PPD
p-ISSN: 2406-8012 | e-ISSN: 2503-3530
PROFESI PENDIDIKAN DASAR

Analysis of Madrasah Ibtidaiyah Teachers' Understanding of Differentiated Learning Training for Merdeka Curriculum

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Submitted: 2021-00-00 Revised: 2021-00-00 Accepted: 2021-00-00		DOI: 10.23917/ppd.v7i2.11404

Keywords:

understanding concepts;

differentiated learning;

madrasah ibtidaiyah teachers

Abstract

Differentiated learning is crucial for addressing student diversity and ensuring all students have equal opportunities to achieve their learning objectives. Therefore, it is essential that teachers understand and implement these strategies in the classroom. This study analyzes Islamic primary school (Madrasah Ibtidaiyah/MI) teachers' understanding of differentiated learning. Using a mixed-methods approach, the research involved 54 MI teachers (10 male and 44 female) from 34 MI schools in Babat Lamongan, East Java. Instruments included written tests and interviews. The written test featured a pre-test and post-test via the Quizizz application, while interviews followed the differentiated learning training. Data analysis combined quantitative and qualitative techniques. Quantitative results showed that the MI teachers' conceptual understanding, measured by the N-gain score, was 0.078, categorizing it as low. However, qualitative findings revealed that, post-training, MI teachers demonstrated a solid understanding of all indicators: explaining concepts, identifying characteristics, providing examples and non-examples, and applying differentiated learning strategies. The study concludes that training in differentiated learning significantly enhances teachers' understanding. Regular and consistent training is recommended to sustain and further develop teachers' expertise in this area.

INTRODUCTION

Background of the Study

Curriculum changes are vital to meet the evolving needs of society and address the expectations and challenges of contemporary developments occur (Aprianti & Maulia, 2023; Forbes, 2013).

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However, while these changes can have positive impacts, they may also bring about negative consequences (Moscatello et al., 2017; Setiawati, 2022). On the positive side, curriculum changes help create a learning system that aligns with modern times. Conversely, rapid shifts can lead to a decline in student achievement (Aprillia et al., 2023; Hapsari, 2014). These impacts affect not only students but also teachers and schools (Aprianti & Maulia, 2023; Aprillia et al., 2023; Nurwiatin, 2022).

In 2022, Indonesia introduced the Merdeka curriculum, designed to be both teacher-centered and learner-centered (Maghfiroh & Sholeh, 2022). The Merdeka curriculum emphasizes essential material, character development, and learner competencies (Nurwiatin, 2022), with differentiated learning as a key feature (Hidayati & Sujarwati, 2023). Differentiated learning allows students to learn according to their interests, talents, and learning styles, thereby promoting success in education (Hidayati & Sujarwati, 2023). Its primary goal is to accommodate student differences, providing equal opportunities to achieve learning objectives through varied curricular approaches (Subban, 2006; Suwastini et al., 2021). Differentiated learning is also highly effective in fostering traits such as teamwork, patience, and motivation, as well as improving learning outcomes, conceptual understanding, and engagement (Dalila et al., 2022; Hidayati & Sujarwati, 2023; Lestari et al., 2023; Variacion et al., 2021; Wahyuni et al., 2023). Consequently, it is crucial for teachers to understand and implement differentiated learning in their classrooms (Mulyawati et al., 2022).

Conceptual understanding is a pivotal cognitive ability that encompasses a comprehensive and functional mastery of mathematical concepts (Fahrudhin et al., 2018). A strong foundation in conceptual understanding not only facilitates the learning of advanced material but also smooths the transition to higher levels of education. Furthermore, this ability is closely intertwined with the capacity to explain concepts effectively; individuals who possess a robust conceptual understanding are generally more capable of articulating these concepts with clarity (Badie, 2018). Conceptual understanding also plays a critical role in enhancing problem-solving abilities and improving overall learning outcomes (Marbun & Marbun, 2021; Zebua et al., 2023; Zulkarnain & Budiman, 2019).

The depth of teachers' conceptual understanding has a profound influence on their students. Specifically, it enhances students' grasp of concepts, fosters the development of problem-solving skills, and enriches their mathematical knowledge (Doerr & Thompson, 2004; Jacobson & Kilpatrick, 2015; Zebua et al., 2023). A deep conceptual understanding among elementary teachers, in particular, is strongly correlated with student achievement (Hegedus et al., 2016). Additionally, a significant positive relationship has been observed between teaching quality and the improvement of children's mathematical competencies (Dunekacke et al., 2024). Therefore, assessing and enhancing the conceptual understanding of elementary-level teachers, especially madrasah teachers, is crucial, as it directly impacts their students' conceptual development and has long-term implications for higher levels of education.

To elevate teachers' conceptual understanding, particularly within the framework of differentiated learning, it is essential to provide targeted training. Such training has been shown to significantly boost teachers' self-efficacy (Rachmawati et al., 2018). Moreover, differentiated learning training equips teachers with the knowledge and skills necessary to develop and implement differentiated learning strategies, thereby improving the overall quality of education (Yasir et al., 2023). This type of training also fosters collaboration among teachers, creates inclusive learning environments, and facilitates peer learning (Ria & Kurniati, 2023).

Problem of The Study

The conceptual understanding of differentiated learning by teachers is of paramount importance, as it has a direct impact on classroom instruction. Differentiated learning has been shown to be highly effective in fostering students' communication skills and critical thinking abilities (Sahril et al., 2021). Moreover, it plays a significant role in improving students' academic (Dalila et al., 2022; Hidayati & Sujarwati, 2023). Despite its importance, research suggests that the level of conceptual

understanding among teachers, prospective teachers, and students does not differ markedly (Anam et al., 2019). Teachers often exhibit a moderate level of conceptual understanding, while students' understanding is frequently at a moderate or even lower level (Khairani et al., 2021; Pasha & Aini, 2022; Rismen et al., 2021; Zebua et al., 2023). In light of these findings, it is crucial for teachers to be adaptable and innovative in designing and implementing instruction that addresses the diverse needs of their students. A deep understanding of differentiated learning and its practical application in the classroom is essential. To enhance teachers' pedagogical competence—particularly in crafting instruction that caters to various learning styles and the diverse abilities of students within the framework of the Merdeka Curriculum—it is imperative to provide training in differentiated learning.

