

Challenges Faced by Science Teachers in Implementing Differentiated Learning in Junior High School Palu Central Sulawesi Indonesia

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Received: October 12, 2023

Revised: November 29, 2023

Accepted: December 25, 2023

Published: December 31, 2023

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DOI: [10.29303/jppipa.v9iSpecialIssue.6383](https://doi.org/10.29303/jppipa.v9iSpecialIssue.6383)

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Abstract: Within the ever-evolving scene of instruction, the usage of differentiated learning, an approach planned to cater to assorted student's needs, has picked up unmistakable quality. This article investigates the challenges experienced by science teachers as they explore the complexities of joining differentiated learning procedures into their classrooms in junior high schools in Palu, Central Sulawesi-Indonesia. A mixed-methods investigative plan, comprising overviews and interviews, was utilized to explore the encounters of science teachers. The quantitative stage uncovered that whereas a critical parcel of teachers grasped differentiated learning, they experienced challenges such as time limitations (80%), substance adjustment (50%), constraints to fitting educating assets (20%), students' resistance (30%), and inadequately proficient improvement (20%). The subjective stage gives in-depth experiences into these challenges, highlighting the requirement for imaginative procedures, progressing back, and asset accessibility to overcome them. The consideration underscores the significance of tending to these challenges to cultivate a more comprehensive and locks-in science teaching-learning environment that benefits both teachers and students.

Keywords: Differentiated Learning; Learning Strategies; Science.

Introduction

The world of instruction is advancing, and with it, the approaches to educating and learning are continually changing. In this time of personalized instruction, where the interesting needs and capacities of each student are recognized, differentiated learning has risen as a capable educational procedure. Differentiated learning tailors' instruction to the differing learning styles, interfaces, and capacities of students, advertising a promising way to upgrade their scholarly encounters. Whereas differentiated learning holds incredible potential, its usage is regularly met with a run of challenges. This article investigates the complicated travel of science teachers as they explore the

complexities of consolidating differentiated learning techniques into their classrooms. From the energetic nature of science itself to the different learning inclinations of students, the troubles confronted by science teachers in applying differentiated learning are multifaceted and require mindful thought. This examination sheds light on the interesting deterrents that science teachers experience and the techniques they utilize to overcome them, eventually cultivating a more lock-in and viable science instruction (Zendler & Greiner, 2020).

Within the domain of cutting-edge instruction, the one-size-fits-all approach is progressively giving way to more custom-made and viable educating strategies. Differentiated learning, an academic procedure that

How to Cite:

Napitupulu, N.D., Ratu, B., Walanda, D.K., & Napitupulu, M. (2023). Challenges Faced by Science Teachers in Implementing Differentiated Learning in Junior High School Palu Central Sulawesi Indonesia. *Jurnal Penelitian Pendidikan IPA*, 9(SpecialIssue), 960-966. <https://doi.org/10.29303/jppipa.v9iSpecialIssue.6383>

recognizes the differences in students' needs and capacities, has picked up noteworthy acknowledgment for its potential to upgrade learning involvement. In any case, the adoption of differentiated learning is not without its obstacles, especially in the field of science. Science teachers, entrusted with streamlining the complexities of this often-daunting subject, confront a one-of-a-kind set of challenges when endeavoring to execute separated learning in their classrooms (Copriady et al., 2021). The study dives into the complex scene of science instruction, shedding light on the troubles experienced by science teachers as they endeavor to meet the assorted needs of their students while guaranteeing a strong establishment in this essential science. From adjusting educational module materials to obliging shifted learning styles, we investigate the multifaceted impediments that science teachers must explore to provide the benefits of differentiated learning successfully.

