

Effectiveness and Challenges of Differentiated Learning in Secondary School: A systematic literature review review

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ABSTRACT

This systematic review of the literature discusses the effectiveness and challenges of implementing differentiated learning (DI) in secondary schools. This study analyzed 16 articles published between 2019 and 2023 using the PRISMA protocol. The study's results indicate that DI is effective in enhancing academic achievement and student engagement, particularly in the classroom among students with diverse abilities. However, the main challenges include a lack of teacher training, limited resources, large class sizes, and insufficient planning time. The success of DI is supported by collaboration between teachers, professional training, and a positive attitude towards inclusion. This study suggests that further research is needed for the practical training of teachers and the long-term evaluation of DI, particularly in developing countries, as well as for online learning.

Keywords:

Differentiated Learning; Effectiveness; Challenge; Secondary school; Systematic Literature Review

INTRODUCTION

Education in the era of globalization demands a relevant and practical approach to learning, as students have diverse characteristics, learning styles, interests, and levels of understanding. However, the conventional methods applied today, where teachers teach as if there is only one student in the class, often bore students and lower their motivation (Safarati & Zuhra, 2023). Differentiated learning emerged as a solution to this problem by tailoring learning to the needs of students, encompassing their readiness, learning profiles, interests, and talents (Gusteti & Neviyarni, 2022).

Research by Nguyen et al. (2020) indicates that conventional methods often fail to meet the diverse needs of students, whereas differentiated learning can help reduce achievement gaps and increase student motivation in high school. Although effective, implementing differentiated learning requires careful preparation from principals and teachers, including understanding student characteristics, utilizing technology effectively, and planning that focuses on desired outcomes (March 2023).

Empirical studies such as those conducted by Syarifuddin and Nurmi (2022) and Laia et al. (2022) show that differentiated learning improves student learning outcomes at the junior high school (junior high school/ *Sekolah Menengah Pertama*) and high school (high school/ *Sekolah Menengah Atas*) levels (Safarati & Zuhra, 2023). However, challenges such as limited teachers' time, resources, and skills in implementing these strategies remain significant obstacles (Prihatini, 2023). To overcome this, support from schools in the form of providing resources and teacher training is needed so that the implementation of learning can run effectively and optimally.

Although considerable research has been conducted on differentiated learning, a gap remains in understanding the factors that support and hinder its implementation, particularly in secondary schools. Previous research tends to focus on only one aspect, such as partial implementation, effectiveness, or challenge, without providing a comprehensive picture of the results of recent studies (Apristi, 2023). The novelty in

this study lies in the synthesis of various recent studies that analyze supporting factors and obstacles in the implementation of differentiated learning in secondary schools, providing a more comprehensive picture through a systematic literature review approach (Peters et al., 2020)

Therefore, a systematic literature review is the right approach to interpret the findings of the research thoroughly. By examining the results of the research from 2019 to 2023, it is hoped that a clearer and more in-depth picture can be obtained regarding: (a) RQ 1: How is the effectiveness of differentiated learning in improving student learning outcomes in secondary school?, (b) RQ 2: What are the challenges faced by teachers in implementing differentiated learning in secondary schools?, (c) RQ 3: What factors affect the successful implementation of differentiated learning in secondary schools

METHOD

1. Search design

This study uses the *Systematic Literature Review* (SLR), with the initial step of collecting articles relevant to the topic (Apristi, 2023). The author also applies the PRISMA protocol to filter articles based on inclusion and exclusion criteria that are in accordance with the focus of the discussion, namely the effectiveness and challenges of differentiated learning in secondary school. (Tanjung et al., 2023).

Database search strategy

The data used in this study are scopus-indexed articles obtained from publish or peris 8. This study covers publications from 2019 to 2023 and obtained 108 articles that correspond to the scopus-indexed theme. between the two words will produce an article that contains those two words, as explained in the following table.

