

## Model Differentiated Learning in 21st Century Education: A Systematic Review of Strategies, Results, And Challenges

Thoriq Aji Silmi<sup>1</sup>, Ardiansyah Lubis<sup>2</sup>, Achmad Maulidi<sup>3</sup>

<sup>1</sup> Pendidikan Agama Islam, Pascasarjana, Universitas Islam Negeri Sunan Ampel, Surabaya

<sup>2</sup> Pendidikan Agama Islam, Pascasarjana, Universitas Islam Negeri Sunan Ampel, Surabaya

<sup>3</sup> Pendidikan Agama Islam, Pascasarjana, Universitas Islam Negeri Sunan Ampel, Surabaya

[thoriqajisilmi@gmail.com](mailto:thoriqajisilmi@gmail.com)<sup>1</sup>, [Alubis865@gmail.com](mailto:Alubis865@gmail.com)<sup>2</sup>, [a.maulidi.albahris@gmail.com](mailto:a.maulidi.albahris@gmail.com)<sup>3</sup>

|  |   |  |   |
|--|---|--|---|
| Submitted:<br>December 13 <sup>th</sup> 2025 | Revised:<br>April 15 <sup>th</sup> 2025 | Accepted:<br>April 15 <sup>th</sup> 2025 | Published:<br>April 30 <sup>th</sup> 2025 |
|--|---|--|---|

Corresponding author:

Email : [thoriqajisilmi@gmail.com](mailto:thoriqajisilmi@gmail.com)

### Abstrak

Pembelajaran berdiferensiasi merupakan pendekatan pedagogis yang mengakui keragaman siswa dalam hal kesiapan, minat, dan gaya belajar. Penelitian ini bertujuan menganalisis implementasi, hasil, dan tantangan pembelajaran berdiferensiasi dalam konteks pendidikan abad ke-21. Menggunakan metode tinjauan pustaka sistematis, penelitian ini mengevaluasi 22 artikel terpilih dari basis data Scopus dan Google Scholar. Hasil penelitian menunjukkan bahwa pembelajaran berdiferensiasi efektif dalam meningkatkan keterlibatan siswa, pemahaman materi, serta keterampilan sosial melalui penyesuaian konten, proses, produk, dan lingkungan belajar. Namun, implementasinya menghadapi tantangan seperti manajemen waktu, keterbatasan sumber daya manusia, dan persepsi ketidakadilan antar siswa. Untuk mengatasi kendala ini, diperlukan peningkatan kompetensi guru, dukungan sistem pendidikan, dan pengelolaan kelas yang lebih efektif. Penelitian ini memberikan kontribusi dengan menawarkan wawasan tentang praktik dan strategi pembelajaran berdiferensiasi yang relevan untuk era Kurikulum Merdeka dan pendidikan berbasis humanistik.

**Kata kunci:** Hasil, Implementasi, Pembelajaran berdiferensiasi, Strategi.

### Abstract

Differentiated learning is a pedagogical approach that recognizes the diversity of students in terms of readiness, interests, and learning styles. This study aims to analyse the implementation, outcomes, and challenges of differentiated learning in 21st-century education. This study uses a systematic literature review method, which evaluates 22 selected articles from the Scopus and Google Scholar databases. The findings reveal that differentiated learning is effective in enhancing student engagement, material comprehension, and social skills through the adaptation of content, processes, products, and learning environments. However, its implementation faces challenges such as time management, limited human resources, and perceptions of inequity among students. Addressing these challenges requires enhancing teacher competence, providing adequate support from the education system, and implementing more effective classroom management. This study contributes by offering insights into differentiated learning practices and strategies relevant to the Merdeka Curriculum era and humanistic education.

**Key words:** *Differentiated Learning, Implementation, Outcomes Strategies.*

## INTRODUCTION

Every child is a unique individual who needs a responsive learning environment. Despite being of the same age and grade level, students can present a wide range of cognitive capacities, prior knowledge, interests, and talents to their teachers. Although overall classroom instruction plays an important role in classroom practice, teachers should be aware that students enter elementary and middle grades at very different levels. Therefore, differentiation is essential to meet their learning needs. There may be students who perform below average, perform above average, and are in the middle. This requires teachers to provide teaching practices that meet the characteristics of students (Achmad et al., 2024). Moreover, the challenges of 21st-century learning encourage teachers to provide inclusion and equality in the education system (Achmad et al., 2024).

In the context of the era of a curriculum Merdeka that emphasizes student-centered learning, differentiation is the key to realizing an independent education as initiated by Ki Hadjar Dewantara, namely, education that humanizes students (Sirait et al., 2024). The era of Merdeka curriculum learning encourages educators to use various learning models that can create an effective and student-centered learning experience (Student Center). As the philosophy of Ki Hadjar Dewantara in the article Adiniyah & Utomo (2023) explains that education should create space for students to grow as a whole to be able to glorify themselves and others (inner independence) and become independent (born independent) (Adiniyah & Utomo, 2023). The Merdeka Curriculum adheres to the belief that a differentiated learning model is an effective approach to teaching and learning (Samsudi et al., 2024a; Sofiana et al., 2024). This emphasis is because differentiated learning adheres to the principle of "teaching at the right level", which means adapting teaching to meet the needs of diverse interests and student readiness (Samsudi et al., 2024a).

Therefore, teachers try to apply various strategies in meeting the characteristics of students, such as interests, readiness, abilities, development, and students' attitudes (Anggoro et al., 2024a; Magableh & Abdullah, 2022). As Tomlinson emphasized, teachers need to use diverse approaches in the classroom to give learners different ways to learn effectively (Balchin & Bouzaki, 2022; Halil et al., 2024). Teachers are called to move away from a "one-size-fits-all" approach and shift to differentiated teaching practices. Menurut (Aisah et al., 2023) One of the strategies in realizing independent learning is to implement differentiated learning.

Differentiated learning is an interesting approach because it can be tailored to each students' learning needs, style, or interests (Halil et al., 2024; Putra et al., 2023a). In contrast to traditional learning, which assumes all students have the same abilities, differentiated learning recognizes that each individual is unique and requires a different approach (Blegur & Hardiansyah, 2024). Thus, differentiated learning can be seen as responsive, student-centered, and as a way of respecting each student (Gibbs & Beamish, 2021). Differentiated learning has also proven effective in responding to the diverse needs of students, so the same approach is not suitable for all students (Magableh & Abdullah, 2022).

Because of the variation among each group of learners, differentiated learning concepts emerged as a relevant approach. This concept is rooted in the understanding that teachers must adapt their teaching according to the diversity of students. Therefore, differentiated learning focuses on a diversity-based approach that can help students meet learning needs based on various aspects such as readiness, interests, and learning profiles (Putra et al., 2023b).