Autonomous educational modules in Indonesia alludes to the independence that allowed schools to create their claim educational program, in expansion to the national educational modules (Crosthwaite et al., 2021). Differentiated learning, on the other hand, is a guidelines approach aimed at fitting instructing strategies and substance to meet the different needs of personal understudies (Lim & Park, 2022). Whereas these two concepts could seem distinct, they are interconnected within the taking after ways which are educational programs adaptability; Free educational programs permit schools in Indonesia to adjust and plan their claim instructive programs. Inside this system, schools have the opportunity to execute differentiated learning techniques (Haim et al., 2023). They can join different educating strategies, materials, and appraisals to cater to the special learning styles and capacities of their understudies. This adaptability engages instructors to adjust their instruction with the standards of differentiated learning. Differentiated learning is all approximately recognizing and pleasing the person learning needs of understudies. With autonomous educational programs, schools have the opportunity to create more personalized instructive plans (Jacobs et al., 2022). Teachers can make educational program components that consider the particular learning levels, interfaces, and capacities of their understudies, advancing a more custom-made instructive involvement. Autonomous educational module advancement often involves considering the nearby setting and community needs. This is often in line with the standards of differentiated learning, which emphasize the significance of setting and personal components within the learning preparation. Teachers can adjust their instruction with the social and social aspects of their students, making the learning encounter

more important and locking in the (Lyu et al., 2023). Differentiated learning includes employing an assortment of evaluation instruments to gauge students' understanding and advancement. An independent educational program can permit schools to select or plan evaluations that best suit their instructive objectives and the differentiated learning procedures in utilize. This may lead to more viable and significant evaluations that bolster the learning preparation (Pan et al., 2021). Autonomous educational programs frequently infer more prominent teachers' independence in choosing what and how they instruct. This independence can empower teachers to test with and adjust separated learning methods to suit their students' special needs and capacities (Joboshi & Oka, 2017).

Whereas autonomous educational programs and differentiated learning may at first appear irrelevant, they can work together to form a more student-centered and versatile instructive environment. This collaboration permits the fitting of instructive encounters to way better meet the different needs of understudies, eventually enhancing the quality of instruction within the Indonesian setting. Understanding these challenges helps improve the quality of education. Differentiated learning caters to diverse learning styles and abilities, making it crucial for effective education. Educators can refine teaching strategies by identifying obstacles to better meet students' needs. Effective implementation of differentiated learning positively impacts student learning outcomes. Recognizing barriers teachers face in executing this approach enables tailored solutions, fostering improved academic achievement and student engagement. Investigating these challenges aids in providing teachers targeted support and professional development opportunities. It enables the creation of specific training programs and resources to empower teachers to implement differentiated learning effectively.

Method

This study utilizes a mixed-methods (Fetters & Tajima, 2023) investigation plan to comprehensively examine the challenges confronted by science teachers ($n=10$, $M=4$; $F=6$) in executing differentiated learning. The investigation combined quantitative and subjective information collection and examination strategies to supply a well-rounded understanding of the issue. Studies were conducted on science teachers from a differing extend of schools (3 Junior High School) invited to take part in a web study. The overview incorporated 25 closed-ended questions to assemble statistical data and quantifiable information on the seen

challenges, recurrence of execution of separated learning, and its effect on student results.

Result and Discussion

The overview was given to 10 science teachers at three schools which are pilot schools in Palu, known as Sekolah Penggerak. These three schools are schools that are required to carry out differentiated differentiation in agreement with the requests for free educational modules, specifically the national educational modules in Indonesia.

The study information uncovered that 100% of the science teachers implemented differentiated learning techniques to a few degrees in their classrooms. Among these, 20% utilized it once in a while, whereas 60% utilized it frequently. In any case, 20% of the instructors detailed seldom or never utilized differentiated learning (Table 1).

Table 1. Implementation of Differentiated Learning

Time	Percentage (%)
Once in a while	20
Frequently	60
Seldom	20

Among those who executed differentiated learning, 90% accepted it had a positive effect on student engagement and understanding. 10% communicated blended or dubious sees on its adequacy. The foremost as often as possible cited challenges by science teachers shown in Table 2

Table 2. Challenges in Implementing Differentiated Learning

Challenges	Percentage (%)
Need of time for individualized instruction	80
Trouble in adjusting substance to distinctive learning levels	50
Inadequately getting suitable education assets and materials	20
Resistance from a few students who were not acclimated to this differentiated learning	30
Constrained proficient improvement opening on separated learning	20

The Challenges in Implementing Differentiated Learning can be seen in Figure 1.

