

TRENDS IN DIFFERENTIATED LEARNING IN ELEMENTARY SCHOOLS (2015-2025): A SYSTEMATIC LITERATURE REVIEW

Redhatul Fauzia^{1*}, Endang Susilaningsih², Bambang Subali³, Ellianawati⁴

^{1,2,3,4}Universitas Negeri Semarang, Indonesia

¹redhatulfauzia@student.unnes.ac.id

Abstract

Differentiated learning is gaining attention in elementary education in Indonesia, especially since the implementation of the Merdeka Curriculum. This study aims to map publication trends, implementation patterns, challenges, and strategies for strengthening differentiated learning in elementary schools during the period 2015–2025. The study used the Systematic Literature Review (SLR) method, referring to the PRISMA 2020 protocol, on 25 empirical research articles that met the inclusion criteria. The results of the study show that the development of differentiated learning can be divided into three phases: before the pandemic, during the pandemic, and in the era of the Merdeka Curriculum. In the initial phase, implementation was still limited; during the pandemic, this approach was adapted to online learning; while in the Merdeka Curriculum era, the practice of differentiated learning has been strengthened through diagnostic assessments and mapping of student learning needs. Bibliometric analysis shows that research focuses on learning readiness, learning flexibility, the use of digital media, and social-emotional support. In general, differentiated learning contributes positively to student motivation, participation, and learning outcomes, although it still faces obstacles in terms of teacher readiness, time management, and limited resources. This study recommends strengthening teacher competencies and sustainable policy support so that the implementation of differentiated learning in elementary schools can be more optimal and equitable.

Keywords: *differentiated learning; elementary school; systematic literature review*

Abstrak

Pembelajaran berdiferensiasi semakin mendapat perhatian dalam pendidikan sekolah dasar di Indonesia, terutama sejak diterapkannya Kurikulum Merdeka. Penelitian ini bertujuan untuk memetakan tren publikasi, pola penerapan, tantangan, dan strategi penguatan pembelajaran berdiferensiasi di sekolah dasar selama periode 2015–2025. Penelitian menggunakan metode Systematic Literature Review (SLR) dengan mengacu pada protokol PRISMA 2020 terhadap 25 artikel penelitian empiris yang memenuhi kriteria inklusi. Hasil kajian menunjukkan bahwa perkembangan pembelajaran berdiferensiasi terbagi ke dalam tiga fase, yaitu sebelum pandemi, masa pandemi, dan era Kurikulum Merdeka. Pada fase awal, penerapan masih terbatas; selama pandemi, pendekatan ini menyesuaikan dengan pembelajaran daring; sedangkan pada era Kurikulum Merdeka, praktik pembelajaran berdiferensiasi semakin menguat melalui asesmen diagnostik dan pemetaan kebutuhan belajar siswa. Analisis bibliometrik menunjukkan fokus penelitian pada kesiapan belajar, fleksibilitas pembelajaran, pemanfaatan media digital, dan dukungan sosial-emosional. Secara umum, pembelajaran berdiferensiasi berkontribusi positif terhadap motivasi, partisipasi, dan hasil belajar siswa, meskipun masih dihadapkan pada kendala kesiapan guru, pengelolaan waktu, dan keterbatasan sarana. Penelitian ini merekomendasikan penguatan kompetensi guru dan dukungan kebijakan yang berkelanjutan agar implementasi pembelajaran berdiferensiasi di sekolah dasar dapat berlangsung lebih optimal dan merata.

Kata Kunci: *pembelajaran berdiferensiasi; sekolah dasar; systematic literature review*

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Introduction

In the last decade, differentiated learning has become an important trend in education because it emphasizes meeting the diverse learning needs of students. Along with the development of independent curricula and educational innovation, the application of differentiated learning has received increasing attention in both research and teaching practices in schools. As stated by Nur Hasanah (2024), the learning needs of individual students can be met by applying a differentiated learning approach. Istiyati et al. (2024) also stated that differentiated learning has become increasingly recognized as an important pedagogical approach in recent decades, mainly because it is able to meet the diverse learning needs of students. According to Nafi'ah et al. (2024), there are three types of approaches in learning, namely differentiation of content, process, product, and learning environment. This differentiation approach is applied based on the diversity of students' abilities, interests, and learning styles. In line with the research by Wiyono et al. (2024), differentiated learning is a learning approach that caters to the diverse needs of students in the classroom.