This is because differentiated learning is characterized by considering students' learning styles and presenting skills in a way that suits different students' learning styles and forms (Al-Makahleh et al., 2023). Therefore, differentiated teaching is an effective way, an approach that implies that each student is taught using strategies that are appropriate to his or her level or learning needs (Al-Makahleh et al., 2023). Many schools around the world use differentiated learning to create an inclusive environment in the classroom (Porta & Todd, 2024).

However, to achieve this goal, teachers are needed who have good abilities such as innovation and have diverse teaching strategies (Sutikno et al., 2024). Based on Giddens' structuring theory, teachers have an important role as agents of change (Hidayat & Patras, 2024). Therefore, differentiated learning, which has proven effective in meeting the diverse needs of students, is a relevant approach. Thus, differentiated learning is expected to meet the needs of diverse student characteristics and encourage teachers to implement varied learning strategies and more meaningful learning activities (Halil et al., 2024).

Teachers with adequate knowledge of differentiated learning strategies can identify each student's unique needs and learning styles, thus allowing for the development of appropriate lesson plans. As a result, teachers skilled in this context can provide a relevant and meaningful learning experience for all students, ensuring they can reach their maximum potential (Hasanah et al., 2023). In addition, this approach encourages inclusion and acceptance in the classroom, creating a positive and supportive learning environment (Hasanah et al., 2023). In other words, learning differentiation focuses not only on the adjustment of the material, but also on how the material is delivered and learned by students. This shows that differentiation is a process that involves various aspects of learning, from teaching materials to classroom interactions. Furthermore, research by (Achmad et al., 2024; Al-Makahleh et al., 2023) emphasizing that while learning objectives may be the same, teachers adjust the learning trajectory to meet the needs of each student.

In addition, teachers can also evaluate students' progress and needs in different learning by collecting data from various sources before, during, and after learning (Sofiana et al., 2024). In other words, differentiation allows teachers to create a more personalized and meaningful learning experience for each student. It's important to remember that differentiation is not an easy task, but the benefits for students are enormous.

Many researchers have discussed differentiated learning. Such as research conducted by Rais Hidayat and Yuyun Elizabeth Patras with the theme "Education transformation in

Indonesia requires the implementation of differentiated learning". However, in the study, Rais Hidayat and Yuyun Elizabeth Patras only photographed the transformation of education after the Covid-19 pandemic (Hidayat & Patras, 2024).

Research by Dewi Oktaviani and Susilo Satanti on "Improving Unplugged Computational Thinking Skills Through Integrated Problem-Based and Differentiated Learning in Indonesia". Dewi Oktaviani and Susilo Satanti concluded that the application of a problem-based learning model integrated with differentiated learning (content and process) significantly improves students' computational thinking skills and encourages cognitive development through problem-solving activities (Oktaviani & Satanti, 2024). Then the research of Samsudi, et al., on Unraveling the Merdeka Curriculum: Exploring Differentiated Instruction's Impact on Student Learning". They concluded that the application of differentiated instruction can increase students' engagement and understanding, as well as provide opportunities for them to learn according to their individual needs and learning styles (Samsudi et al., 2024a).

Of the many research on differentiated learning, there has been little research that specifically differentiates learning in 21st century education. How is Differentiated Learning Implemented in the 21st Century? Then how are the outcomes of differentiated learning in the 21st century? And what are the challenges faced in the implementation of differentiated learning in the 21st century? This is what is new or novelty in this research, which is to analyze differentiated learning in 21st century education.

## METHODS

This research is qualitative research using a literature review or *Systematic Literature Review* (SLR). The literature used is journals or articles relevant to the problem or research purpose. *The Systematic Literature Review* selects, identifies, and evaluates research to answer formulated research questions. In this systematic literature review, the research began by identifying articles related to Differentiated Learning in the Scopus and Google Scholar databases through the *Publish or Perish tool*. There are four phases involved in mapping the literature, namely the identification phase, the screening phase, the eligibility phase, and the inclusion phase. (Pramono, et al 2021)

The following phases are the Identification phase. In the identification phase, the goal is to gather a comprehensive list of potentially relevant studies. The procedural protocol is:

1. Perform systematic searches in academic databases (e.g., Scopus, Web of Science, Google Scholar).
2. Export all references into a reference management tool with Mendeley.

Secondly the screening phase, In this phase, you begin the first filtering process by removing duplicates and applying title/abstract level exclusion criteria. The procedural protocol is:

1. Remove duplicate entries
2. Screen titles and abstracts to exclude studies that are obviously irrelevant.
3. Apply general exclusion criteria.

Thirdly, at this point, you conduct a full-text review of the remaining articles to ensure they meet your detailed inclusion/exclusion criteria.

The procedural protocol is:

1. Retrieve and read the full text of each remaining study.
2. Evaluate methodological quality, relevance, and alignment with your research questions
3. Exclude studies that lack depth, empirical evidence, or methodological rigor.

The last phase is the inclusion phase. The final step is only the studies that fully meet all criteria are included in the synthesis or analysis. The procedural protocol is:

1. Finalize the list of studies that will be reviewed in-depth
2. These studies are included in qualitative synthesis, quantitative synthesis (meta-analysis), or thematic analysis

### 1. Research Question

Research Questions are designed based on the needs of the chosen topic. The following are the research questions in this study:

1. How is Differentiated Learning Implemented in the 21st Century?
2. How do learning outcomes differentiate in the 21st century?
3. What are the challenges faced in implementing differentiated learning in the 21st century?

### 2. Identification Stage

The identification process is carried out by searching for relevant literature through various academic databases, such as **Scopus, and Google Scholar**. Keywords used in searches include the following terms:

**Table 1 Keywords used to reach articles relevant to research**

| Data Base      | Keywords  |
|----------------|---|
| Google Scholar | Pembelajaran Berdiferensiasi<br>Pembelajaran abad ke-21 |

**Scopus** “Differentiation learning” “in the 21<sup>st</sup> century learning model”

Table 1 shows that the keywords used in the search for relevant articles are “Pembelajaran Berdiferensiasi”, “Pembelajaran abad ke-21”, and “differentiation learning”. The focus defined in this literature leads to research related to Strategies, outcomes, and challenges in applying differentiated learning. The next step is determining the criteria for articles to be included and excluded from the focused theme according to the framework needed for the review, as shown in Table 2.

