v6i4.6323>
- Navisa, N. A. P., Annas, A. N., & Kobandaha, F. (2025). Inovasi pembelajaran di era kontemporer: Tinjauan literatur tentang tren dan tantangan. *Educazione: Jurnal Multidisiplin*, 2(1), 146-157. <https://doi.org/10.37985/educazione.v2i1.42>
- Pare, A., & Sihotang, H. (2023). Pendidikan holistik untuk mengembangkan keterampilan abad 21 dalam menghadapi tantangan era digital. *Jurnal Pendidikan Tambusai*, 7(3), 27778-27778. <https://doi.org/10.31004/jptam.v7i3.11268>
- Prananto, Irfan W., Ramadhani, Deswara V., Hidayat, R. (2025). Numeractif: Development of a Numeracy Activity Book Based on Democratic Parenting for Elementary School Students. *Jurnal Ilmiah Pendidikan Dasar*, 12 (2), 389-413. <http://dx.doi.org/10.30659/pendas.12.2.389-413>
- Rifa'i, Y. (2023). Analisis metodologi penelitian kualitatif dalam pengumpulan data di penelitian ilmiah pada penyusunan mini riset. *Cendekia Inovatif Dan Berbudaya*, 1(1), 31-37. <https://doi.org/10.59996/cendib.v1i1.155>
- Rifaudin, A., Pramono, B., Aisyah, E., Syarifudin, E. & Muslihah, E. (2025). Teacher professionalism development model as a pillar of basic education quality. *Jurnal Ilmiah Pendidikan Dasar*, 12 (2), 358-374. <http://dx.doi.org/10.30659/pendas.12.2.358-374>
- Rosa, E., Destian, R., Agustian, A., & Wahyudin, W. (2024). Inovasi Model dan Strategi
-

Pembelajaran dalam Implementasi Kurikulum Merdeka: Inovasi Model dan Strategi Pembelajaran dalam Implementasi Kurikulum Merdeka. *Journal of Education Research*, 5(3), 2608-2617. <https://doi.org/10.37985/jer.v5i3.1153>

Santri, D. D. (2023). An Analyzing critical thinking skills using the context of the learning package for students of Madrasah Tsanawiyah Negeri 2 Jambi. *AKSIOMA: Jurnal Matematika Dan Pendidikan Matematika*, 14(1), 95–103. <https://doi.org/10.26877/aks.v14i1.14704>

Sulianto, J., Buchori, A., & Rahmawati, N. D. (2025). Development of Augmented Reality-Based Mathematics Textbooks to Foster Critical and Creative Thinking Skills. *Jurnal Ilmiah Pendidikan Dasar*, 12 (2), 228-250. <http://dx.doi.org/10.30659/pendas.12.2.228-250>

Susanta, A., Koto, I., & Susanto, E. (2023). Mathematics PISA Problems Using Local Context for Elementary School Students. *Jurnal Gantang*, 8(1), 11–19. <https://doi.org/10.31629/jg.v8i1.5604>

Susanti, P. (2022). The Effectiveness Of Realistic Mathematics Education Learning Approach On Critical Thinking Skills Of Elementary School Students. *ANARGYA: Jurnal Ilmiah Pendidikan Matematika*, 5(2), 197–205. <https://doi.org/10.24176/anargya.v5i2.8308>

Wang, M. T., Degol, J. L., & Henry, D. A. (2021). Pandemic Learning Loss and Educational Inequalities: Evidence from COVID-19. *Educational Researcher*, 50(9), 565–574. <https://doi.org/10.1590/S0104-40362022003003776>

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.