Conceptually, differentiated learning is based on various educational theories that highlight the importance of understanding individual differences in the learning process. The Differentiated Instruction theory developed by Tomlinson emphasizes the need to adjust learning materials, strategies, learning outcomes, and learning environments by considering the readiness, interests, and learning profiles of students Tomlinson & Imbeau (2023). This approach is in line with the constructivist view that sees learning as an active process of knowledge construction, as well as Vygotsky's Zone of Proximal Development (ZPD) theory, which emphasizes the importance of providing learning support in accordance with the developmental stage of learners. In addition, Gardner's Multiple Intelligences theory provides a conceptual basis for accommodating the diversity of learners' abilities, potential, and learning styles. Thus, differentiated learning is positioned as a learner-oriented approach that aims to create equitable learning opportunities by recognizing the diversity of learner characteristics.

In an international context, literature shows that differentiated learning is effective in adapting to the learning needs of each student. According to Alwahdah end Supardi (2023) differentiated learning teaches students to have a good understanding of the material, thereby improving their learning outcomes. As stated by Anindhita et al. (2022), the learning process requires student activity, which is built through collaboration with teachers so that learning objectives can be achieved. For example, in a quasi-experimental study by Hapsari end Subiyantoro (2024), it was stated that in differentiated learning, the level of student activity increased significantly, with students becoming active during the learning process. In addition, research by Azizah end Paksi (2024) also states that differentiated learning is also appropriate for improving student learning outcomes, and its effectiveness has been tested. Thus, it is stated that differentiated learning not only improves learning outcomes but also encourages student activity, independence, and motivation to learn in achieving learning objectives. However, most of these studies tend to focus on specific classroom settings, short-term instructional interventions, or single subject areas, and rarely examine differentiated learning across broader educational contexts or extended time periods. As a result, the existing literature provides limited insight into long-term trends and cross-phase implementation challenges of differentiated learning.

Numerous international studies highlight that flexible instruction, grouping based on readiness, analysis of learning profiles, and adaptive teaching approaches are crucial to ensuring equitable learning opportunities for all students Tomlinson end Imbeau (2023). Despite this, the

implementation of differentiation differs significantly across countries due to variations in teacher training, curriculum design, and assessment systems. In the Indonesian context, the introduction of the Merdeka Curriculum has further promoted differentiated learning by prioritizing student autonomy, personalized learning trajectories, and diagnostic assessments Wahyudin et al. (2024). Nevertheless, several obstacles persist, such as teachers limited pedagogical mastery, inadequate professional development, and uneven application of differentiation across grade levels (Kristiyuana et al., 2025; Lestari et al., 2024). These conditions show that differentiated learning is not merely a classroom strategy but a comprehensive instructional reform that demands ongoing evaluation and continuous improvement.

The practical implementation of differentiated learning also presents significant challenges at the classroom level. Teachers are required to have a deep understanding of individual student differences and the ability to design varied instructional strategies accordingly. One of the most frequently reported obstacles is teacher competence. According to Muthaharoh et al. (2024), argue that teachers' professional skills are crucial in addressing diverse student potentials to ensure that individual learning needs are met. Additionally, teachers often face constraints related to limited time for lesson planning, classroom organization, and grouping students in large classes, which can reduce the effectiveness of differentiated instruction. According to Lestari et al. (2024) teachers' readiness and understanding are essential to effectively implement differentiated learning and transform it from a theoretical concept into practical application.

Several studies also highlight supporting factors that contribute to the successful implementation of differentiated learning, particularly following the adoption of the Merdeka Curriculum. Solikah (2024) emphasizes that diagnostic assessments, learning needs mapping, and flexible teaching module design are important foundations in strengthening the practice of content, process, and product differentiation in the classroom. Research by Khabibah et al. (2023) shows that this strategy is effective in overcoming difficulties in learning mathematics through adjustments to media, learning environments, and tasks, which have an impact on consistently improving student learning outcomes from the pre-cycle to the final cycle. Additionally, a study by Az-zahra et al. (2025) reveals that the latest trend is toward integrating differentiated learning with innovative models such as Problem-Based Learning (PBL), especially in science and mathematics learning, thereby improving students' cognitive understanding, activity, and analytical thinking skills. Overall, the trends of the past decade show a shift towards more adaptive, responsive, and student-centered learning, while emphasizing the importance of differentiation as a key strategy in improving the quality of learning in elementary schools. Despite these promising findings, previous studies generally emphasize immediate learning outcomes and classroom-level effectiveness, while paying less attention to how differentiated learning practices evolve over time or across different policy phases. Moreover, few studies attempt to synthesize these findings through systematic mapping or bibliometric analysis, leaving thematic relationships and research trends underexplored

Previous studies have widely demonstrated that differentiated learning is effective in increasing students' motivation, engagement, and academic performance across various subjects. However, most of these studies focus on limited classroom contexts, single subjects, or short-term interventions, so they do not provide a comprehensive picture of how differentiated learning develops across different educational periods. In particular, research has not systematically examined long-term trends from 2015–2025, including the distinction between the pre-pandemic, pandemic, and post-pandemic (Merdeka Curriculum) phases. This gap is

significant because the implementation of differentiated learning is strongly influenced by policy changes, shifts in learning modalities, teacher readiness, and instructional reforms, which vary substantially across these periods and directly affect the consistency, quality, and sustainability of differentiated learning practices in elementary schools.