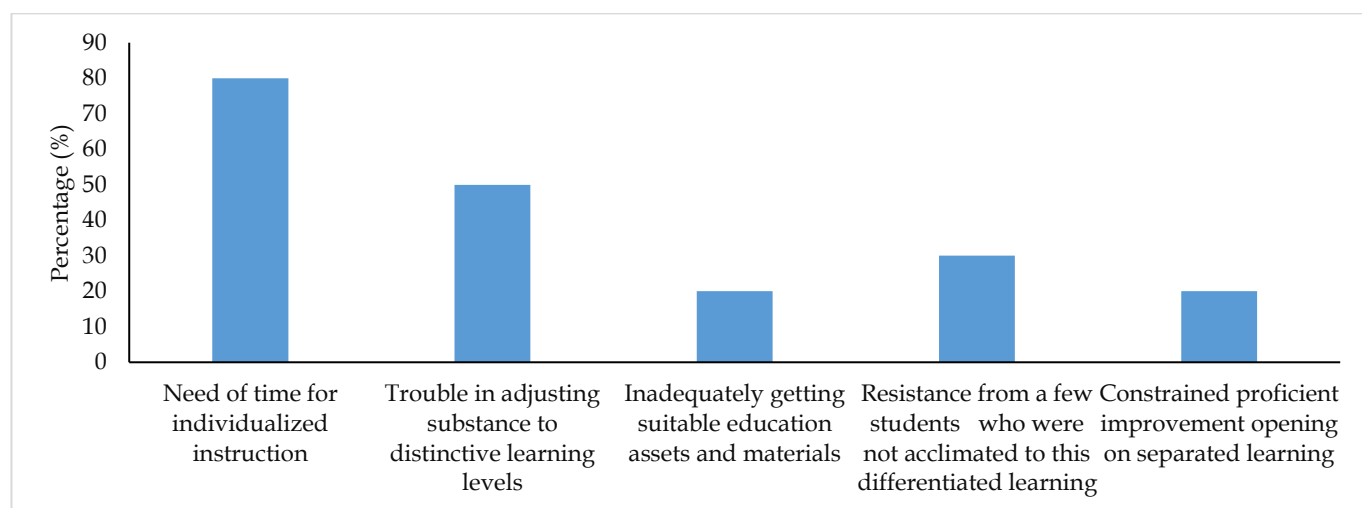


Figure 1. Challenges in Implementing Differentiated Learning

The need for time for individualized instruction could be a significant challenge that teachers confront when attempting to actualize differentiated learning. Differentiated learning is an approach that points to tailor instruction to the differentiated needs, capacities, and learning styles of person student inside a classroom (Tetzlaff et al., 2022). To overcome the need for time for individualized instruction, instructors may discover an adjustment between assembly educational program prerequisites and giving personalized learning encounters. This frequently includes cautious time administration, inventive lesson arranging, and the

utilization of innovation and instructing to streamline the guidelines handled.

Moreover, bolstering from directors and the school framework is pivotal. Schools and locale can give proficient improvement openings, diminish regulatory burdens, and energize a move in educational hones that prioritize differences. By recognizing the significance of personalized learning and giving the essential assets back, instructive teaching can aid teachers in addressing the challenge of time imperatives while executing differentiated learning viably (Yang et al., 2023).