Research's State of the Art

Understanding refers to a person's ability to use information meaningfully, which can be assessed through various indicators, such as the capacity to explain concepts in one's own words, apply information in novel contexts, and generate new analogies and generalizations generalizations (Ndani & Erita, 2023). Key dimensions of conceptual understanding include factual and procedural knowledge, connections, knowledge transfer, and metacognition. Supporting characteristics encompass engaging in meaningful learning activities, memorization, and addressing misconceptions (Mills, 2016). A solid grasp of concepts forms the critical foundation necessary for comprehending principles and theories across various fields (Prediger et al., 2023).Therefore, it is imperative for students to develop a robust understanding of the concepts that underpin these principles and theories. Conceptual understanding is a vital component of learning, as individuals with a strong conceptual foundation tend to exhibit enhanced problem-solving abilities (Nurani et al., 2021). A solid grasp of concepts is crucial for effectively addressing everyday problems and for avoiding significant mistakes related to the material being studied (Zebua et al., 2023). Moreover, conceptual understanding serves as the foundational bedrock for acquiring other essential skills.

Numerous studies have investigated teachers' conceptual understanding, with a particular focus on their grasp of material concepts in disciplines such as science and mathematics (Anam et al., 2019; Andayani et al., 2022). For instance, Andayani, Anam, and Handayani conducted a study examining the conceptual understanding of 105 prospective primary school teachers regarding the topic of digestion, finding that 45.12% of participants fell into the deficient category (Andayani et al., 2022). Similarly, a study by Anam, Widodo, and Sopandi, which involved 15 teachers, 33 prospective teachers, and 39 students, revealed that the ability to understand scientific concepts related to heat conduction did not significantly vary among these groups, with the majority of participants falling within the moderate to deficient levels (Anam et al., 2019) . In light of these findings, the present research focuses on teachers' understanding of the concept of differentiated learning.

Differentiated learning is an adaptive teaching method in which educators offer a variety of learning opportunities tailored to students' diverse backgrounds, readiness, interests, and profiles (Estaiteyeh & DeCoito, 2023). This inclusive instructional approach embraces pluralism and diversity, necessitating the integration of multiple variables to create an effective learning environment (Funk & Woodroffe, 2024). The implementation of the independent curriculum at the elementary school level encounters several significant challenges, particularly in cultivating the motivation among students and teachers to embrace and advance the curriculum (Fadhli, 2022). In its inaugural year, the independent curriculum revealed several deficiencies, including a lack of experience with autonomous learning, limited access to resources and educational materials, difficulties in time management, and inadequate qualifications and skills. Nonetheless, despite these shortcomings, the overall situation has shown signs of improvement (Iskandar et al., 2023). The gradual implementation of differentiated learning within the independent curriculum at the elementary school level has yet to reach its full potential in terms of effectiveness (Wiranti et al., 2023). This is evidenced by reports indicating that

not all students feel comfortable in the learning environment, the uneven development of both hard and soft skills among students, and a general lack of self-reflective ability among the student body.

Gap Study & Objective

Joseph et al., (2013) conducted a study on the application of differentiated learning among prospective teacher students. The findings indicated that these students responded positively to differentiated learning, demonstrating a better understanding compared to those in classes employing a comprehensive, whole-class instructional approach. Furthermore, these students expressed a readiness to implement differentiated learning upon graduation. However, expressing readiness alone is insufficient; teachers must possess a deep understanding of differentiated learning and the ability to design effective differentiated instruction. This is crucial because the successful implementation of differentiated learning is highly dependent on teacher expertise (Tapper & Horsley, 2017). Thus, the primary aim of this research is to provide teachers with a comprehensive understanding of differentiated learning.

Typically, differentiated learning implemented by teachers involves accommodating visual, auditory, and kinesthetic learning styles, ensuring that all students engage in similar activities that align with their preferred learning modes. Another common approach to differentiated learning addresses students' varying abilities by offering remedial support or enrichment opportunities. In the context of the Merdeka curriculum, differentiated learning is seen as a tool to meet students' needs based on their learning readiness, talents, interests, and individual learning profiles (Tomlinson, 2001). This differentiation can occur through adjustments in content, processes, and products. Although differentiated learning is not a novel concept, its application in teaching and learning activities remains relatively infrequent (Aprima & Sari, 2022). A review of existing research on conceptual understanding and differentiated learning reveals a dearth of studies focusing on teachers' conceptual understanding of differentiated learning, particularly in the context of differentiated learning training. Therefore, this study aims to analyze the conceptual understanding of madrasah ibtidaiyah teachers within the framework of differentiated learning training under the Merdeka curriculum.

METHOD

Type and Design

This study employed a mixed-method approach to analyze the conceptual understanding of *madrasah ibtidaiyah* classroom teachers participating in differentiated learning training for the independent curriculum. Mixed-method research combines qualitative and quantitative approaches (Cresswell, 2005). According to Sugiyono (2020), mixed-method research integrates both quantitative and qualitative methods within a single study, resulting in more comprehensive, valid, reliable, and objective data. The specific mixed-method approach used in this study is the explanatory sequential design, which involves first analyzing quantitative data, followed by qualitative data analysis.

The study's participants included 54 Islamic primary school (*madrasah ibtidaiyah* or MI) teachers—10 male and 44 female—who were members of the Teachers' Working Group (KKG) representing 34 MIs in Babat Subdistrict, Lamongan Regency, East Java. The participants consisted of vice principals for curriculum, Grade 1 teachers, and Grade 4 teachers. These grades were chosen because, in the 2023-2024 school year, all madrasah ibtidaiyah in Babat Subdistrict implemented the Merdeka curriculum specifically for these levels. Through purposive sampling, three teachers were selected for interviews to further explore the pre-test and post-test results.

Data and Data Sources

The data and sources for this research comprise primary data in the form of qualitative data, including written test results and interviews. The written test was designed to assess teachers'

understanding of differentiated learning concepts before and after training. The interviews served to clarify ambiguous data and provide deeper insights into the written test results. This research employed data triangulation, utilizing both source triangulation and technique triangulation.

Data Collection Technique

Data collection in this study occurred in two stages: written tests and interviews. The written test included a pretest administered before the differentiated learning training and a posttest given afterward. Once all teachers had completed both the pretest and posttest, interviews were conducted to further explore the written test results. The Quizizz application was used for administering the pretest and posttest, while the interviews took place following the differentiated learning training.