Table 1 Database search strategies

Filter	Information
Year	2019 -2023
Subject area	education
Search string	<i>Differentiated learning AND secondary school OR junior high school OR senior high school</i>
Source type	Journal
Language	English
Document type	Article (open access)
Rank type	Terindeks scopus

Furthermore, the article search process was carried out on January 11, 2025, using the Publish or Perish 8 application. The sorting process is carried out on the elements of titles, summaries, and keywords that are relevant to the theme and are not general. The search results show that there are 108 articles from Scopus detailed in the following table: (Herwulan Irine Purnama et al., 2023)

Table 2 Findings of articles from Scopus-indexed pop databases

Yes	Keywords	Quantity
1.	<i>Diferentiated learning AND secondary school</i>	77
2.	<i>Differentiated learning AND secondary school OR junior high school OR senior high school</i>	18
3.	<i>Differentiated learning AND junior high school</i>	11
4.	<i>Differentiated learning AND senior high school</i>	2
	Sum	108

2. Inclusion and exclusion criteria

The inclusion and exclusion criteria are an important step in the Systematic Literature Review (SLR) to determine which articles can or cannot contribute to the research. Only articles that meet the inclusion criteria will be used as a database for research. The following are the inclusion and exclusion criteria applied by the researcher in the article selection process.

Table 3 Induction and exclusion criteria

Criterion	Inclusion	Exclusion
Title and content of the article	Relating to differentiated learning in secondary school	Have irrelevant titles
Year of publication	Publications from 2019 to 2023	Publications outside the specified vulnerability
Types of publications	Journal articles only.	Reviews, editorial, and non-empirical studies
Language	English	Other
Article study area	Differentiated learning	Other
Participants	Teachers and secondary school pupils	Other
Accessibility	Full-text or open-access articles	Articles that require payment
Journal Index	Only articles that are indexed by scopus	Other

3. Screening and assessment for data feasibility

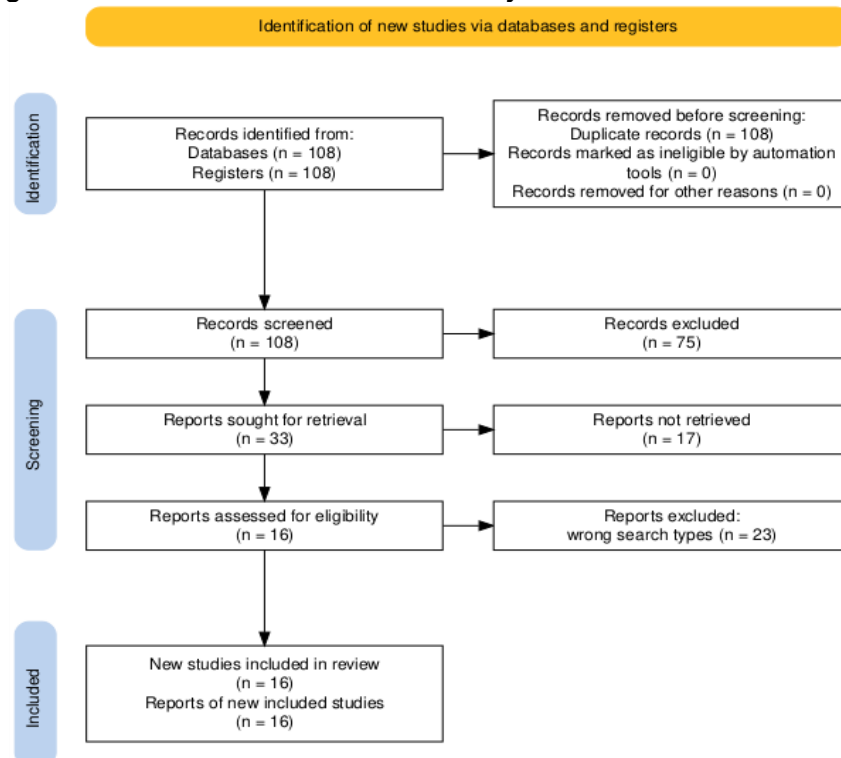


Figure 1. PRISMA Flow Diagram(Haddaway et al., 2022)

The initial stage in the article selection process is identification to ensure that there is no duplication of documents. Of the 108 articles obtained through the Scopus database, no duplication was found, so all articles were declared to

have passed the identification stage. The next stage is *screening*, which consists of two parts: selection based on titles, keywords, and abstracts, and selection based on full *text reading*. In the first stage of screening, 33 articles met the inclusion criteria, while another 75 articles were removed because they were not suitable. Furthermore, 33 articles that passed were re-selected through a thorough reading, and only 16 articles met the inclusion criteria. A total of 17 articles were eliminated because they did not meet the document access requirements. The final stage is the included stage, which is the reporting of the final number of articles that are worthy of analysis. Based on all stages of selection, 16 articles were obtained that will be further analyzed according to three research questions. Then the selected data is input to *vosviewers* to map the initial network of theme relevance.