Adjusting substance to diverse learning levels could be a basic component of differentiated learning, an

educating approach that points to cater to the differing needs, capacities, and inclinations of personal students inside the same classroom (Tamascelli et al., 2023). This handle can be challenging for teachers due to a few reasons such as differing students capacities (Fernández-Mesa et al., 2022), educational modules imperatives (Michailidi & Stavrou, 2021), asset confinements (Castillo & Hernandez, 2023), time limitations (Campbell et al., 2023), evaluation challenges (Marttinen et al., 2022), classroom administration (Baxter et al., 2014), proficient improvement needs (Cheng & Liu, 2022), and resistance from students (Rutten, 2021). Overcoming the trouble in adjusting substance to distinctive learning levels requires a combination of techniques, counting continuous proficient advancement, getting to suitable assets, time administration abilities, and a profound understanding of each student's special needs. It's moreover fundamental to form a strong school and locale environment that values and advances separated learning, which can help lighten a few of the challenges instructors confront in this endeavor. Deficiently getting to suitable instructing assets and materials may be a common challenge that teachers experience when endeavoring to execute differentiated learning. Educators can utilize online stages. Utilize online stages and open instructive assets (OER) to get to a wide cluster of instructing materials, counting versatile lesson plans, exercises, and appraisals (Hilal et al., 2022).

Resistance from some students who do not usually separate learning could be a common challenge that teachers may experience when actualizing this direction approach. Differentiated learning tailor's instruction to meet the different needs, interfaces, and learning styles of personal understudies (Carpenter et al., 2020). Teachers can assist students who end up more comfortable with and open to separate learning, eventually cultivating a more comprehensive and successful learning environment. Over time, numerous understudies may come to appreciate the benefits of this approach in terms of moving forward engagement, understanding, and individualized back. Constrained proficient advancement openings on differentiated learning allude to the challenges that instructors may face when seeking preparation, assets, and bolster to viably actualize this direction approach in their classrooms (Lillge & Knowles, 2020). Teachers can prepare themselves with the information and aptitudes required to actualize this academic approach viably, eventually profiting understudies by fitting instruction to a person's needs and capacities.

Within the interviews, numerous teachers emphasized the challenge of finding time to form and execute differentiated materials. The requests to cover the educational programs regularly cleared out restricted time for fitting instruction. Teachers

communicated that adjusting the science educational programs to cater to differentiated learning levels was a noteworthy challenge. They are famous that it required an in-depth understanding of students' capacities and inclinations. A few teachers highlighted the shortage of suitable resources and materials for differentiated learning, making it troublesome to supply assorted substances and exercises (Zhao et al., 2023). Whereas most students reacted emphatically to differentiated learning, a minority stood up to this approach, citing nature with conventional strategies. Teachers depicted the got to oversee students' desires and ease them into the unused educating fashion. Some teachers communicated a want for more proficient improvement openings centered on differentiated learning. They felt that picking up mastery in this zone would help them in overcoming the challenges they experienced.

The comes about of this sheds light on the challenges confronted by science teachers in executing differentiated learning (Krüger et al., 2022). The quantitative discoveries appear that a noteworthy parcel of science teachers have grasped differentiated learning to shift degrees. They see it as having a positive effect on student engagement and understanding. Be that as it may, a striking parcel of teachers remain hesitant to completely embrace this approach, and there are a few key challenges that they experience.

The foremost conspicuous challenge is the need for time for individualized instruction, which is reliable with past investigations in instruction Fields (Tetzlaff et al., 2022). The requests to cover the educational modules within a restricted period regularly make it difficult for teachers to supply custom-fitted instruction. This challenge is closely related to the trouble in adjusting substance to diverse learning levels, which requires a profound understanding of students' capacities and inclinations.

Asset impediments moreover posture a jump for science teachers. The shortage of fitting educational materials and assets for differentiated learning confines their capacity to broaden substance and exercises viably (Sattin-Bajaj et al., 2023). Additionally, student resistance to this unused approach, even though not a larger part, demonstrates the significance of overseeing desires and steadily presenting differentiated learning to understudies who are more acclimated to conventional strategies. The requirement for proficient improvement in differentiated learning is obvious from the discoveries (Schlatter et al., 2021). Teachers communicated a desire for preparing and bolstering to assist them in executing differentiated learning more successfully. This presents an opportunity for instructive education and policymakers to contribute to instructor-preparing programs centered on this academic approach.