The written test consisted of five multiple-choice questions, each aligned with one of the five concept-understanding indicators used in this study: (1) explaining concepts, (2) identifying characteristics of concepts, (3) providing examples of concepts, (4) providing examples of non-concepts, and (5) planning differentiated learning (Dewi & Luthfah, 2020). Each indicator was translated into a question, resulting in a total of five questions focused on differentiated learning. The assessment criteria for the written test were categorized as "able" or "unable," as shown in Table 1.

The interview guide comprised 15 questions, distributed as follows: three questions on explaining concepts, five on identifying characteristics of concepts, two on providing examples of concepts, two on providing examples of non-concepts, and three on applying differentiated learning.

Table 1. Concept Understanding Criteria

Concept Understanding Indicator	Concept Understanding Criteria	
	Unable	Able
Explaining the concept	Explains the concept incorrectly	Explains the concept correctly
Listing the characteristics of the concept	Mention of 1 characteristic out of 2 characteristics or the characteristic has not been mentioned correctly.	Mentions at least 2 characteristics correctly, including student needs mapping and the use of multiple learning strategies to accommodate student needs
Providing an example of the concept	Provides an example of the concept inaccurately, or fails to provide one	Provides at least one correct example of the concept
Providing examples not concepts	Provides non-concept examples inaccurately, or fails to provide any	Provides at least one correct example of a non-concept
Implementing differentiated learning	Mentions strategies inaccurately, or fails to mention differentiated learning strategies.	Lists at least one appropriate differentiated learning strategy

Data Analysis

The data analysis for this research utilized both quantitative and qualitative techniques. The quantitative analysis involved descriptive statistics and the N-gain test to assess the effectiveness of differentiated learning training. This was achieved by calculating the difference between pretest and

posttest scores (Madyani et al., 2019). The gain scores were subsequently analyzed according to the categories outlined in Table 2.

Table 2. Categories of N-Gain Scores (Meltzer, 2002)

Score <g>	Category
(g) ≥ 0.7	High
0.3 < g ≤ 0.7	Medium
(g) ≤ 0.3	Low

The qualitative analysis followed the methodology proposed by Miles et al., (2020), which includes data collection, data display, and conclusion drawing. Data collection involved selecting, focusing, highlighting, coding, and categorizing relevant data. Data display entailed organizing the information to present a clear and comprehensive picture, which enabled the researchers to draw informed conclusions. In this study, data were classified and identified, with findings presented as a coherent, organized collection. This approach facilitated the interpretation of madrasah ibtidaiyah teachers' understanding of differentiated learning.

Finally, based on the analyzed data, the researchers drew conclusions regarding the conceptual understanding of differentiated learning among teachers in Islamic primary schools.

RESULTS

The research instruments for the written test and interview guidelines were validated by three experts—lecturers in mathematics education. These validators deemed the instruments suitable for use, subject to certain revisions. Specifically, they recommended transforming some questions into story problems and elevating the taxonomy level to a higher order of thinking (C4/analysis). After these revisions were made, the updated instruments were re-evaluated and approved by the same validators.

Table 3 below presents the percentage of correct answers for each indicator: 11% for Indicator 1, 6% for Indicator 2, 11% for Indicator 3, 5% for Indicator 4, and 11% for Indicator 5. The average correct response rate across all pre-test questions is 8.8%.

Table 3. Pre-test Results on Understanding the Concept of Differentiated Learning

Question no.	Concept Understanding Indicator	Number of correct answers	Percentage of correct answers
1	Explaining the concept	6	11%
2	Listing the characteristics of the concept	3	6%
3	Providing an example of the concept	6	11%
4	Providing examples not concepts	2	5%
5	Implementing differentiated learning	6	11%
	Average correct answer		8,8%

Following the pre-test, a training session on differentiated learning was conducted, beginning with an initial assessment. The objective of this training was to equip madrasah ibtidaiyah teachers with a comprehensive understanding of the principles of differentiated learning and to provide them with hands-on experience in conducting initial assessments and applying differentiated learning strategies in content, process, and product differentiation.

During the initial assessment training, various methods for identifying students' initial abilities—both cognitive and non-cognitive—were discussed. These methods included cognitive style tests,

learning style tests, aptitude and interest tests, and written assessments tailored to the material being taught. Several online applications and tools were also introduced to facilitate these assessments. The primary goal of conducting an initial assessment is to gauge students' ability levels and their potential to grasp the material (Azis & Lubis, 2023). Moreover, effective assessment is crucial for developing and implementing differentiated learning strategies (Ningsih & Fitriani, 2022; Setiawan et al., 2023).

Teachers were grouped according to their cognitive styles and learning interests. Each group was assigned a worksheet focusing on content-differentiated learning, process-differentiated learning, or product-differentiated learning. They were allotted 45 minutes to complete the worksheet and present their findings to other groups using the "work visit" method. Following the presentations, additional reinforcement was provided through detailed explanations of the different types of differentiated learning. At the conclusion of the training, a post-test was administered using the same questions as the pre-test. The results of this post-test, assessing the understanding of differentiated learning concepts among Madrasah Ibtidaiyah teachers, are presented in Table 4.

Table 4. Post-test results on understanding the concept of differentiated learning

Question no.	Concept Understanding Indicator	Number of correct answers	Percentage of correct answers
1	Explaining the concept	11	20%
2	Listing the characteristics of the concept	4	7%
3	Providing an example of the concept	13	24%
4	Providing examples not concepts	4	7%
5	Implementing differentiated learning	19	35%
	Average correct answer		19,2%

Table 4 shows that the percentage of correct answers for Indicator 1 is 20%, Indicator 2 is 7%, Indicator 3 is 24%, Indicator 4 is 7%, and Indicator 5 is 35%. The average correct response rate for the post-test questions is 19.2%, reflecting an improvement of 10.4% from the pre-test results. The comparison between pre-test and post-test percentages is illustrated in Diagram 1 below.