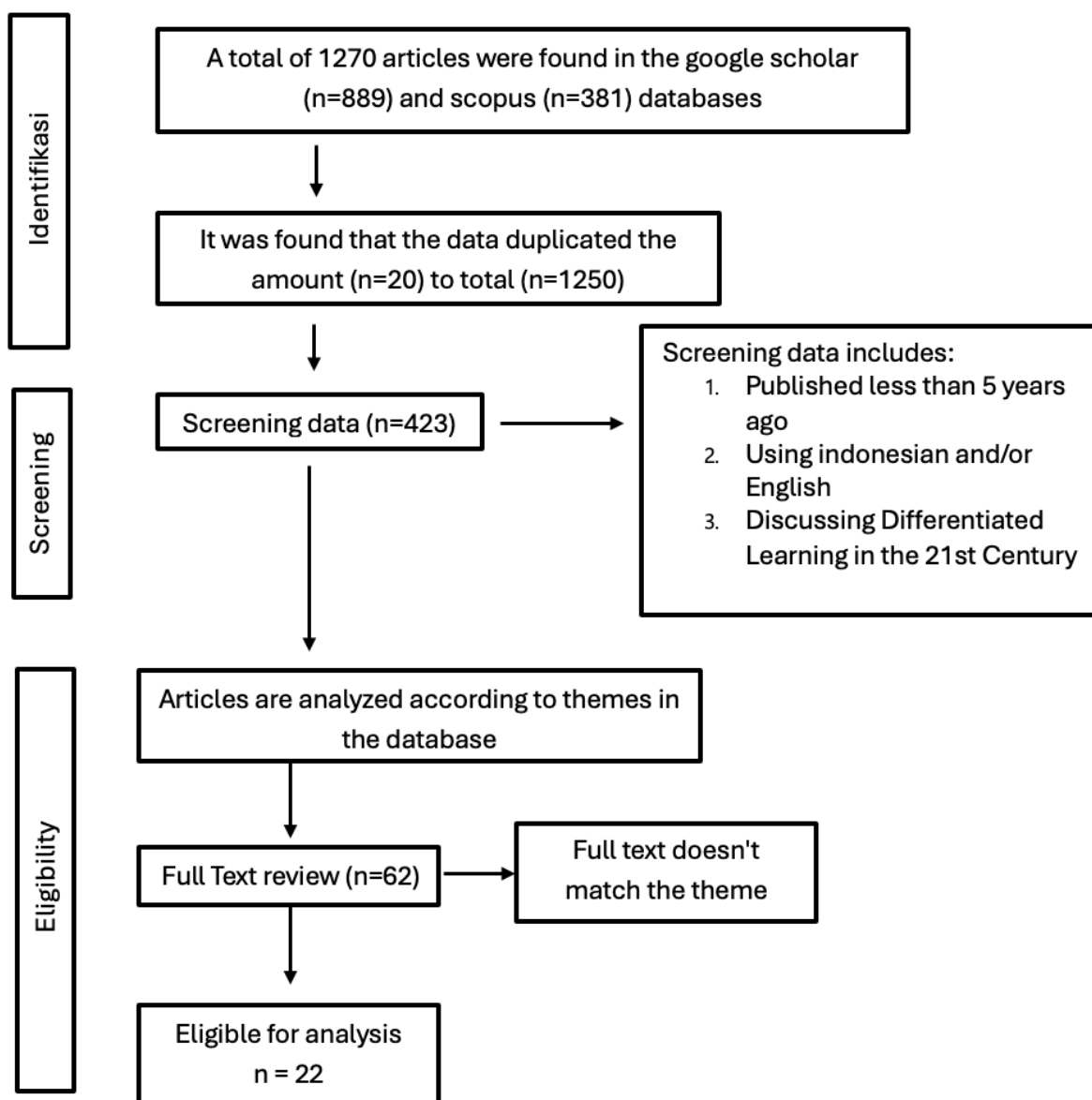
**Tabel 2 Inclusion and Exclusion Criteria**

| Inclusion Criteria  | Exclusion Criteria  |
|---|---|
| <b>Journal Articles</b>   | Books, Magazines, and websites.                                   |
| <b>Articles published in the last 5 years (from 2019 to 2024)</b>     | Articles published over the last 5 years                          |
| <b>Using English and/or Indonesian</b>                                | Using Indonesian that is not standard, and or regional languages. |
| <b>Articles on Differentiated Teaching and 21st Century Learning.</b> | Discuss learning in general                                       |

Table 2 illustrates the articles selected for action based on inclusion and exclusion criteria. The full text of each article is downloaded, and articles that meet the exclusion criteria are excluded. In other words, the included articles are reviewed and analyzed in depth to answer the research questions. Therefore, the determination of inclusion and exclusion criteria is essential to create a high-quality research study.

In this research, the screening phase used Covidence- systematic review management and was extracted with Mendeley tools and references. The use of Mendeley and Covidence in a Systematic Literature Review (SLR) provides a structured, efficient, and transparent approach to managing academic sources. Mendeley serves as a powerful reference manager, enabling researchers to collect, organize, and annotate relevant studies efficiently. Meanwhile, Covidence offers a specialized platform that streamlines the review process through systematic screening, eligibility assessment, data extraction, and synthesis aligned with PRISMA standards. By integrating both tools, researchers ensure greater rigor, accuracy, and accountability in their review process, which ultimately enhances the quality and credibility of the research findings.

### ARTICLE IDENTIFICATION



### RESULTS AND DISCUSSIONS

The PRISMA diagram above shows the process of selecting articles for analysis in research focused on differentiated learning in the 21st century. Starting from the identification stage, 1,270 articles were found from the Google Scholar (889 articles) and Scopus (381 articles) databases, which after the removal of duplication (20 articles) resulted in 1,250 unique articles. Of these, 423 articles passed the initial screening stage with the criteria: published in the last 5 years, written in Indonesian or English, and relevant to the theme of differentiated learning. Furthermore, 62 articles passed the feasibility assessment stage through a full-text

review, but 40 were excluded because they did not fit the research theme. Finally, 22 articles deemed worthy and relevant were included in further analysis. This process demonstrates a systematic and structured approach to sift through the studies that are most relevant to the research topic. Here are 22 articles that meet the inclusion criteria with Scopus and Sinta Accreditation:

**Table 3**  
**22 Included articles**

| No | Journal Name   | Writer  | Journal Title   |
|----|--|---|---|
| 1  | Forum for Linguistic Studies 2024, 6(2), 1178.   | Sofiana, N., Andriyani, S., dkk.  | The implementation of differentiated learning in ELT: Indonesian teachers' readiness. <i>Forum for Linguistic Studies</i> ,   |
| 2  | <i>Jurnal Ilmiah Peuradeun</i> , 12(2), 517–538  | Samsudi, Suprpto, E., Utanto, Y. dkk  | Unraveling the Merdeka Curriculum: Exploring Differentiated Instruction'S Impact on Student Learning  |
| 3  | <i>Jurnal Teknologi Pendidikan: 1(1): 1-9</i>  | Adiniyah, N., & Utomo, A. P.  | Implementasi Model Project Based Learning Berdiferensiasi berdasarkan Kesiapan belajar Peserta Didik pada Materi Sistem Imun Kelas XI SMA. <i>Jurnal Teknologi Pendidikan</i> |
| 4  | <i>International Journal of Evaluation and Research in Education</i> , 11(1), 459–466          | Magableh, I. S., & Abdullah, A.   | Differentiated instruction effectiveness on the secondary stage students' reading comprehension proficiency level in Jordan   |
| 5  | <i>Journal of Education and Learning</i> , 19(1), 241–248.                                     | Rijal, A., Aswarliansyah, & Waluyo, B                                       | Effectiveness of differentiated learning in mathematics: insights from elementary school students.  |
| 6  | <i>International Journal of Learning, Teaching and Educational Research</i> 4(7).              | Wardani, K., & Darmawan, P.   | <i>Pembelajaran Berdiferensiasi Sebagai Pendekatan Keragaman Peserta Didik Untuk Memenuhi Target Kurikulum.</i>   |
| 7  | <i>International Journal of Language Education</i> , 8(2), 370–383.                            | Halil, N. I., Yawan, H., Hasanah, A. N., Syam, H., & Andas, N. H.           | <i>A New Program to Foster Inclusion: Unraveling Language Teachers' Pedagogical Practices to Differentiated Instruction.</i>  |
| 8  | <i>International Journal of Learning, Teaching and Educational Research</i> , 22(10), 433–452. | Hasanah, E., Al Ghazy, M. I., Suyatno, S., dkk                              | <i>Unlocking Classroom Potential: Exploring the Mediating Role of Teacher Mindset on Embracing Differentiated Instruction.</i>  |
| 9  | <i>Asia-Pacific Education Researcher</i> .   | Subban, P., Suprayogi, M. N., Preston, M., Liyani, A. N., & Ratri, A. P. P. | <i>Diferentiation is Sometimes a Hit and Miss". Educator Perceptions of Differentiated Instruction in the Higher Education Sector.</i>  |
| 10 | <i>Jurnal Ilmiah Peuradeun</i> , 12(2), 517–538.   | Samsudi, Suprpto, E., Utanto, Y., Rohman, S., & Djafar, T.                  | <i>Unraveling the Merdeka Curriculum: Exploring Differentiated Instruction'S Impact on Student Learning.</i>  |
| 11 | <i>Jurnal Penelitian Pendidikan IPA</i> , 9(9), 7427–7433                                      | Prihandono, T., Supriyono, A., Abdillah, U. F., & Sudarti, S.               | <i>Analysis of Differentiate Learning with Classroom Action Research to Improve Physics Activities and Outcomes.</i>  |
| 12 | <i>International Journal of Learning, Teaching and Educational Research</i> , 18(8), 2019      | Suyatno, Mardati, A., Wantini, Pambudi, D. I., & Amurdawati, G.             | <i>The impact of teacher values, classroom atmosphere, and student-teacher relationship towards student attitude during learning process.</i>                                 |



|    |   |   |   |
|----|---|---|---|
| 13 | <i>Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini</i> , 7(6), 6493–6504.                    | Motimona, P. D., & Maryatun, I. B.  | Implementasi Metode Pembelajaran STEAM pada Kurikulum Merdeka pada PAUD.  |
| 14 | <i>Journal of Elementary Education</i> , 5(1), 2614–1752. 2021                                | Amaliyah, A., & Rahmat, A.  | Pengembangan Potensi Diri Peserta Didik Melalui Proses Pendidikan.  |
| 15 | <i>Jurnal Pembelajaran, Bimbingan, Dan Pengelolaan Pendidikan</i> , 4(5) 2024                 | Supriana, E., Tita Liliani, N., & Zulfa Luthfia, R.   | Tantangan Implementasi Pembelajaran Berdiferensiasi : Sebuah Studi Literatur.   |
| 16 | <i>Journal of Learning, Teaching and Educational Research</i> , 18(8), 214–226. 2019          | Shareefa, M., Moosa, V., Zin, R. M., Abdullah, N. Z. M., & Jawawi, R.                         | Teachers' perceptions on differentiated instruction: Do experience, qualification and challenges matter? <i>International</i> |
| 17 | <i>Journal of Elementary Education</i> 30(1), 51–67   | van Geel, M., Keuning, T., Frèrejean, J., dkk   | Capturing the complexity of differentiated instruction. <i>School Effectiveness and School Improvement</i> ,                  |
| 18 | <i>Technium Social Sciences Journal</i> , 509–514.2023  | Octamaya, A., Awaru, T., Ridwan, M., Ahmad, S., & Sadriani, A.                                | Obstacles to Implementation of Differentiation Learning in Sociology Subjects.  |
| 19 | <i>International Journal of Evaluation and Research in Education</i> , 13(2), 1194–1204. 2024 | Anggoro, S., Fitriati, A., Thoe, N. K., Talib, C. A., & Mareza, L.                            | Differentiated instruction based on multiple intelligences as promising joyful and meaningful learning..                      |
| 20 | <i>Prasi</i> , 17(1), 11–21.  | Mirawati, I. G. A., Suwastini, N. K. A., Haryanti, N. D., & Jayantini, I. G. A. S. R. (2022). | Differentiated Instructions: Relevant Studies On Its Implementation.  |
| 21 | <i>Jurnal Pendidikan IPA Indonesia</i> , 12(4), 625–634. 2023                                 | Putra, G. S., Pribadi, A., & Zakiyah, S.  | The implementation of differentiated learning in ELT: Indonesian teachers' readiness. <i>Forum for Linguistic Studies</i> ,   |
| 22 | <i>Journal of Elementary Education</i> , 5(3), 2614–1752. 2022                                | Schwab, S., & Woltran, F.   | Unraveling the Merdeka Curriculum: Exploring Differentiated Instruction'S Impact on Student Learning                          |

## 1. RQ1 How to Implement Differentiated Learning in the 21st Century?

Differentiated learning can be applied through various strategies to meet the diverse needs of students. This includes: 1) setting personalized learning goals for each student based on their individual strengths, weaknesses, and interests; 2) use a variety of instructional methods, including hands-on instruction, group work, problem-based learning, and inquiry-based learning, to address a variety of learning styles; 3) provide adaptive materials that are appropriate to the complexity and difficulty level of students' abilities; 4) create flexible groups based on students' specific needs, such as ability level, interests, or learning styles, to ensure targeted instruction; 5) use different types of assessments, such as quizzes, projects, and presentations, to assess students' progress and provide feedback; 6) offer additional support, such as extra practice, one-on-one tutoring, or peer-to-peer collaboration, to students who need it; 7) encourage student-centered learning by allowing students to choose topics, set their own goals, and reflect on their progress; 8) encourage collaborative learning by

creating an environment where students can learn from and help each other; 9) provide personalized, constructive, and need-based feedback for each student, and give students the freedom to work at their own pace, and offer additional support or enrichment activities if needed (Sofiana et al., 2024).