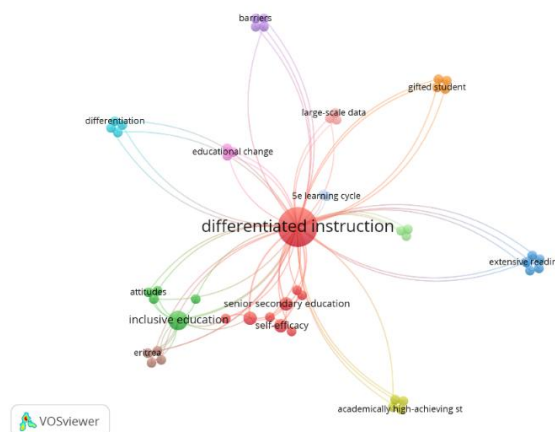


Figure 2 Network visualization co-occurrence

A visualization of the keyword network from the article "*The Effectiveness and Challenges of Differentiated Learning in High Schools: A Systematic Literature Review*" shows that the term "differentiated instruction" is the center of attention with a wide connection to various other educational concepts. This visualization shows the linkages between differentiated learning and a number of important topics, including *inclusive education*, *self-efficacy*, *gifted students*, *educational change*, *barriers*, and *academically high-achieving students*. This relationship indicates that differentiated learning is a complex and multi-layered approach, touching on various aspects of the secondary education system.

RESULTS AND DISCUSSION

Differentiated learning is getting more and more attention in the world of education, especially in high school. This approach effectively accommodates the diversity of students' learning styles, increasing their achievement and engagement. This study examines the effectiveness and challenges of its implementation, as well as the trends of scientific publications from 2019 to 2023. The following graph shows the trend of publications on this topic during the period.

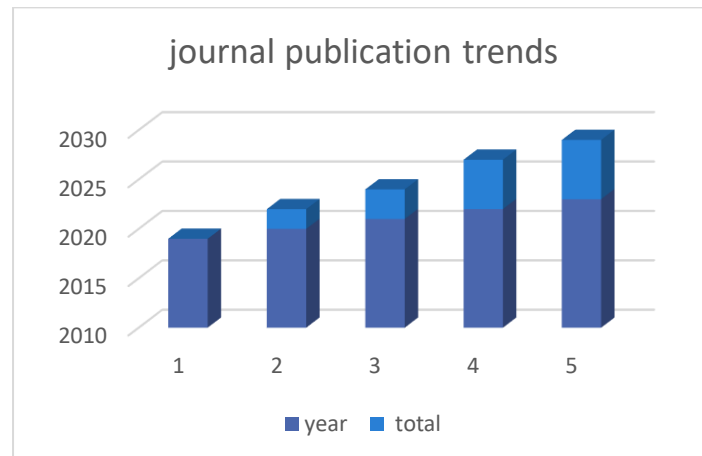


Figure 3 Publication trend images

Figure 3 shows the development of research on differentiated learning at the secondary school level from 2019 to 2023. The graph shows the number of article publications each year. With a total of 16 articles, the number of publications on differentiated learning in secondary schools has stabilized, but there has been an increase every year between 2019 and 2023. This trend is consistent with previous findings that differentiated learning is very effective in the world of education (Trenggono and Winarni, 2025). Of the 16 articles, all of them cover studies carried out in secondary schools in several countries, which are divided into two levels, namely junior high and high school. The graph below shows the number of studies available at both secondary school levels.