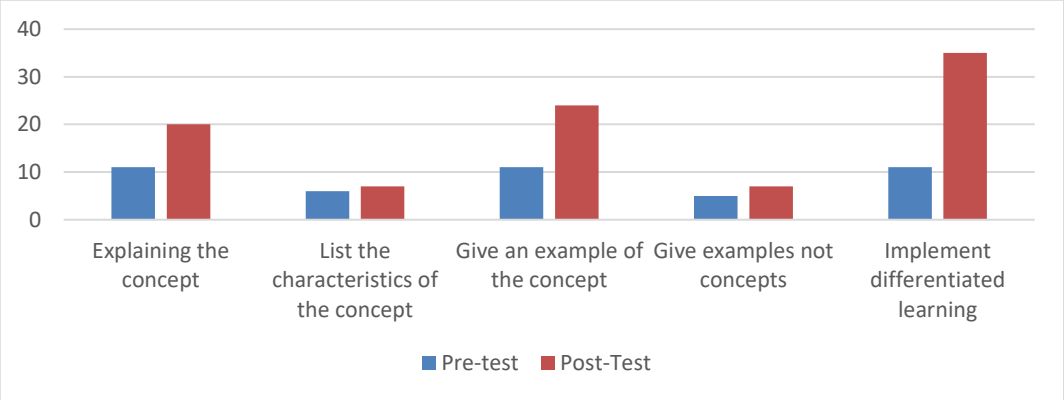

Diagram 1. Comparison of Pre-test and Post-test Results

Table 5. Categorization of N-Gain from the Concept Understanding Test

Pretest score	Posttest score	N-Gain	Categories
9,12	16,29	0,078	Low

Table 5 indicates that the N-Gain score for concept understanding of differentiated learning is 0.078, categorizing it as "low." While there was an improvement in the conceptual understanding of madrasah ibtidaiyah teachers following the Merdeka Curriculum Differentiated Learning training, their overall concept understanding remains within the low category.

The interview transcripts of three randomly selected subjects (SA, SB, and SC) are presented in Tables 6, 7, and 8. The coding for the interview transcript is as follows: P: Interviewer; SAa.b: Subject A, question a; Response to question b.

Table 6. Interview transcript of subject A

Concept understanding indicators	Interview Transcript	
Explaining the concept	P	" I'm going to ask you some questions related to your understanding of differentiated learning. First, have you ever heard the term 'differentiated learning' before?"
	$SA_{4.1}$	: " No, not yet."
	P	: " So, this is the first time you've encountered it?"
	$SA_{4.2}$	: "Yes, it's the first time."
	P	: "Based on what you practiced in the recent training, how would you describe differentiated learning?"
	$SA_{4.3}$	: "Um... Learning that... how do I put it... adapts to the child's interests and habits, so that from these differences, we can achieve better results".
Listing the characteristics of the concept	P	: " You've already practiced it before, right? So, when you implement differentiated learning in your class according to the independent curriculum, what's your plan?"
	$SA_{5.2}$	: "Um... God willing, I'll start by mapping the students' abilities and interests so that I can provide materials or learning methods that suit them."
	P	: "Okay. What are the characteristics of differentiated learning that you're familiar with?"
	$SA_{6.1}$	: " Um... From what I understand, it's about creating an environment where the child learns happily, so they can achieve the best possible outcomes."
	P	: "Alright. You mentioned earlier that differentiated learning involves mapping students' needs. What do you mean by mapping the needs of the learners?"
	$SA_{7.1}$	: "Um... for example, some children learn best visually, others are kinesthetic, and what's the other one?"
	P	: "Auditory."
	$SA_{7.2}$	: " Auditory, yes. So, for instance, a child who prefers visual learning might benefit more from videos. If they're auditory, maybe through songs or singing. And for kinesthetic learners, they might learn best through hands-on practice, like making products."
Providing an example of the concept	P	: "Okay. Can you give an example of differentiated learning?"
	$SA_{11.3}$	: " For example, as I learned earlier in the training... If we're teaching about transportation, a kinesthetic learner might be assigned to draw different means of transport. A visual learner could be asked to create a video, and for an auditory learner, the task could involve composing a song.".
	P	: " So, the media you mentioned included videos, right? And then there were pictures..."
	$SA_{11.4}$	: " Yes, and also singing."

Providing examples not concepts	P	: "Could you provide an example of "undifferentiated learning"?"
	$SA_{12.1}$	: "It's when everyone receives the same task, such as a transportation problem. The teacher assigns the same problem or question to the entire class. For instance, I complete the same worksheet page as everyone else."
	P	: "I see. So, this is an example of undifferentiated learning. Does this type of learning align with the implementation of the independent curriculum?"
	$SA_{13.1}$	: "No."
	P	: "No, understood."
Implementing differentiated learning	P	: "What strategies are employed to meet or adapt to the needs of students?"
	$SA_{8.1}$	: "Um... as I recall, there are three primary strategies: modifying the content, adjusting the process, and... what was the last one? Oh, yes, the product."
	P	: "Actually, there should be four strategies, including the learning environment."
	$SA_{8.2}$	: "Ah, yes, the learning environment."
	P	: "Indeed. Could you elaborate on what you mean by the learning environment? Specifically, how it can encourage students to learn."
	$SA_{9.1}$	: "Well... perhaps it involves creating a pleasant atmosphere, utilizing appropriate media, and providing effective learning aids."

In Table 6 and the interview transcript $SA_{4.3}$, it was observed that Subject SA was able to explain the concept of differentiated learning in his own words. Subject SA also accurately identified the characteristics of differentiated learning, as demonstrated in interview transcripts $SA_{6.1}$ and $SA_{7.1}$. Furthermore, Subject SA provided appropriate examples of both differentiated learning and non-differentiated learning, as illustrated in $SA_{11.3}$ and $SA_{12.1}$. Additionally, Subject SA successfully identified three out of the four strategies for implementing differentiated learning, as indicated in $SA_{8.1}$.

Table 7. Interview transcript for Subject B

Concept comprehension indicator	Interview transcript	
Explaining the concept	P	: "Do you know the term 'differentiated learning'?"
	$SB_{2.1}$	: "In my opinion, differentiated learning is an approach that addresses the diverse learning needs of students. This can be reflected in the varying learning styles, interests, and talents of the students."
	P	: "Differentiated learning is part of the implementation of the "Merdeka" curriculum. Could you elaborate on that?"
	$SB_{3.1}$	: "All learning should be based on the diversity of students' interests. So, before we start teaching, especially within the "Merdeka" curriculum, we as teachers must first understand the students' learning styles, interests, and talents."
Listing the characteristics of the concept	P	: "Could you mention the characteristics of differentiated learning?"
	$SB_{4.1}$	: "The key characteristic is that it is student-centered; we need to consider the unique learning needs of each student."