Furthermore, Samsung et al., said that there are four elements that can be used to implement differentiated learning, namely content, processes, products, and learning environments (Samsudi et al., 2024a; Sofiana et al., 2024).

### **Content differentiation**

This process differentiation refers to the learning material that the teacher wants to convey to students. Content also includes resources or tools used to achieve learning objectives (Adiniyah & Utomo, 2023; Magableh & Abdullah, 2022) This approach involves variation in the organization and presentation of content, which includes ideas, knowledge, and skills that students are expected to master according to the curriculum (Rijal et al., 2025). In addition, content differentiation focuses on adjusting learning materials to suit the individual learning needs of each student. Content differentiation strategies can be differentiated into the level of readiness, interest, and learning style of students. Teachers as educators prepare learning media according to the learning needs of students (Wardani & Darmawan, 2024) In keeping with Tomlinson's concept, content differentiation involves tailoring teaching materials to meet the diverse learning needs, preferences, and abilities of each student in a classroom setting (Halil et al., 2024).

In other words, teachers must adapt their teaching methods and approaches to fit their students' preferences, individualities, and abilities. It is important for them to know the unique characteristics and preferences of each student, and to provide educational opportunities that meet their specific needs and interests. Furthermore, when incorporating differential learning, teachers should consider the appropriate steps to take, as this does not involve treating each student differently or categorizing them based on intelligence (Sofiana et al., 2024).

In this situation, teachers with an evolving mindset apply diverse and flexible strategies to meet the needs of students with different learning styles (Hasanah et al., 2023). Teachers try to make students comfortable in the learning process. The teacher provides a class agreement that is made by letting students determine for themselves the points that they will run through in the learning process. Students must understand the purpose of the class agreement, so the teacher explains it at the beginning. Then, the teachers provide questions

that can lead students to consider the ideas or agreements they need. After the class agreement was formed, the teacher gave a positive response to the students' cooperation (Halil et al., 2024).

In addition to the learning agreements that have been made, teachers also use content differentiation strategies by offering a variety of teaching materials. This pedagogical approach is designed to address the diversity of learning styles and preferences of students in the classroom. These materials cover a wide range of media, including traditional print sources, digital media, hands-on activities, and additional materials from various Education platforms (Halil et al., 2024). Teachers use innovative teaching methods and engage students. Includes the use of games, software applications, new teaching strategies, and social media platforms (Subban et al., 2024).

Teacher strategies involve the use of a variety of resources during the preparation stage of materials, not only the existing teaching modules but also a variety of additional references from the Independent Learning Platform and best practices shared by fellow teachers. This deliberate effort ensures that the teaching materials are rich and varied, thus increasing the effectiveness of the learning experience. In addition, teachers use a variety of presentation formats in the classroom, including videos, PowerPoints, and PDF documents derived from existing learning modules (Halil et al., 2024).

Student-oriented focus has been shown to work more effectively as a means of differentiating instruction to accommodate student diversity. Aspects such as choice, formative assessment, and soft skill embedding, all prove effective when engaging students in the learning and teaching process (Subban et al., 2024).

### **Process Differentiation**

Process differentiation is a flexible approach to learning, where teachers adapt teaching strategies and approaches to meet the diverse learning needs of each student. Thus, students can practice and internalize learning materials more effectively. This involves adjusting the pace, providing varied learning paths, utilizing alternative assessment modalities, and implementing flexible grouping strategies (Halil et al., 2024; Rijal et al., 2025). Process refers to the way the teacher teaches and the methods used by students to learn. This involves teaching strategies and applied learning approaches (Adiniyah & Utomo, 2023; Magableh & Abdullah, 2022).

One example of process differentiation is giving students the option to learn through modules or videos. This approach accommodates diverse learning preferences and allows

students to better understand concepts. Additionally, the use of a variety of teaching methods, such as individual, pair, and group work, can help teachers gauge students' readiness levels and provide more effective instruction. (Halil et al., 2024).

Although teachers know how each student learns, assignments may not always be suitable for them. So, teachers need to communicate directly with students to know their difficulties and offer other ways to complete assignments. Teachers should focus on getting students involved and understanding, as well as tailoring lessons to each student's needs and interests. Teachers should also be flexible and adjust what is expected of students and when assignments should be completed, depending on the student's readiness. Teachers must be willing to help students who need additional time to complete assignments, and focus on the student and consider their learning pace and comfort (Halil et al., 2024)

In addition, teachers' assessments of student engagement, whether through physical movement around the classroom or through enthusiastic interactions, serve as an important means of ensuring that all students actively participate and benefit from the different instruction provided (Halil et al., 2024). The data obtained from this assessment can help teachers to adjust process differentiation strategies more effectively. Process differentiation focuses on adjusting the learning method to suit the individual learning needs of each student. Thus, process differentiation aims to create a conducive and inclusive learning environment. Some of the ways that can be used in process differentiation are: a). Providing different levels of difficulty in learning activities, b). Compiling guide questions with different levels of complexity related to students' interests, c). Making an agenda that contains a list of tasks, the time needed to do the assignment and giving students the freedom to organize the way they learn, d). Collaborating with various learning methods and providing a choice of activities that are varies according to the learning style of the learner (Wardani & Darmawan, 2024).

### **Product differentiation**

Product differentiation is a way for students to demonstrate what they have learned in lessons. This can be an assignment, project, presentation, or any other form used to express a student's understanding (Adiniyah & Utomo, 2023; Magableh & Abdullah, 2022). Rijal, et al., also said that product differentiation is a method to differentiate between student learning output and the results of application and further development of knowledge obtained (Rijal et al., 2025). In other words, product differentiation means giving students the freedom to express their understanding in a variety of ways. For example, instead of expecting all

students to produce the same type of final product, such as a written essay or test, teachers can offer a variety of options that cater to different learning styles, interests, and abilities (Halil et al., 2024).