Moreover, existing literature has not mapped the bibliometric relationships among key concepts or identified cross-year patterns in the barriers to implementation. Therefore, this study fills the gap by presenting a systematic mapping of differentiated learning trends in elementary schools over a full decade through a Systematic Literature Review (SLR) supported by VOSviewer analysis. The novelty of this study lies in mapping a full-decade trend (2015–2025) by systematically dividing the pre-pandemic, pandemic, and Merdeka Curriculum phases, and integrating a Systematic Literature Review (SLR) with bibliometric visualization using VOSviewer to reveal thematic structures, research trends, and implementation gaps that have not been captured by conventional narrative reviews. No previous SLR has analyzed all three phases simultaneously. This approach offers novelty by integrating trend analysis, policy-phase comparison, and bibliometric visualization to provide a more holistic understanding of the evolution of differentiated learning in Indonesia.

Based on these limitations, the research gap of this study lies in the absence of a Systematic Literature Review that comprehensively maps differentiated learning trends across three crucial educational phases: the pre-pandemic period, the pandemic period, and the Merdeka Curriculum era simultaneously. Therefore, the novelty of this study is presented through a decade-long trend analysis (2015–2025) supported by bibliometric visualization to identify thematic patterns and implementation challenges of differentiated learning in Indonesian elementary schools.

Research Methods

This study used the Systematic Literature Review (SLR) method based on the PRISMA 2020 protocol to ensure transparency, methodological accuracy, and research repeatability (Page et al., 2021)). The SLR process was carried out through four main stages, namely identification, screening, eligibility assessment, and determination of studies to be included.

In the identification stage, research articles were collected from three scientific databases, namely Google Scholar, Crossref, and Scopus, using a combination of Boolean keywords such as “differentiated learning,” “elementary school,” “implementation,” “learning readiness,” and “learning needs.”

The inclusion criteria in this study included: (1) articles discussing differentiated learning at the elementary school level; (2) published between 2015 and 2025; (3) written in Indonesian or English; and (4) available in full text. The exclusion criteria included conceptual articles, research outside the context of elementary schools, duplicate publications, and articles that did not clearly describe the methodology. The initial screening process was conducted by reviewing the titles and abstracts, followed by an assessment of the full text.

To ensure the quality of the included studies, each article that passed the eligibility stage was evaluated using predefined quality indicators, including clarity of research objectives, appropriateness of research design, adequacy of data collection techniques, transparency of data analysis procedures, and relevance of findings to the context of differentiated learning. Empirical studies employing recognized research designs such as quasi-experimental studies, classroom action research, survey research, and qualitative case studies were considered eligible, provided that the methodology, participants, instruments, and procedures were clearly

described. Studies that did not meet all quality indicators or contained incomplete methodological or data descriptions were excluded from the final synthesis.

Data from the selected articles were then systematically extracted and coded based on year of publication, type of research method (qualitative, quantitative, or mixed methods), focus of study, curriculum context, form of implementation, obstacles encountered, and reported reinforcement strategies. The thematic analysis was conducted through an iterative process that involved initial coding, category formation, and theme refinement by continuously comparing findings across studies to identify recurring patterns, dominant themes, and longitudinal trends in differentiated learning research.

In addition to thematic analysis, bibliometric analysis was conducted using VOSviewer software to map keyword co-occurrence relationships and generate thematic research clusters. This bibliometric mapping complemented the thematic analysis by visually identifying research concentration areas, emerging topics, and underexplored themes. The entire article selection process was visualized using the PRISMA 2020 flowchart to enhance the transparency of the research process.

Overall, 2,005 articles were identified, consisting of Google Scholar ($n = 1,000$), Crossref ($n = 1,001$), and Scopus ($n = 4$). After removing 324 duplicate articles, 105 articles in languages other than English/Indonesian, and 189 non-journal documents, 1,387 articles remained for the screening stage. The next stage excluded articles that were not available in PDF format ($n = 456$), did not have an abstract ($n = 206$), and were further duplicates ($n = 287$), resulting in 438 articles for eligibility assessment. A total of 188 articles were inaccessible due to inactive links. Of the 250 articles that were fully assessed, 132 articles did not meet the criteria for differentiated learning and 13 articles did not have sufficient data. Thus, 25 empirical research articles were declared to meet the criteria and were included in the final synthesis. All of these articles were then analyzed and mapped using VOSviewer as shown in Figure 1.