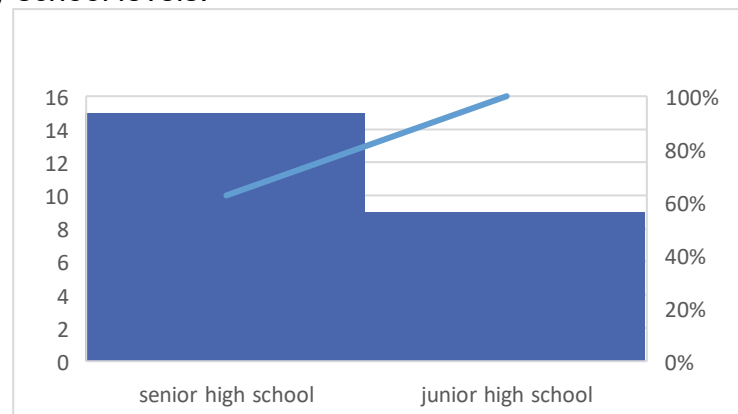


Figure 4. Proportion of high school level

The graph shows that more research on differentiated learning is conducted at the high school level (15 articles) than junior high school (9 articles). The cumulative percentage of articles showed that high school reached 95%, while junior high school was 55%, indicating that the focus of research was more dominant at the high school level. There are 12 countries with published articles discussing differentiated learning in secondary schools in the Scopus database.

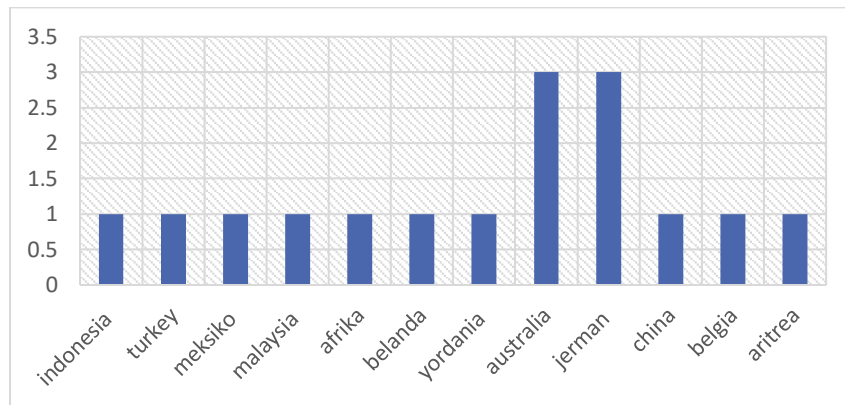


Figure 5. countries and number of article publications

Figure 5 shows the distribution of the number of publications of differentiated learning-related articles in high school by country. Based on the graph, the countries with the highest number of publications are Australia and Germany, each with 3 publications. Meanwhile, other countries such as Indonesia, Turkey, Mexico, Malaysia, Africa, the Netherlands, Jordan, China, Belgium, and Eritrea each contributed one publication.

Australia and Germany have the highest number of publications related to differentiated learning, demonstrating the strong commitment of both countries to the implementation and evaluation of DI in secondary schools. Germany, for example, adopted this approach to encourage equality and inclusion in the classroom (Gebauer & McElvany, 2020). In contrast to developing countries such as Indonesia, which are still in the early stages of implementing DI. Despite the interest, the main challenges in Indonesia are the lack of understanding of teachers, limited resources, and high administrative burden. (Sari et al., 2023)

1. The effectiveness of differentiated learning in improving students' academic achievement in secondary schools. Differentiated learning is a strategy that teachers use to tailor teaching to the diversity of students in an inclusive classroom. Several studies have shown that this approach is effective in improving students' academic achievement at the high school level. For example (Ibrahim Suleiman Magableh & Amelia Abdullah, 2022) shows that differentiated learning improves reading comprehension of 11th graders in Jordan. Likewise, (Salar et al., 2021) found that differentiated learning significantly improved the achievement of low- and middle-achieving students, while in high-achieving students, both methods provided equivalent outcomes. (Kamarulzaman et al., 2022) emphasized that this approach also has a positive impact on the development of talented and intelligent students' mathematical thinking. Other research shows that high school students use differentiated learning more often than elementary school students, which shows more intensive implementation at the secondary level (Pozas et al., 2021).