In addition, the implementation of assignments is differentiated according to the level of readiness of students in different groups. The completion requirements for these tasks vary depending on the assigned group and teachers categorize the tasks based on the results of the pre-assessment. Teachers also use thematic tasks that vary in learning. These assignments are created with students' interests, hobbies, and academic readiness in mind (Halil et al., 2024).

These product differentiation approaches, when combined with proper assessment, can have a positive impact on student learning. Samsudi, et al., revealed that students have a positive perception of the use of different assessments in differentiated learning. This approach also significantly improves student performance as measured before and after learning (Samsudi et al., 2024a). The same research explains that differentiated in-teaching assessments focus on the learning process and have a positive impact on student learning outcomes (Samsudi et al., 2024a)

One way to implement differentiated assessments is to provide flexibility in completing tasks. In differentiating products, teachers expand the choice to students by offering a wide selection of assignment, project, or assignment submission methods, such as utilizing online platforms or submitting work manually. This approach accommodates diverse learning preferences and technology access levels, encourages inclusivity and empowers students to engage with the learning process in ways that best suit their needs. (Halil et al., 2024).

Flexibility in completing this task is in line with the broader concept of product differentiation. Product differentiation focuses on adjusting learning outcomes to suit the individual learning needs of each student. Product differentiation is also in the form of evidence obtained or studied, and understood by students. The products produced include two things: a) Various levels of interest, activities, topics, and themes to provide opportunities for students to learn various things and be able to find their interests, b) Learning products must be available in various formats and media to express learning according to students' wishes. Learning products must provide space for learners to show creativity in expressing their learning (Wardani & Darmawan, 2024).

## Learning environment

Learning *Environments*: These environments can be physical (such as classrooms) or psychological (such as classroom environments). It is an atmosphere where teachers and students interact with each other with respect and appreciation, creating a strong learning community (Adiniyah & Utomo, 2023; Magableh & Abdullah, 2022).

In the context of differentiation, the learning environment refers to the overall atmosphere, both physically and emotionally, in the classroom. The teachers arrange various seating arrangements for students based on their readiness, interests, and learning style. Thus, they create a positive learning environment where students feel safe, comfortable, and relaxed, ensuring that their educational needs are met. In addition, teachers are also ready to build a conducive and moral learning atmosphere. They do this by setting up special areas in the classroom, such as attendance zones, emoticon zones, private galleries, reading corners, and class agreements (Sofiana et al., 2024).

## 2. RQ2 How are differentiated learning outcomes in the 21st century?

Differentiated learning has a significant positive influence on student learning outcomes. This is supported by several studies, one of which is research conducted by Muh. Asriadi AM, et al., who stated that the application of differentiated learning produced a significant effect ( $g = 1,109, p < .01$ ) compared to learning in the control group. This shows that learning strategies tailored to students' individual learning needs and preferences can improve overall learning achievement (Muh. Asriadi et al., 2023). In line with the results of the research of Trapsilo Prihandono, et al., students' physics learning outcomes also increased significantly, with a 25% increase in classical learning outcomes. The average student score increased by 6.06, and the student's learning completeness level was above the minimum completeness criterion (Prihandono et al., 2023)

Increased student engagement. Students who engage in differentiated learning show higher interest and active participation in the classroom (Samsudi et al., 2024) In line with the results of the research of Trapsilo Prihandono, et al., which stated that there was an increase in student learning activities by 20.14%. This shows that students are more engaged in the learning process when an approach that suits their learning style is applied. (Prihandono et al., 2023) Improved understanding of the material. With a tailored approach, students can understand concepts better, as the material is delivered according to their learning style. (Samsudi et al., 2024b) Social skills development. Differentiated learning also

assists students in developing social skills, as they often work in diverse groups. (Samsudi et al., 2024b)

The results of the implementation of differentiated learning show that this approach can significantly improve learning outcomes, student order, and material comprehension. Although it requires high planning and flexibility from teachers, the long-term benefits for students are significant, especially in the development of critical thinking, collaboration, and confidence skills. Challenges in its implementation can be overcome with proper teacher training and adequate education system support.

### **3. RQ 3. What are the challenges faced in the implementation of differentiated learning in the 21st century?**

One of the duties of teachers is to carry out their role in maintaining and improving students. (Suyatno et al., 2019) Seriap's learning ability that is implemented has challenges that can hinder, including in implementing differentiated learning in the 21st century. Differentiated Learning is an alternative to implementing student-centered learning. (Amaliyah & Rahmat, 2021; Motimona & Maryatun, 2023) Based on the literature review that has been conducted, the results show various challenges obtained from the implementation of Differentiated Learning, including time management. (Supriana et al., 2024) In designing, implementing and evaluating a concept of differentiated learning requires proper time management. Teachers need readiness in various components so that the implementation of differentiated learning runs smoothly.

Another challenge that was found to be just as many was the need to improve human resources, especially teachers. (Shareefa et al., 2019) Differentiated learning is said to be a complex teaching skill, including content planning, student grouping, facilities, and materials in the curriculum (van Geel et al., 2019). This complexity overwhelms teachers to plan and manage learning experiences that suit students' needs (Octamaya et al., 2023). Improving the quality of teachers' human resources (HR) to carry out differentiated learning is important in the context of 21st century education, especially with the various demands for the quality and accessibility of education that is more inclusive and adaptive to the individual needs of students. Differentiated learning, which focuses on teaching that is tailored to the characteristics, interests, abilities, and needs of students, requires teachers to have qualified competencies, both in terms of pedagogy, classroom management skills, and professionalism.

The next challenge felt is when teachers manage larger classes. The ideal and effective number of students in a class is at 20 students. The researchers argue that the large number of students in one class makes learning ineffective because it cannot accommodate individual spaces and guidance from teachers to the maximum (Shareefa et al., 2019). A large number of learners allows teachers to manage the classroom well or even vice versa. (Anggoro et al., 2024b)

Then, implicated by the paragraph above, what is in the mind of a teacher is the fear and distrust of teachers towards differentiated learning. With the challenges that have been mentioned, teachers reportedly have their own fears regarding the new expectations of the implementation of learning that will be carried out. This is due to uncertainty about their ability to implement differentiated learning. (Tobin & Tippett, 2013)

There is a perception of students towards different treatment in each group. Different treatment of each student can have a negative impact on students' perception of justice. During the implementation of collaboration in learning, students can work on tasks of different levels of difficulty so that there is a perception of students that they are not treated equally (Mirawati et al., 2022) This becomes possible, if teachers do not have competence in teaching, so that unfair treatment in each learning group often occurs.