	P	: "How would you describe the process of mapping learning needs?"
	$SB_{5.1.}$	: It involves assessing aspects like learning readiness, learning profiles, and student skills."
Providing an example of the concept	P	: "Can you provide an example of differentiated learning?"
	$SB_{9.1}$	: "For instance, when teaching students to recognize animals, some may be shown visuals, others may listen to the sounds the animals make, while some may engage in kinesthetic activities, moving between stations to gather information and draw conclusions from the learning process."
	P	: "What media do you use to convey information in differentiated learning?"
	$SB_{10.1}$	: "I use online media, as students today are quite familiar with it. For example, we can use an LCD screen connected to the internet, with a laptop setup, or we could take them to the lab. Additionally, I incorporate tools and media that are visually appealing to foster student interest in learning."
Providing examples not concepts	P	: "Could you give an example of learning that is not differentiated?"
	$SB_{11.1}$	: "An example of non-differentiated learning would be when a teacher explains a topic in a one-directional manner, such as presenting material A without checking if all students have understood the content. This approach fails to account for the diverse learning needs of the students."
	P	: "How do you perceive undifferentiated learning within the implementation of the independent curriculum?"
	$SB_{12.1}$	: "Within the “Merdeka” curriculum, everything should be differentiated. However, in previous curricula, some teachers may have continued to use monotonous teaching methods."
Implementing differentiated learning	P	: "What strategies do you use to accommodate the needs of each student?"
	$SB_{6.1}$	: "There are content strategies, product strategies, and... I'm forgetting the third one."
	P	: "Could you clarify what is meant by a learning environment that encourages students?"
	$SB_{7.1}$	: "A learning environment should stimulate students' interest in learning. In other words, when students are placed in a conducive environment, their desire to learn should naturally grow. It is essential for teachers to create an environment that supports continuous learning."

Table 7 and interview transcripts $SB_{2.1}$ and $SB_{3.1}$ demonstrate that Subject SB was able to explain the concept of differentiated learning in his own words. Subject SB also accurately identified the characteristics of differentiated learning, as shown in interview transcript $SB_{4.1}$. Additionally, Subject SB provided appropriate examples of both differentiated learning and non-differentiated learning, as evidenced in interview transcripts $SB_{9.1}$ and $SB_{11.1}$. Furthermore, Subject SB was able to mention two out of the four strategies for implementing differentiated learning, as noted in $SB_{6.1}$.

Table 8. Interview Transcript of Subject C

Concept comprehension indicator	Interview transcript	
Explaining the concept	P	: "What is differentiated learning, ma'am? Could you explain it to me?"
	$SC_{1.1}$	: "Differentiated learning involves grouping students based on observations or questionnaires. We can group them according to their interests, talents, abilities, or other factors."
	P	: "How have you identified the needs of the students?"

	$SC_{2.1}$	: "There are two methods: first, through observation, and second, through a questionnaire or survey."
	P	: "What exactly is being mapped?"
	$SC_{2.2}$	: "We map out students' learning interests, talents, and skills."
Listing the characteristics of the concept	P	: "What are the characteristics of differentiated learning?"
	$SC_{6.6}$	: "I always start with a quiz. Every lesson includes a quiz."
	P	: "At the beginning?"
	$SC_{6.7}$	: "Yes, at the beginning of each lesson. The quiz helps me observe the students as well."
	P	: "So, the students are grouped according to the quiz results. What about content differentiation? For example, using videos?"
	$SC_{6.8}$	: "Yes."
	P	: "What else?"
	$SC_{6.9}$	: "Sometimes the students conduct observations themselves. For instance, in science, they might observe photosynthesis, plant growth, or animal reproduction. We assign tasks based on these observations to assess their understanding and capture the learning process."
Providing an example of the concept	P	: "Can you provide an example from your teaching? For instance, in what material do you use differentiated learning, and what strategies do you apply—content, process, or product?"
	$SC_{4.1}$	: "For example, when teaching about the solar system, I might show a video where the children can observe."
	P	: "Is this content, process, or product?"
	$SC_{4.2}$	: "It's content."
	P	: "And for the product?"
	$SC_{4.3}$	: "For the product, the students could create a model of the solar system, with each child crafting different planets. This allows us to observe the extent of their understanding and whether it aligns with their abilities."
	P	: "What kind of materials can be used?"
	$SC_{4.4}$	: "Materials can be sourced from the environment, like cardboard, plasticine, or other items."
Providing examples not concepts	P	: "Can you describe what non-differentiated learning looks like?"
	$SC_{5.1}$	: "Non-differentiated learning is when the teacher simply explains the content from the book without considering whether the students are ready to learn. It's monotonous and lacks stimulating media or methods to engage students' interest."
Implementing differentiated learning	P	: "How do you strategize for differentiated learning?"
	$SC_{3.1}$	: "The strategies can involve content, product, or environment."
	P	: "Could you briefly explain each of them?"
	$SC_{3.2}$	: "For content, it might involve using audio-visual aids. For products, it's about the learning outcomes. For the environment, it could involve making observations."

Table 8 and the interview transcripts $SC_{1.1}$ and $SC_{2.2}$ demonstrate that Subject SC was able to explain the concept of differentiated learning in his own words. However, Subject SC exhibited some confusion regarding the characteristics of differentiated learning, leading to incorrect responses, as shown in interview transcripts $SC_{6.7}$ and $SC_{6.9}$. Nevertheless, Subject SC was able to provide appropriate

examples of both differentiated and non-differentiated learning concepts, as seen in interview transcripts $SC_{4.1}$ and $SC_{5.1}$. Additionally, Subject SC correctly identified three out of the four strategies for implementing differentiated learning, as indicated in $SC_{3.1}$.

Based on the post-test results and the interview findings for the three subjects above, the conclusion regarding the concept understanding of Madrasah Ibtidaiyah teachers in the Merdeka Curriculum Differentiated Learning training is presented in Table 9 below.