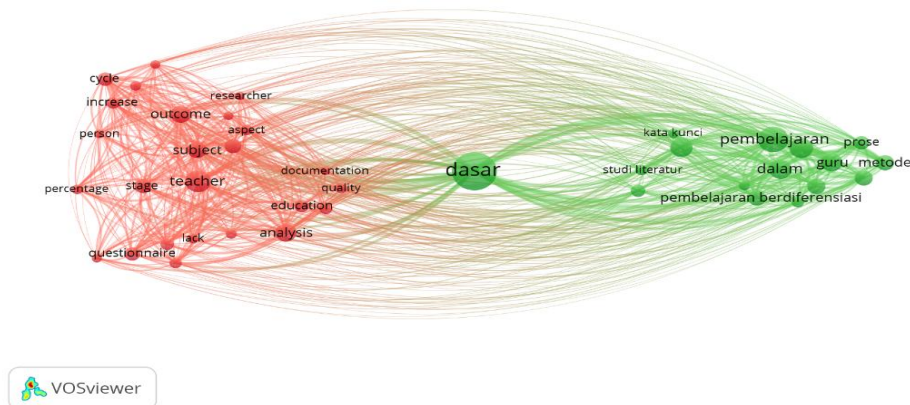


Figure 1. VOS Viewer

Figure 1 shows a visualization of the research keyword network on differentiated learning trends in elementary schools between 2015 and 2025, analyzed using VOSviewer software. Each node represents a keyword used in scientific publications, while the size of the node indicates the frequency of occurrence of that keyword. Different colors indicate clusters of interrelated research themes. The lines connecting the nodes illustrate the level of correlation between keywords, where closer distances indicate stronger relationships.

The visualization results show that differentiated learning in elementary schools developed into several main clusters, which included learning strategies, mapping students'

learning needs, learning activity and outcomes, and curriculum implementation. The interrelationship between clusters shows that differentiated learning does not stand alone but is integrated with various pedagogical aspects in the learning process in elementary schools.

Result and Discussion

The PRISMA 2020 Flow Diagram illustrates the selection stages used in this Systematic Literature Review (SLR). The entire process of identification, screening, and eligibility assessment was conducted following the PRISMA guidelines to maintain methodological transparency and accuracy. Through this procedure, a very broad collection of studies was gradually narrowed down based on their relevance to the topic of differentiated learning, the availability of complete documents, and their suitability to the predetermined inclusion criteria. The details of the numbers at each stage are explained in the Methods section, so that this Results section can directly highlight the composition and quality of the final dataset analyzed.

From the entire selection process, 105 studies were deemed eligible for analysis, and 25 of them met all the criteria as empirical studies that were reviewed in depth. These 25 studies are the most relevant and methodologically robust sources of evidence on differentiated learning practices in elementary schools between 2015 and 2025. These studies form the main basis for mapping trends, developing pedagogical patterns, and understanding how the implementation of differentiated learning has changed over the decade. The next section outlines the main findings of the research, including shifts in implementation practices, the dominant learning strategies used, and their impact on student learning outcomes.

The following section presents the main findings of the study, focusing on trends in the implementation of differentiated learning, dominant instructional strategies, and their reported impacts on student learning outcomes in elementary schools. See Figure 2.