The next challenge lies in the implementation of differentiated learning on different material topics. Some teachers have the perception that not all material topics can be done with differentiated learning. Materials that are mathematical are said to be more difficult to differentiate learning compared to more conceptual materials. (Putra et al., 2023) With the difference in topics and materials in the classroom, teachers have obstacles in carrying out differentiated learning.

The last challenge is the assumption that differentiated learning through homogeneous groupings, will prevent communication between diverse students. Research states that homogeneous grouping of students, as occurs in differentiated learning, has little positive effect on students' academic achievement. Homogeneous grouping is also said to be at risk of preventing students' opportunities to communicate with diverse students (Schwab & Woltran, 2023).



## CONCLUSION

Differentiated learning has been shown to be effective in improving student engagement, material comprehension, and social skills through strategies that tailor content, processes, products, and learning environments to the individual needs of students. This approach supports a more inclusive and humanistic education, in accordance with the principles of the Independent Curriculum. The implementation of differentiated learning faces a variety of challenges, including time management, limited teacher competencies, large student numbers, students' perceptions of fairness, and difficulties in applying differentiation to certain topics.

To overcome these challenges, more in-depth teacher training and competency development, support from the education system, and better classroom management are needed. Teachers should also be trained to integrate differentiation strategies more flexibly and effectively in the classroom. This article makes a significant contribution by identifying differentiated learning strategies that are relevant to 21st-century education. This research also strengthens the importance of the role of teachers as agents of change in realizing education that is oriented to student needs and humanistic values.

## ACKNOWLEDGEMENT

The writers would like to express their greatest gratitude to all authors who have contributed substantially to the manuscript. Ardiansyah Lubis wrote the first draft and contributed to data analysis and the revisions. Achmad Maulidi analyzed the data and contributed to the first draft, Thoriq Aji Silmi served as the corresponding author, and the revisions. Special thanks to Doctoral Lecturer Islamic State University of Sunan Ampel Surabaya, who has supported this research.

## REFERENCES

- Achmad, W. K. S., Rachman, S. A., Aras, L., & Amran, M. (2024). Differentiated instruction in reading in elementary schools: a systematic review. *International Journal of Evaluation and Research in Education*, 13(3), 1997–2005. <https://doi.org/10.11591/ijere.v13i3.27134>
- Adiniyah, N., & Utomo, A. P. (2023). Implementasi Model Project Based Learning Berdiferensiasi berdasarkan Kesiapan belajar Peserta Didik pada Materi Sistem Imun Kelas XI SMA. *Jurnal Teknologi Pendidikan*, 1(1). <https://doi.org/10.47134/jtp.v1i1.36>
- Aisah, D. N., Munandar, K., Wadiono, G., & Jannah, S. R. (2023). Mewujudkan Merdeka Belajar Melalui Pembelajaran Berdiferensiasi. *Jurnal Teknologi Pendidikan*, 1(3), 9. <https://doi.org/10.47134/jtp.v1i3.85>

- Al-Makahleh, A. A., Smadi, A. M., & Momani, M. (2023). The Effectiveness of a Training Program Using Differentiated Instruction to Improve the Reading Skill of Jordanian Third Graders With Learning Difficulties. *Theory and Practice in Language Studies*, 13(9), 2313–2322. <https://doi.org/10.17507/tpls.1309.18>
- Amaliyah, A., & Rahmat, A. (2021). Pengembangan Potensi Diri Peserta Didik melalui Proses Pendidikan. *Journal of Elementary Education*, 5(1), 2614–1752. <https://doi.org/https://doi.org/10.32507/attadib.v5i1.926>
- Anggoro, S., Fitriati, A., Thoe, N. K., Talib, C. A., & Mareza, L. (2024). Differentiated instruction based on multiple intelligences as promising joyful and meaningful learning. *International Journal of Evaluation and Research in Education*, 13(2), 1194–1204. <https://doi.org/10.11591/ijere.v13i2.24791>
- Balchin, K., & Bouzaki, F. (2022). Using Instructional Technologies to Cater for Individual Learner Differences. *International Journal of TESOL Studies*, 4(3), 111–124. <https://doi.org/10.46451/ijts.2022.03.09>
- Bi, M., Letzel-Alt, V., Pozas, M., Zhu, C., & Struyven, K. (2024). Chinese version of the teachers' attitudes towards differentiated instruction scale: an adaptation study. *Cogent Education*, 11(1). <https://doi.org/10.1080/2331186X.2024.2380166>
- Blegur, J., & Hardiansyah, S. (2024). Differentiation instruction publications in physical education: bibliometric analysis of the last ten years. *Journal of Education and Learning*, 18(3), 902–913. <https://doi.org/10.11591/edulearn.v18i3.21307>
- Gibbs, K., & Beamish, W. (2021). Conversations with Australian Teachers and School Leaders About Using Differentiated Instruction in A Mainstream Secondary School. *Australian Journal of Teacher Education*, 46(7), 97–113. <https://doi.org/10.14221/ajte.2021v46n7.6>
- Halil, N. I., Yawan, H., Hasanah, A. N., Syam, H., & Andas, N. H. (2024). A New Program to Foster Inclusion: Unraveling Language Teachers' Pedagogical Practices to Differentiated Instruction. *International Journal of Language Education*, 8(2), 370–383. <https://doi.org/10.26858/ijole.v8i2.64997>
- Hasanah, E., Al Ghazy, M. I., Suyatno, S., Maryani, I., & Mohd Yusoff, M. Z. (2023). Unlocking Classroom Potential: Exploring the Mediating Role of Teacher Mindset on Embracing Differentiated Instruction. *International Journal of Learning, Teaching and Educational Research*, 22(10), 433–452. <https://doi.org/10.26803/ijlter.22.10.24>
- Hidayat, R., & Patras, Y. E. (2024). Education transformation in Indonesia requires the implementation of differentiated learning. *International Journal of Evaluation and Research in Education*, 13(3), 1526–1536. <https://doi.org/10.11591/ijere.v13i3.27658>
- Magableh, I. S., & Abdullah, A. (2022). Differentiated instruction effectiveness on the secondary stage students' reading comprehension proficiency level in Jordan.