Table 9. Criteria for Teacher Concept Understanding in Differentiated Learning

Indicator of concept understanding	Criteria for concept understanding			Conclusion
	SA	SB	SC	
Explaining the concept	Able	Able	Able	Able
Listing the characteristics of the concept	Able	Able	Unable	Able
Providing an example of the concept	Able	Able	Able	Able
Providing examples not concepts	Able	Able	Able	Able
Implementing differentiated learning	Able	Able	Able	Able

Table 9 shows that all three subjects were able to explain the concept of differentiated learning, identify its characteristics, provide examples and non-examples, and determine strategies for its implementation. Thus, the understanding of differentiated learning concepts among Islamic Primary School (Madrasah Ibtidaiyah/MI) teachers who participated in this training can be categorized as "able." However, it is important to note that only 19.2% of the subjects answered the post-test questions correctly. Despite this, during the interviews, the teachers demonstrated competence and met all the indicators of concept understanding. This finding aligns with the opinion of Wahyudi et al., (2023), which suggests that teachers' competence in differentiated learning has advanced in the areas of content differentiation, process differentiation, and product differentiation.

DISCUSSIONS

The ability of Islamic Primary School (Madrasah Ibtidaiyah/MI) teachers in the Babat sub-district to implement differentiated learning has consistently shown a lower percentage compared to the other four indicators, both in pre-test and post-test evaluations. This discrepancy is intriguing and warrants further investigation, particularly because the concept of differentiated learning has been integrated into the curriculum since its previous iterations, albeit under different terminology. One of the core principles of the K13 curriculum is the recognition of individual differences and the cultural backgrounds of learners. Research by Kustijono & Wiwin HM, (2014) indicates that this principle is well understood by teachers. This is consistent with the findings of Churnia & Neviyarni (2021), who emphasize that individuals have unique characteristics, and educators are therefore expected to recognize and address these differences effectively.

Accommodating individual differences involves the use of diverse learning media, which are integrated into lesson planning. Despite an understanding of this principle, as highlighted in the study, teachers often struggle to apply it in practice, frequently resorting to uniform teaching strategies for all students. To improve teachers' planning and implementation of differentiated learning in the classroom, it is essential to adopt a similar approach in differentiated learning training for both pre-service and in-service teachers. This ensures that the principles and strategies of differentiated learning are deeply embedded in teachers' instructional practices (Estaiteyeh & DeCoito, 2023).

As noted by Gusteti & Neviyarni (2022), differentiated learning requires the application of various models, strategies, and methods that are adapted to both the material and the characteristics of the students. During the training, elementary school teachers implemented differentiated learning through product differentiation. This was achieved by presenting the results of group discussions in various forms, including rhymes, songs, videos, TikTok applications, concept maps, and textbooks.

According to Haratua et al. (2024) one of the key differentiations educators can make in the learning process is based on content/materials, processes, and/or the products created by students. Product differentiation can be effectively implemented by showcasing the results of group discussions. This approach is supported by Ambarita & Simanullang (2023) and Purnawanto (2023), who explain that product differentiation allows students to choose how they present their work—whether through writing, images, or videos. Saputri et al., (2023) also underscore that product differentiation reflects students' interpretations of what they have learned. This can be facilitated by offering students choices in how they express their learning or present their results, such as through writing, images, videos, or narratives. Moreover, understanding concepts through videos can stimulate cognitive processes, enabling students to construct their own understanding (Cavazza et al., 2022).

Research by Chanetsa & Ramnarain, (2023) suggests that textbook analysis can serve as an effective tool for teacher professional development, helping to enhance teachers' conceptual understanding. Teachers appeared to appreciate the training process, as it allowed them to express the knowledge they gained in ways that aligned with their learning styles. According to Fendrik et al., (2022), understanding learning styles is crucial for both teachers and students, as it plays a significant role in students' academic success. Success hinges on identifying one’s unique learning style, recognizing strengths and weaknesses, and adapting preferences to each learning situation. Therefore, the key to student success lies in their dominant learning style. A lack of teacher understanding of students' learning styles can negatively impact student outcomes. By recognizing each student’s learning style, teachers can adopt teaching methods that align with those styles, thereby enhancing learning effectiveness.

Aditya et al. (2021), propose that interactive multimedia can serve as an effective alternative learning medium, particularly in subjects such as social education. The application of interactive multimedia based on the Game Quiz Education approach in social education has proven to be both valid and efficient, making it suitable for use in elementary schools. Interactive multimedia that presents material in an engaging manner and accommodates various student learning styles is essential for effective learning. Although the interviews suggest that the trainees have an understanding of the concept of differentiated learning, the pre-test and post-test results tell a different story. This discrepancy appears to stem from the teachers' unfamiliarity with the Quizizz platform. Many teachers faced difficulties in navigating the application and did not thoroughly read the instructions. Additionally, the complexity of the multiple-choice questions led to a high error rate among participants. Similar challenges were observed in the study by Tarmini et al. (2020), where teachers at MTs Al-Ma'arif 1 Aimas also struggled with the Quizizz application.

This observation is consistent with the findings of Tanjung et al. (2023), who reported that differentiated learning, when implemented through selected models, positively influences learning outcomes, processes, motivation, student engagement, scientific literacy, and higher-order thinking skills, such as critical and creative thinking. Differentiation is primarily driven by learning styles, while other factors such as readiness and interest play significant roles in students' self-development, helping them to better understand themselves and achieve self-actualization. According to Fauzi et al. (2023), a strong grasp of differentiated learning enables educators to adopt new learning paradigms. Developing strategies based on the analysis of students' learning needs can foster a conducive learning environment.

Initially, none of the teachers or training participants (0.0%) understood how to conduct assessments using Quizizz. However, after the training, 86% of the participants were able to use the Quizizz platform effectively. This underscores the importance of ongoing IT media training to ensure that teachers become proficient in using these tools for evaluation. Consistent and continuous training is crucial to enhancing teachers' understanding of differentiated learning concepts. This is supported by Prediger et al. (2023), who found that training can significantly improve teachers' expertise across various domains within a year. Nursita et al. (2022) also emphasized that modern technological media streamline the learning and evaluation process, making these activities more productive. Similarly, Saputra (2023) noted that the Quizizz application or website provides a creative and transparent means for teachers to assess student learning, offering challenges that motivate students to strive for better results. Thus, Quizizz can be considered an effective alternative for learning assessments.