Table 1.5 Findings of the article summary of problem 1

Yes	Article title	Writer	Method	Result
1	Effect of Differentiated Instruction and 5E Learning Cycle on Academic Achievement and Self-efficacy of Students in Physics Lesson	Riza Salar, Umit Turgut	Kuantitatif, matching pre-test/post-test control group design	Differentiated learning improves the academic achievement of elementary and middle level students.
2	Differentiated instruction effectiveness on the secondary stage students' reading comprehension proficiency level in Jordan	Ibrahim Suleiman Magableh, Amelia Abdullah	Quasi-experimental, two-group pre-test/post-test	DI significantly improves the reading comprehension ability of high school students.
3	Impact of Differentiated Instruction on the Mathematical Thinking Processes of Gifted and Talented Students	Mohd Hasrul Kamarulzaman et al.	Quantitative, survey and math tests on 400 talented students	DI has a significant influence on the mathematical thinking process of talented students.
4	A change of perspective – Exploring Mexican primary and secondary school students' perceptions of their teachers differentiated instructional practice	Marcela Pozas, Claudia Jaquelina González Trujillo, Verena Letzel	Quantitative survey with mixed variance analysis (mixed ANOVA)	Students perceive teachers to apply DI practices, especially mastery learning, tutoring systems, and heterogeneous grouping.

2. The challenges faced by teachers in implementing differentiated learning in secondary schools.

Although differentiated learning is quite effective, challenges in its implementation remain. (Letzel et al., 2023), (Milinga et al., 2023) mentioning that the main challenge is the teacher's limited understanding and lack of resources, such as time, workload, and practical support. Other studies also revealed technical and practical difficulties in the implementation of DI, such as student supervision, the development of adaptive systems, as well as the need for social-emotional understanding and creating an inclusive learning environment (Hasanah et al., 2022), (Smets & Struyven, 2020). according to (Source: dkk., 2022), (Gibbs, 2023) and (Zerai et al., 2023) added that the biggest challenges are large classroom management, limited training, unsupportive student home conditions, and lack of workshops to improve DI skills. The implementation of direct DI has faced various difficulties, and this is even more complex when done online, as revealed by (Sun, 2023) which mentions that lack of direct interaction and limited media are the main obstacles.

Table 1.6 Findings of the Problem 2 Summary Article

Yes	Article title	Writer	method	Result
1.	A teachers professional development programme to implement differentiated instruction in secondary education: How	Wouter Smets & Katrien Struyven	Participatory action research, collaborative study with 4 teams of teachers, interviews and field notes	Teachers have successfully implemented various DI strategies, especially cooperative learning, but they are not optimal in responsive teaching and the use of responsive assessments is still not optimal.

Yes	Article title	Writer	method	Result
	far do teachers reach?			
2.	Challenging but positive! – An exploration into teacher attitude profiles towards differentiated instruction (DI) in Germany	Verena Letzel dkk.	Quantitative with cluster analysis of 450 teachers, attitude surveys and self-reports on the use of DI	3 profiles of teachers' attitudes towards DI were identified: valuing-teacher, non-valuing-teacher, challenged-but-valuing-teacher. There are significant differences in DI implementation between clusters.
3.	Differentiated instruction in L2 teaching: two extensive reading programmes conducted during COVID-19 pandemic	Xiaomei Sun	Exploratory case studies, interviews, surveys, teachers' reflective journals and documents (N=74+27)	DI is reflected in learning materials, processes, and products. The limitations of DI in the affective aspects and learning environment are due to online mode. The engagement gap between high-achieving and low-achieving students.
4.	Conceptual Model of Differentiated-Instruction (DI) Based on Teachers' Experiences in Indonesia	Enung Hasanah et al.	Phenomenological study, in-depth interviews of 12 junior high school teachers with purposive sampling	DI as learning that places students as subjects, provides a sense of physical and mental security, adjusts to the needs and potentials of students, builds a conceptual model of DI in Indonesia.
5.	Teachers' Perceptions of Differentiated Instruction for Academically High-Achieving Secondary School Students in Tanzania	Joseph Reginard Milinga dkk.	Multiple case studies, FGDs and interviews of 30 teachers in 4 schools specifically for high-achieving students	Teachers' perceptions of DI are limited, although they are in accordance with the international literature. Emphasis on the importance of teacher training to improve DI practices for high-achieving students in Tanzania.
6.	'I do not think I actually do it well': a discourse analysis of Australian senior secondary teachers' self-efficacy and attitudes	Tom Porta dkk.	Qualitative discourse analysis, semi-structural interviews of 5 high school teachers from 2 independent schools	Teachers know more about the DI strategy than the concept of the DI framework. Limited time and a sense of implementation failure affect teachers' attitudes and self-efficacy. Professional development needs are essential.
7.	Voices in practice: challenges to implementing differentiated instruction by teachers and school leaders in an Australian mainstream secondary school	Kathryn Gibbs	Qualitative study with semi-structural interviews of 7 teachers and 2 school leaders in one school	Teachers' barriers to DI implementation include limited resources, student behavior, limited time, a rigid curriculum, and lack of leadership support.
8.	The meanings of differentiated instruction in the	Desalegn Zerai dkk.	Qualitative narrative study, narrative	Teachers interpret DI as a caring orientation, a flexible pedagogical approach, a reflective process, a failed