- International Journal of Evaluation and Research in Education*, 11(1), 459–466.  
<https://doi.org/10.11591/ijere.v11i1.21971>
- Mirawati, I. G. A., Suwastini, N. K. A., Haryanti, N. D., & Jayantini, I. G. A. S. R. (2022). Differentiated Instructions: Relevant Studies on Its Implementation. *Prasi*, 17(1), 11–21.  
<https://doi.org/10.23887/prasi.v17i1.41867>
- Motimona, P. D., & Maryatun, I. B. (2023). Implementasi Metode Pembelajaran STEAM pada Kurikulum Merdeka pada PAUD. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, 7(6), 6493–6504. <https://doi.org/10.31004/obsesi.v7i6.4682>
- Muh. Asriadi, A. M., Hadi, S., Istiyono, E., & Retnawati, H. (2023). Does differentiated instruction affect learning outcome? Systematic review and meta-analysis. *Journal of Pedagogical Research*, 7(5), 18–33. <https://doi.org/10.33902/JPR.202322021>
- Octamaya, A., Awaru, T., Ridwan, M., Ahmad, S., & Sadriani, A. (2023). Obstacles to Implementation of Differentiation Learning in Sociology Subjects. *Technium Social Sciences Journal*, 509–514. <https://doi.org/https://doi.org/10.47577/tssj.v50i1.9933>
- Oktaviani, D., & Satanti, S. (2024). Improving Unplugged Computational Thinking Skills Through Integrated Problem-Based and Differentiated Learning in Indonesia. *Acta Paedagogica Vilnensia*, 52, 93–110. <https://doi.org/10.15388/ActPaed.2024.52.10>
- Porta, T., & Todd, N. (2024). The impact of labelling students with learning difficulties on teacher self-efficacy in differentiated instruction. *Journal of Research in Special Educational Needs*, 24(1), 108–122. <https://doi.org/10.1111/1471-3802.12619>
- Pramono, S. W., Ahdiani, U., & ... (2021). Tata Kelola Karya Cipta Sekolah Melalui Digitalisasi Upaya Bakti Bagi Dunia Pendidikan. *Jurnal Pengabdian ....*  
<https://ejournal.umri.ac.id/index.php/PengabdianUMRI/article/view/2391>
- Prihandono, T., Supriyono, A., Abdillah, U. F., & Sudarti, S. (2023). Analysis of Differentiate Learning with Classroom Action Research to Improve Physics Activities and Outcomes. *Jurnal Penelitian Pendidikan IPA*, 9(9), 7427–7433.  
<https://doi.org/10.29303/jppipa.v9i9.3426>
- Putra, G. S., Pribadi, A., & Zakiyah, S. (2023a). Differentiated Instruction Scenario on Physics Learning: Reflection of Readiness and Future Implementation. *Jurnal Pendidikan IPA Indonesia*, 12(4), 625–634. <https://doi.org/10.15294/jpii.v12i4.48545>
- Rijal, A., Aswarliansyah, & Waluyo, B. (2025). Effectiveness of differentiated learning in mathematics: insights from elementary school students. *Journal of Education and Learning*, 19(1), 241–248. <https://doi.org/10.11591/edulearn.v19i1.21806>
- Samsudi, Suprptono, E., Utanto, Y., Rohman, S., & Djafar, T. (2024). Unraveling the Merdeka Curriculum: Exploring Differentiated Instruction’S Impact on Student Learning. *Jurnal Ilmiah Peuradeun*, 12(2), 517–538. <https://doi.org/10.26811/peuradeun.v12i2.1131>

- Schwab, S., & Woltran, F. (2023). *Obstacles to Differentiated Instruction (DI). Reviewing Factors Outside the Classroom that Contribute to Successful DI Implementation*. <https://www.researchgate.net/publication/372830808>
- Shareefa, M., Moosa, V., Zin, R. M., Abdullah, N. Z. M., & Jawawi, R. (2019). Teachers' perceptions on differentiated instruction: Do experience, qualification and challenges matter? *International Journal of Learning, Teaching and Educational Research*, 18(8), 214–226. <https://doi.org/10.26803/ijlter.18.8.13>
- Sirait, A. A., Basri, H., & Ab Rahman, Z. (2024). The Concept of Independent Curriculum Implementation: Realizing Humanistic Islamic Education Learning. *Educative: Jurnal Ilmiah Pendidikan*, 2(1), 1–10. <https://doi.org/10.37985/educative.v2i1.210>
- Sofiana, N., Andriyani, S., Shofiyuddin, M., Mubarak, H., & Candraloka, O. R. (2024). The implementation of differentiated learning in ELT: Indonesian teachers' readiness. *Forum for Linguistic Studies*, 6(2). <https://doi.org/10.59400/fls.v6i2.1178>
- Subban, P., Suprayogi, M. N., Preston, M., Liyani, A. N., & Ratri, A. P. P. (2024). Diferentiation is Sometimes a Hit and Miss". Educator Perceptions of Diferentiated Instruction in the Higher Education Sector. *Asia-Pacific Education Researcher*. <https://doi.org/10.1007/s40299-024-00904-8>
- Supriana, E., Tita Liliani, N., & Zulfa Luthfia, R. (2024). Tantangan Implementasi Pembelajaran Berdiferensiasi : Sebuah Studi Literatur. *Jurnal Pembelajaran, Bimbingan, Dan Pengelolaan Pendidikan*, 4(5). <https://doi.org/10.17977/um065.v4.i5.2024.9>
- Sutikno, J., Nasrulloh, A., Pranata, D., Hanif Pambayu, S., Kamaruzaman Syed Ali, S., Hardianto, D., Sutapa, P., Karakauki, M., & Wahyudin Pratama, K. (2024). *Improving students' learning motivation through differentiate learning in sports education subject Mejorar la motivación de aprendizaje de los estudiantes a través del aprendizaje diferenciado en la asignatura de educación deportiva*. 2041, 912–922.
- Suyatno, Mardati, A., Wantini, Pambudi, D. I., & Amurdawati, G. (2019). The impact of teacher values, classroom atmosphere, and student-teacher relationship towards student attitude during learning process. *International Journal of Learning, Teaching and Educational Research*, 18(8), 54–74. <https://doi.org/10.26803/ijlter.18.8.4>
- Tobin, R., & Tippett, C. D. (2013). Possibilities and Potential Barriers: Learning to Plan for Differentiated Instruction in Elementary Science. *International Journal of Science and Mathematics Education*.
- Van Geel, M., Keuning, T., Frèrejean, J., Dolmans, D., van Merriënboer, J., & Visscher, A. J. (2019). Capturing the complexity of differentiated instruction. *School Effectiveness and School Improvement*, 30(1), 51–67. <https://doi.org/10.1080/09243453.2018.1539013>

---

Wardani, K., & Darmawan, P. (2024). Pembelajaran Berdiferensiasi Sebagai Pendekatan Keragaman Peserta Didik Untuk Memenuhi Target Kurikulum. 4(7).  
<https://doi.org/10.17977/um067.v4.i7.2024.2>