CONCLUSION

The study concluded that while Madrasah Ibtidaiyah teachers' conceptual understanding of differentiated learning improved after receiving training, the improvement remained in the low category. The key findings of this research are as follows: First, teachers demonstrated a solid grasp of the fundamental concepts of differentiated learning. Madrasah Ibtidaiyah teachers were able to meet all indicators of conceptual understanding, including explaining concepts, identifying their characteristics, providing examples and non-examples, and implementing differentiated learning strategies post-training. Second, teachers require concrete examples of how to effectively implement differentiated learning strategies, particularly concerning content, processes, products, and learning environments. Third, teachers continue to encounter challenges in utilizing IT-based media. Previous research on teacher support through training to enhance understanding and ability in implementing differentiated learning has typically been limited to a single school and has not focused on the Islamic primary school level. In contrast, this study encompassed all teachers of grades 1 and 4 at Madrasah Ibtidaiyah (Islamic primary schools) in Babat Subdistrict, Lamongan Regency, East Java. Consequently, the findings of this research offer a more comprehensive picture of teachers' understanding of differentiated learning and have broader implications for enhancing teacher competence. A primary limitation of this research is the brief duration of the training, which lasted less than one semester. Therefore, the following recommendations are proposed for future research: Differentiated learning training should be conducted continuously and consistently to further enhance teachers' understanding of differentiated learning. Additionally, training should be provided in the use of practical and user-friendly IT media to ensure that teachers become proficient and are able to develop their competence in educational technology.

REFERENCES

Aditya, T., Sudrajat, A., & Sumantri, M. S. (2021). The development of interactive multimedia based on the quiz education game on the content of IPS learning in basic schools. *International Journal of Multicultural and Multireligious Understanding*, *8*(4), 654–661. https://doi.org/10.18415/ijmmu.v8i4.2627

Ambarita, J., & Simanullang, P. S. (2023). *Implementasi pembelajaran berdiferensiasi*. Penerbit Adab.

Anam, R. S., Widodo, A., & Sopandi, W. (2019). Teachers, pre-service teachers, and students understanding about the heat conduction. *IOP Conference: Journal of Physics Conference Series*, *1157*(2), 1–6. https://doi.org/10.1088/1742-6596/1157/2/022012

Andayani, Anan, R. S., & Handayani, M. (2022). Analisis pemahaman konsep calon guru sekolah dasar pada konsep pencernaan. *PRIMARY: Jurnal Pendidikan Guru Sekolah Dasar*, *11*(4), 1177–1184. https://doi.org/10.33578/jpfkip.v11i4.8726

Aprianti, A., & Maulia, S. T. (2023). Kebijakan pendidikan : dampak kebijakan perubahan kurikulum pendidikan bagi guru dan peserta didik. *Jurnal Pendidikan Dan Sastra Inggris*, *3*(1), 182–189.

https://doi.org/10.55606/jupensi.v3i1.1507

Aprillia, E., Nurhayati, C., & Pandiangan, A. P. B. (2023). Perubahan kurikulum pada proses pembelajaran. *Jurnal Ilmu Pendidikan Dan Sosial (JIPSI)*, *1*(4), 2829–272. https://doi.org/10.58540/jipsi.v1i4.78

Aprima, D., & Sari, S. (2022). Analisis penerapan pembelajaran berdiferensiasi dalam implementasi kurikulum merdeka pada pelajaran matematika SD. *Cendikia : Media Jurnal Ilmiah Pendidikan*, *13 (1)*(1), 95–101. https://iocscience.org/ejournal/index.php/Cendikia/article/view/2960

Azis, A. C. K., & Lubis, S. K. (2023). Asesmen diagnostik sebagai penilaian pembelajaran dalam kurikulum merdeka di sekolah dasar. *Pena Anda: Jurnal Pendidikan Sekolah Dasar*, *1*(2), 20–29. https://doi.org/10.33830/penaanda.v1i2.6202

Badie, F. (2018). A Description Logic Based Knowledge Representation Model for Concept Understanding. In: van den Herik, J., Rocha, A., Filipe, J. (eds) Agents and Artificial Intelligence. *ICAART 2017. Lecture Notes in Computer Science(), vol 10839. Springer, Cham.* https://doi.org/10.1007/978-3-319-93581-2_1

Cavazza, J., Ahmed, W., Volpi, R., Morerio, P., Bossi, F., Willemse, C., Wykowska, A., & Murino, V. (2022). Understanding action concepts from videos and brain activity through subjects' consensus. *Scientific Reports*, *12*(19073), 1–15. https://doi.org/10.1038/s41598-022-23067-2

Chanetsa, T., & Ramnarain, U. (2023). The effect of textbook analysis as a teacher professional development tool on teacher understanding of nature of science. *Science and Education*, 1–21. https://doi.org/10.1007/s11191-023-00442-7

Churnia, E., & Neviyarni, N. (2021). Individual differences in learning and remembering. *Journal of Counseling, Education and Society*, *2*(1), 1–6. https://doi.org/10.29210/08jces72400

Cresswell, J. W. (2005). *Educational research: Planning, conducting and evaluating quantitative and qualitative research*. Merrill Prentice Hall.

Dalila, A. A., Rahmah, S., Liliawati, W., & Kaniawati, I. (2022). Effect of differentiated learning in problem based learning on cognitive learning outcomes of high school students. *Jurnal Penelitian Pendidikan IPA*, *8*(4), 2116–2122. https://doi.org/10.29303/jppipa.v8i4.1839

Kusuma, O. D., & Luthfah, S. (2020). *Memenuhi Kebutuhan Belajar Murid melalui Pembelajaran Berdifeerensiasi.* Kementerian Pendidikan dan Kebudayaan.

Doerr, H. M., & Thompson, T. (2004). Understanding teacher educators and their pre-service teachers through multi-media case studies of practice. *Journal of Mathematics Teacher Education*, *7*, 175–201. https://doi.org/10.1023/B:JMTE.0000033048.97096.39

Dunekacke, S., Wullschleger, A., Grob, U., Heinze, A., Lindmeier, A., Vogt, F., Geeler, S. K., Leuchter, M., Meier-Wyder, A., Seemann, S., & Opitz, E. M. (2024). Teaching quality in kindergarten: professional development and quality of adaptive learning support enhances mathematical competency. *ZDM - Mathematics Education*, *56*(1). https://doi.org/10.1007/s11858-024-01566-y

Estaiteyeh, M., & DeCoito, I. (2023). Planning for differentiated instruction: empowering teacher candidates in STEM education. *Canadian Journal of Science, Mathematics and Technology Education*, *23*(1), 5–26. https://doi.org/10.1007/s42330-023-00270-5