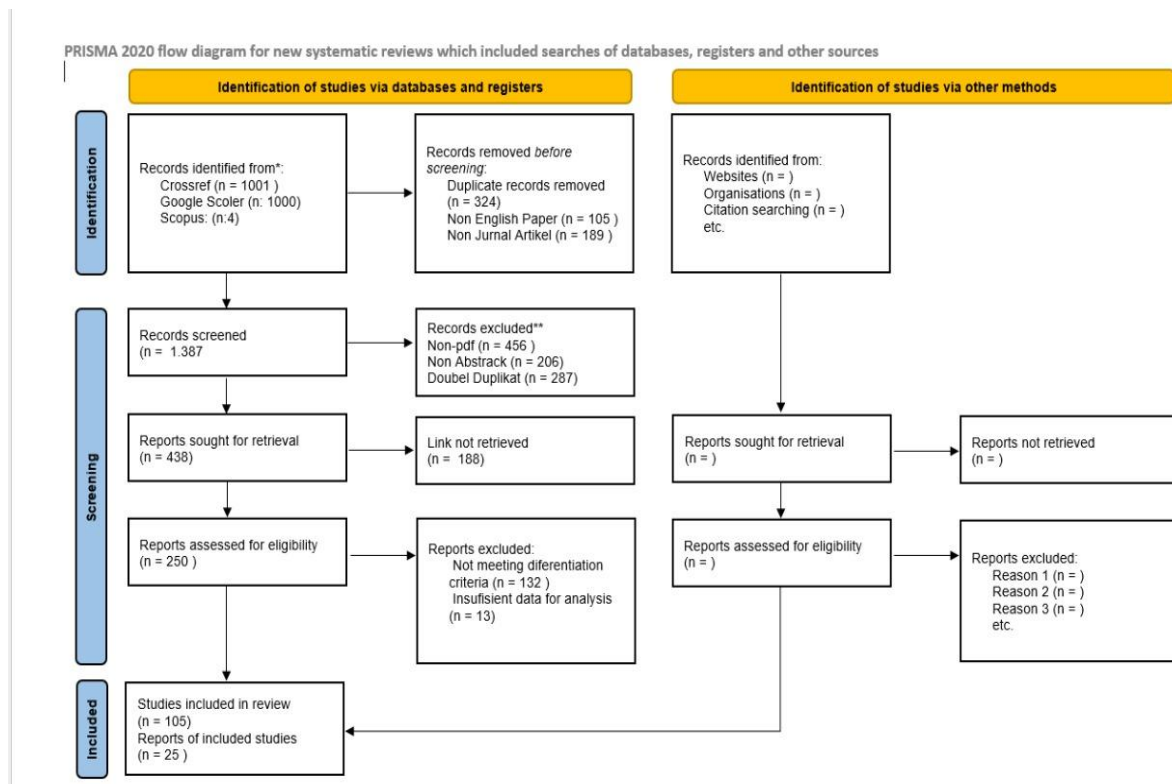


Figure 2. The Data PRISMA

Figure 2 illustrates the PRISMA-based article selection process, detailing the number of studies identified, screened, assessed for eligibility, and included in the final analysis

This selection process was carried out to ensure that only articles relevant to the focus of differentiated learning trends in elementary schools were analyzed. The synthesis resulted in 25 articles showing trends in differentiated learning in elementary schools between 2015 and 2025. The results of the review can be seen in Table 1.

Table 1 presents a summary of the key findings from selected journal articles examining the implementation of differentiated learning in elementary schools. The table highlights research results across different years, contexts, and instructional strategies.

Table 1. Result Review

| Author | Year | Findings |
|-----------------|-------------|--|
| Tanjung | 2019 | In the context of EFL elementary school, Differentiation adapts content, process, and product based on students' learning styles and readiness; improves participation and learning outcomes. |
| Ghazali | 2024 | Differentiated learning models are more effective than direct instruction in improving the learning outcomes of elementary school students with high learning interest, demonstrating a positive interaction between interest and learning outcomes. |
| Kuway et al | 2023 | Differentiated learning aided by digital teaching materials increased elementary school students' interest in learning from 69% to 85%. This strategy effectively facilitates the visual, auditory, and kinesthetic learning styles of students. |
| Solikah | 2025 | A literature review shows that differentiated learning in the Merdeka Curriculum increases intrinsic motivation, engagement, and learning outcomes of elementary school students, as well as supporting an inclusive and student-centered approach. |
| Anggraeni et al | 2024 | SLR identified a research gap: there is no ongoing professional development for teachers related to content/process/product differentiation that takes into account multiple intelligences, learning styles, learning readiness, motivation, self-concept, critical/creative thinking. |
| Hidayat | 2023 | The descriptive study shows that the implementation of DI in social studies is in line with the Merdeka Curriculum; emphasizing the importance of initial assessment (readiness, interest, learning profile), strategy adjustment (content, process, product), learning environment development, evaluation, and reflection. It recommends the development of learning and assessment designs as implementation steps in elementary schools. |