Yes	Article title	Writer	method	Result
	narratives of Eritrean teachers		interviews of 18 elementary and secondary school mathematics and science teachers	effort, and a demanding approach. Most have a positive attitude despite limited resources.

3. What factors affect the successful implementation of differentiated learning in high school?

In the application of differentiated learning in secondary school, there are supporting and inhibiting factors. According to (Porta & Todd, 2022) and (Pozas & Letzel-Alt, 2023) Supporting factors include teacher collaboration, mutual reflection, trusting relationships with students, assignment choices, and professional development to master DI strategies. While the inhibiting factors are time constraints, large classes, rigid curriculum, strict external exams, planning documents that are difficult to change, and less practical DI training at universities. (Stollman et al., 2021) also revealed that DI is supported by a homogeneous group of students, the teacher's freedom to design materials, and the ability to recognize student needs. However, challenges arise from large and heterogeneous classrooms, rigid curriculum, limited planning time, and varying teacher readiness and confidence. The success of the implementation of DI is influenced by contextual factors, such as the type of school and subject. Teachers' trust in constructivist learning is also an important factor. However, high workloads and lack of training make teachers feel unprepared, which limits the effectiveness of DI (Pozas et al., 2020)

Table 1. 7 Findings of the article Summary Problem 3

No	Article title	Writer	Method	Result
1.	Teachers and differentiated instruction: exploring differentiation practices to address student diversity	Marcela Pozas, Verena Letzel, Christoph Schneider	Quantitative analysis of national survey data (German NEPS) with mixed ANCOVA	Teachers apply DI with low frequency;
2.	Teachers' Interactive Cognitions of Differentiated Instruction: An Exploration in Regular and Talent Development Lessons	Saskia Stollman dkk.	Qualitative study with stimulated recall interviews (SRI)	Teachers focus more on individuals and small groups on "talent" lessons;
3.	Teacher collaboration, inclusive education and differentiated instruction: A matter of exchange, co-construction, or synchronization?	Marcela Pozas & Verena Letzel-Alt	National quantitative survey (NEPS Germany) with mixed ANOVA and multi-stratified linear regression	Teacher collaboration is mainly in the form of material exchange; more intense forms of collaboration (synchronization, co-construction) have a positive effect on the implementation of DI.

No	Article title	Writer	Method	Result
4.	Differentiated instruction within senior secondary curriculum frameworks: A small-scale study of teacher views from an independent South Australian school	Tom Porta & Nicole Todd	Qualitative studies	Teachers understand DI as an adjustment of teaching according to the needs of students.

CONCLUSION

Differentiated learning has been proven to be effective in increasing achievement and motivation of students with different learning needs and styles. Although it is more personalized and inclusive, the main challenges in its implementation include limited time, resources, large classes, and a lack of teacher training. The success of the implementation is influenced by collaboration between teachers, positive attitudes towards inclusion, and support from school management. The researcher recommends that the next researcher focus more research on the development of practical and effective teacher training for differentiated learning, as well as the evaluation of its impact in the long term, including in the context of online learning.

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