Whereas differentiated learning offers significant benefits for understudy engagement and understanding, it isn't without its challenges for science instructors. Understanding and tending to these challenges is pivotal for the fruitful execution of separated learning in science classrooms. This study's discoveries can advise the advancement of bolster programs and assets to help instructors overcome these impediments and procure the total benefits of separated learning within the science instruction scene (Macariu et al., 2020).

Within the energetic scene of instruction, the interest in progressed education strategies is an ever-evolving journey. This consideration has dived into the challenges confronted by science teachers in their journey to execute differentiated learning, an educational approach planned to meet the differing needs of students. The discoveries reflect the nuanced encounters of science teachers and give important experiences into the deterrents they experience in this way of instructive development (Mohamed, 2022). One of the key discoveries of this consideration is that a noteworthy extent of science teachers has grasped differentiated learning to a few degrees, seeing it as a powerful instrument for improving students' engagement and understanding (Musengimana et al., 2022). This acknowledgment of the approaches potential underscores the commitment of educators to offer the finest conceivable learning involvement to their students. Be that as it may, the road to executing differentiated learning is not without its obstacles. The foremost unmistakable challenge is the perpetual issue of time limitations. The weight to cover the educational programs inside constrained timeframes frequently hinders instructors from completely realizing the potential of custom-fitted instruction. Adjusting substance to cater to the shifted learning levels of students is another noteworthy challenge. It requires a profound understanding of a student's capacities and inclinations, an assignment that requires both time and skill (Chan & Chen, 2022).

Conclusion

Whereas most students react emphatically to differentiated learning, a minority may stand up to this unused approach, frequently due to their nature with conventional instructing strategies. Teachers play a significant part in overseeing understudy desires and gradually presenting differentiated learning to make a more comprehensive learning environment. In addition, the requirement for comprehensive proficient advancement openings is obvious from the information. Science teachers communicated a craving for preparing and back custom fitted to the particular challenges of executing differentiated learning. This presents an

opportunity for instructive educators and policymakers to contribute to instructor-preparing programs that prepare teachers with the abilities and information required to actualize differentiated learning successfully. The challenges confronted by science teachers in executing separate learning are multifaceted but not unfavorably. Understanding and tending to these challenges is basic for the fruitful integration of differentiated learning techniques into science classrooms. The discoveries of this ponder give profitable direction for the advancement of bolster programs, assets, and proficient advancement initiatives that can enable science teachers to explore these challenges more viably. Eventually, such endeavors will contribute to making a more comprehensive and lock-in learning environment that benefits both instructors and understudies within the field of science instruction.

Acknowledgments

The participation of the science teachers of Junior High School (SMP BK, SMP 16, and SMP 18) in the research is highly appreciated.

Author Contributions

Conceptualization, designing research methodology, N.D.N, and M.N, Writing the initial draft of the manuscript, N.D.N, and D.K.W, data collection, conducting interviews, B.R, analyzing qualitative data, assisted in interpreting, D.K.W, literature review, synthesized research finding, M.N. All authors actively participated in discussions, data interpretation, and manuscript revisions. Collaboratively addressed the challenges faced by science teachers in implementing differentiated learning strategies, providing comprehensive insights into the educational landscape in Palu, Central Sulawesi, Indonesia. Ensured the research study's integrity, rigor, and relevance in contributing to the field of science education and pedagogy in junior high schools.

Funding

This research received no external funding.

Conflicts of Interest

The authors declare that the information provided in this research has no conflict of interest. We have no financial or personal relationships that might influence or bias our work, including any affiliations with organizations or entities with a vested interest in the outcomes of this research. There are no professional or personal interests that could impact our objectivity in conducting this research, analyzing the data, or presenting the results.

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