| Author | Year | Findings |
|--------------------|------|---|
| Latifah | 2023 | Research shows that 52% of students are visual learners, 29% are auditory learners, and 19% are kinesthetic learners. Teachers use this data to implement differentiated learning so that students learn according to their characteristics in the Merdeka Curriculum. |
| Andini | 2016 | Differentiation is a solution for inclusive learning in elementary schools through mapping students' learning needs and using various strategies according to individual characteristics. |
| Miqwati et al | 2023 | Research shows that the application of differentiated learning with differentiation in content, process, and product can improve science learning outcomes and the activity of elementary school students. Teachers play a role in adjusting learning strategies to the needs, interests, and readiness of students. |
| Fauziyah & Rofiki | 2024 | The results of a systematic literature review show that 94% of studies found a positive impact of differentiated learning on the achievement of learning objectives. This strategy strengthens learning motivation, inclusiveness, and learning outcomes in elementary schools. |
| Suprayogi & Valcke | 2016 | The implementation of differentiated learning in elementary schools in Indonesia is still not optimal. Teachers generally understand the concept of DI, but still find it difficult to adjust the learning process and products to the needs of each student. Therefore, support in the form of continuous training is needed so that teachers are able to design differentiation strategies in a more focused and consistent manner in classroom practice. |
| Nurhayati et al | 2024 | Case study research shows that the application of differentiated learning in the Merdeka Curriculum addresses the diverse learning needs of elementary school students. Differentiation of content, process, and product helps increase motivation and participation in learning. |
| Bushie | 2015 | Reviews show that Tomlinson's principle-based differentiated learning effectively accommodates diversity in student readiness-interest-learning profiles, but field practices often do not match theory. |
| Mulyani et al | 2024 | The implementation of differentiated learning in elementary schools has increased between 2019 and 2023, especially since the introduction of the Merdeka Curriculum. The main driving factor behind this trend is the need for learning that is oriented towards students' learning styles and interests. However, several obstacles have been identified, such as a lack of teacher training, limited infrastructure, and |

| Author | Year | Findings |
|--------------------|-------------|--|
| | | difficulties in grouping students based on their learning readiness. |
| Samsiyah | 2022 | The application of the STAR model (Situation, Challenge, Action, Reflection) in differentiated learning has been proven to improve students' literacy and numeracy skills. Learning is tailored to students' readiness and learning styles. |
| Rahmawati | 2023 | This shows that differentiated learning can be implemented through strategies that differentiate processes, products, and content. However, teachers face obstacles such as time constraints and difficulties in preparing different learning modules. |
| Khulisoh | 2022 | Proving that differentiated learning is effectively applied in the Merdeka Curriculum by paying attention to principles. It also provides benefits in increasing student motivation to learn. |
| Fauzia dan Ramadan | 2023 | Research shows that the application of differentiated learning is in line with the main principles of differentiated learning. This learning method increases student activity and mathematics learning outcomes. |
| Septiaseh et al | 2024 | The results of the study show that students' learning styles have an influence on the success of differentiated learning, especially in elementary schools. It also notes that the trend of research on differentiated learning has increased significantly from 2021 to 2024. |
| Rosiyani et al | 2024 | Differentiated learning in science subjects increases student motivation and enthusiasm through learning needs mapping, planning, evaluation, and reflection. |
| Fitriyah & Bisri | 2023 | Differentiated learning increases motivation and learning outcomes, creates harmonious teacher-student relationships, and fosters student independence and creativity. |
| Firmansyah et al | 2024 | Across the 25 included studies, differentiated learning consistently improved achievement (increase 20%–40%) and classroom engagement (36.6% → 81.9%), particularly when teachers used flexible grouping and readiness-based tasks. |
| Melesse | 2015 | Elementary school teachers have a very low understanding and practice of differentiated learning due to minimal training and various obstacles such as limited time, resources, and school support. |
| Az-zahra et al | 2025 | Differentiated learning has been proven to improve students' cognitive understanding, engagement, and analytical thinking skills in science and mathematics learning in elementary schools. |
| Mavidou & Kakana | 2019 | The consistent application of differentiated learning has been proven to improve children's learning outcomes, especially through differentiation based on interests, readiness, and learning styles. |

The findings in Table 1 indicate that differentiated learning consistently contributes to improvements in student motivation, engagement, and learning outcomes. However, several studies also report persistent challenges, particularly related to teacher readiness, time constraints, and the lack of continuous professional development

Based on the findings summarized in Table 1, the distribution and thematic trends of the reviewed journal articles are further visualized in Figure 3.

Figure 3 illustrates the bibliometric visualization of research trends on differentiated learning in elementary schools.

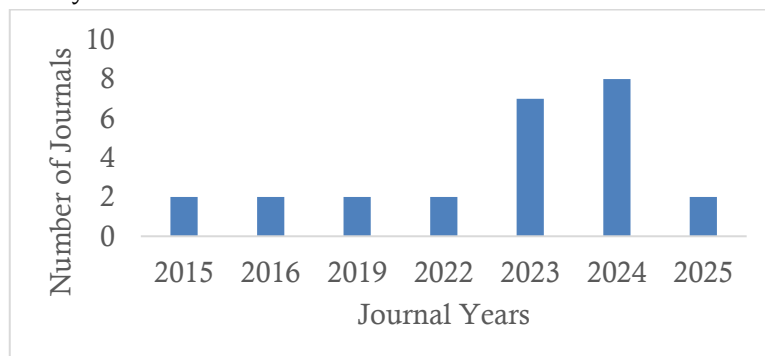


Figure 3. Journal Data

The visualization shows a growing concentration of research on adaptive and learner-centered differentiation practices.

Trends in Differentiated Learning (2015-2025)

Based on a review of 25 selected journal articles, differentiated learning in elementary schools has shown significant improvement over the past decade. During the early period of 2015–2018, the implementation of differentiation practices was still limited in both theoretical understanding and classroom application. Most studies in this phase focused on introducing the basic concepts of content, process, and product differentiation. In line with research conducted by Muthaharoh et al. (2024) limited teacher training and the absence of strong supporting policies were identified as major obstacles, which resulted in the relatively restricted implementation of differentiated learning during this period.

Subsequently, in the 2019–2021 period, the COVID-19 pandemic became a catalyst for more adaptive learning approaches. Differentiation practices began to be adjusted to distance learning contexts, enabling teachers to respond to students' varying readiness levels, interests, and learning styles during online instruction. Empirical evidence reported by (Hapsari end Subiyantoro, 2024; Miqwati et al., 2023) show that the application of this differentiation-based model increased student activity from 36.6% to more than 80% and also significantly improved learning outcomes.

The strengthening of differentiated learning continued in the 2022–2025 period, particularly following the implementation of the Merdeka Curriculum. During this phase, research increasingly emphasized adaptive and learner-centered instructional strategies, positioning differentiated learning as a key component of inclusive education in elementary schools. Studies by (Fauzia dan Hadikusuma Ramadan, 2023; Firmansyah et al., 2023; Solikah, 2024) confirming that differentiated learning has become an important part of adaptive and inclusive learning strategies. Moreover, recent research trends highlight a growing focus on the

integration of diagnostic assessment, the creation of responsive learning environments, and the continuous professional development of teachers to support effective implementation.

Table 2 summarizes the development trend of differentiated learning in elementary schools from 2015 to 2025 based on the findings of the selected journal articles. The table illustrates changes in implementation focus across different periods.

Table 2. Differentiated Learning Trend Data

| Year | Description |
|-----------|--|
| 2015-2018 | The implementation of differentiated learning is still limited in both theory and practice among teachers. |
| 2019-2020 | A more adaptive application of differentiated learning is needed. |
| 2021-2025 | The trend toward differentiated learning is growing stronger as the Merdeka Curriculum is implemented. |

The data in Table 2 shows how the trend of differentiated learning has progressed between 2015 and 2025. Between 2015 and 2018, its implementation was still very limited and was even considered poor in terms of both theory and practice by teachers. Then, in line with the development of education in Indonesia in 2019-2020, its application was slowly reintroduced in a more adaptive manner with online learning due to the Covid-19 pandemic. After that period passed in 2021-2025, the trend of applying differentiated learning continues to develop in its implementation because it is also in line with the Merdeka curriculum that is being implemented.

The Impact of Differentiated Learning on Student Engagement and Learning Outcomes

Most of the research reviewed showed an increase in student learning outcomes and engagement. Based on research by Fauziyah et al (2024), there was a significant positive impact of differentiated learning on the learning outcomes of elementary school students, which reached 94%. This learning method also increased the average by 20%-40% after the implementation of differentiated learning, for example in studies conducted by (Khabibah et al., 2023a; Rachmawati end Agustini, 2025).

In addition to learning outcomes, there was also an increase in student learning activity. The application of models combined with differentiated learning, such as the Problem-Based Learning and Project-Based Learning models, was also able to increase student participation actively, as seen in the research conducted by Hapsari and Subiyantoro (2024) Several other studies, such as those by Fitriyah and Bisri (2023) and Hakim (2018) also reveal that differentiated learning strengthens the positive relationship between teachers and students and fosters student creativity.

Factors Hindering the Implementation of Differentiated Learning

Although this trend has been widely discussed in recent decades and continues to grow rapidly, there are still a number of challenges encountered in its implementation. These are as follows: a). Teacher Readiness and Professional Training: readiness and professional training are still limited, as stated in research (Mulyani et al, 2024; Umayrah end Wahyudin, 2024) that many teachers do not yet fully understand strategies for mapping student learning needs and

managing heterogeneous classrooms. b). Time and Resource Constraints: These certainly also hinder the planning of differentiated learning. This is because many are still not skilled at managing time when implementing differentiated learning. This is in line with research (Khulisoh, 2022; Rahmawati, 2023). c). Infrastructure Constraints: Supporting infrastructure helps it run well, but often it is not supportive, such as the media, especially in 3T area schools. This is also mentioned as an obstacle by Nafi'ah et al (2025) in their research. d). Lack of Management Support and Collaboration among Teachers: The lack of management and collaboration among teachers in developing differentiated learning in a sustainable manner also becomes an obstacle to the implementation of differentiated learning. This is because in practice, it cannot be done sustainably.

Strategies for Strengthening the Implementation of Differentiated Learning

The findings of the literature review indicate that the success of strengthening the implementation of differentiated learning in elementary schools is greatly influenced by the improvement of educators' professional capacity, policy support at the school level, and the availability of adequate learning facilities. Teacher competence is a key factor, because the effectiveness of differentiation depends on their ability to conduct diagnostic assessments, identify students' learning readiness levels, and design flexible learning strategies in terms of content, process, and products according to students' needs Negeri et al. (2025) emphasize that "teachers still need a strong understanding of initial assessment, learning profile determination, and flexible learning design for differentiation to be effective." Research by Anwar et al. (2025) also emphasizes the importance of strategies such as flexible grouping and tiered instruction as approaches that have been proven to increase teacher responsiveness in dealing with student diversity in the classroom.

In addition to improving teacher competence, professional collaboration is another important strategy. Teachers cannot work alone in developing differentiated learning, so a learning community is needed to enable the exchange of good practices, lesson study, and peer mentoring. The study by Umami end Damayani (2023) shows that teacher collaboration plays a role in increasing teachers' creativity and confidence when designing differentiated learning, because peer support influences the quality of implementation in the classroom. Collaboration also makes it easier for teachers to overcome challenges arising from student heterogeneity and limited planning time.

Strengthening learning facilities and learning technology is also a strategic factor that supports the effectiveness of differentiation. The use of visual, audio, and digital media, as well as flexible learning spaces, allows teachers to adjust the presentation of material to visual, auditory, and kinesthetic learning styles. Syarida et al. (2025) found that the use of interactive digital media helps increase student participation and understanding in differentiated learning, especially in concept-based subjects such as IPAS and local culture. On the other hand, Lestari et al. (2024) proved that the use of technology in differentiation can encourage an increase in students' critical and creative thinking skills in mathematics learning, especially when differentiation strategies are implemented consistently and structurally.

The role of school policies and leadership that support innovation is a very decisive reinforcing factor. Schools need to provide space for teachers to design more flexible learning, prepare teaching modules that are responsive to student needs, and integrate differentiation practices into the academic supervision process. Negeri et al. (2025) emphasize that without adequate structural support, the implementation of differentiated learning is difficult to sustain

consistently because teachers tend to revert to conventional approaches that are easier to use. In addition, policy commitment is needed to ensure the equitable distribution of learning resources and facilities across schools, so that the application of differentiation can take place in a fair and inclusive manner.

In general, strengthening the implementation of differentiated learning requires a combination of improving educator competence, professional collaboration among teachers, optimizing technology and learning media, and policy support from schools. Empirical findings show that this approach not only helps teachers manage the diversity of student abilities in the classroom, but also has a positive impact on student motivation, academic achievement, and social-emotional development. Thus, strengthening differentiated learning practices is an important aspect of ensuring that the learning process in elementary schools is truly capable of responding to the different needs and characteristics of each student.

Conclusion

Based on research findings, differentiated learning in elementary schools from 2015 to 2025 has experienced rapid development. In the early years, its implementation was still limited because teachers did not yet have a sufficient understanding of the principles of differentiation. During the 2019–2021 pandemic, differentiated learning practices began to be adapted to distance learning formats, enabling teachers to accommodate students' varying levels of readiness and learning styles. After 2022, the Merdeka Curriculum further strengthened the implementation of differentiated learning by emphasizing adaptive and learner-centered learning. Differentiated learning has consistently been proven to increase student motivation, engagement, and learning outcomes. Therefore, teachers are encouraged to continue to improve their learning designs and engage in professional collaboration to make implementation more effective.

In addition, this study highlights a number of ongoing challenges, such as limited teacher readiness, suboptimal diagnostic assessment practices, and inconsistent implementation across classes. Research trends also show an increased focus on personalized learning, the use of digital tools for differentiation, and the integration of social-emotional learning. Future education policies need to prioritize the continuous development of teacher competencies, a systematic assessment framework, and technology-based differentiation models. Further research is recommended to conduct classroom-based longitudinal studies, examine specific differentiation techniques in various subjects, and explore students' perceptions of differentiated learning.

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