Fadhli, R. (2022). Implementasi kebijakan kurikulum merdeka di sekolah dasar. *Jurnal Elementaria Edukasia*, *5*(2), 147–156. https://doi.org/10.31949/jee.v5i2.4230

Fahrudhin, A. G., Zuliana, E., & Bintoro, H. S. (2018). Peningkatan pemahaman konsep matematika melalui realistic mathematics education berbantu alat peraga bongpas. *ANARGYA: Jurnal Ilmiah Pendidikan Matematika*, *1*(1), 14–20. https://doi.org/10.24176/anargya.v1i1.2280

Fauzi, M. A. R., Azizah, S. A., & Atikah, I. (2023). Pembelajaran berdiferensiasi sebagai implementasi paradigma baru pendidikan. *Jurnal Teknologi Pendidikan*, *1*(1), 1–10.

https://doi.org/10.47134/jtp.v1i1.38

Fendrik, M., Putri, D. F., Pebriana, P. H., Sidik, G. S., & Ramadhani, D. (2022). The Analisis Kecenderungan Gaya Belajar Siswa Sekolah Dasar. Jurnal Pendidikan dan Konseling (JPDK), 4(3), 793-809. https://journal.universitaspahlawan.ac.id/index.php/jpdk/article/view/4094/3107

Forbes, C. T. (2013). Curriculum-dependent and curriculum-independent factors in preservice elementary teachers' adaptation of science curriculum materials for inquiry-based science. *Journal of Science Teacher Education*, *24*(1), 179–197. https://doi.org/10.1007/s10972-011-9245-0

Funk, J., & Woodroffe, T. (2024). A differentiated approach to Indigenous pedagogies: addressing gaps in teachers' knowledge. *Australian Educational Researcher*, *51*(2), 631–650. https://doi.org/10.1007/s13384-023-00616-w

Gusteti, M. U., & Neviyarni, N. (2022). Pembelajaran berdiferensiasi pada pembelajaran matematika di kurikulum merdeka. *Jurnal Lebesgue : Jurnal Ilmiah Pendidikan Matematika, Matematika Dan Statistika*, *3*(3), 636–646. https://doi.org/10.46306/lb.v3i3.180

Hapsari, F. (2014). Efektifitas perubahan kurikulum terhadap kegiatan pembelajaran di sekolah (studi kasus pada SDN 03 Pagi Ciracas). *Research and Development Journal Of Education*, *1*(1), 26–35. https://doi.org/10.30998/rdje.v1i1.1376

Haratua, C. S., Pratiwi, A. E., Supriadi, D., Huriyatussania, F. F., Hendriana, H., & Rosdiana. (2024). Pembelajaran berdiferensiasi pada kurikulum merdeka. *Journal on Education*, *07*(01), 479–491. https://jonedu.org/index.php/joe/article/view/6372

Hegedus, S. J., Tapper, J., & Dalton, S. (2016). Exploring how teacher-related factors relate to student achievement in learning advanced algebra in technology-enhanced classrooms. *Journal of Mathematics Teacher Education*, *19*(1), 7–32. https://doi.org/10.1007/s10857-014-9292-5

Hidayati, L., & Sujarwati, I. (2023). The differentiated learning strategy in implementation merdeka belajar curriculum to improve students' learning outcomes of english lesson in elementary school. *Cendikia : Media Jurnal Ilmiah Pendidikan*, *13*(5), 724–733. https://iocscience.org/ejournal/index.php/Cendikia/article/view/3668

Iskandar, S., Rosmana, P. S., Farhatunnisa, G., & Mayanti, I. (2023). Implementasi kurikulum merdeka di sekolah dasar. *Innovative: Journal of Social Science Research*, *3*(2), 2322–2336. https://doi.org/10.46772/kontekstual.v4i02.995

Jacobson, E., & Kilpatrick, J. (2015). Understanding teacher affect, knowledge, and instruction over time: an agenda for research on productive disposition for teaching mathematics. *Journal of Mathematics Teacher Education*, *18*(5), 401–406. https://doi.org/10.1007/s10857-015-9316-9

Joseph, S., Thomas, M., Simonette, G., & Ramsook, L. (2013). The impact of differentiated instruction in a teacher education setting: successes and challenges. *International Journal of Higher Education*, *2*(3). https://doi.org/10.5430/ijhe.v2n3p28

Khairani, B. P., Maimunah, & Roza, Y. (2021). Analisis kemampuan pemahaman konsep matematis siswa kelas XI SMA/MA pada materi barisan dan deret. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *05*(02), 1578–1587. https://doi.org/10.31004/cendekia.v5i2.623

Kustijono, R., & Wiwin HM, E. (2014). Pandangan guru terhadap pelaksanaan kurikulum 2013 dalam pembelajaran fisika SMK di Kota Surabaya. *Jurnal Penelitian Fisika Dan Aplikasinya (JPFA)*, *4*(1), 1. https://doi.org/10.26740/jpfa.v4n1.p1-14

Lestari, Hadarah, & Soleha. (2023). Implementasi Pembelajaran Berdiferensiasi Dalam Meningkatkan Aktivitas Belajar Siswa Kelas Tinggi di Sekolah Dasar Negeri 10 Pangkalpinang. *Edois: International Jurnal of Islamic Education*, *1*(2), 49–58. https://doi.org/10.32923/edois.v1i02.3710

Madyani, I., Yamtinah, S., & Utomo, S. B. (2019). The implementation of PBL integrated with STEM in the material of temperature and its changes to the improvement of studentsâ€™ creative thinking skills and learning results. *Journal of Educational Science and Technology (EST)*, *5*(3), 260–267. https://doi.org/10.26858/est.v5i3.10899

Maghfiroh, N., & Sholeh, M. (2022). Implementasi kurikulum merdeka belajar kampus merdeka dalam menghadapi era disrupsi dan era society 5.0. *Jurnal Inspirasi Manajemen Pendidikan*, *09*(05), 1185–1196. https://ejournal.unesa.ac.id/index.php/inspirasi-manajemen-pendidikan/article/view/44137

Marbun, S. R., & Marbun, S. K. (2021). Pengaruh pemahaman konsep dan penalaran logis terhadap hasil belajar matematika siswa SMP. *EKSAKTA: Jurnal Penelitian Dan Pembelajaran MIPA*, *6*(2), 287–294. https://doi.org/10.31604/eksakta.v6i2.287-294

Meltzer, D. E. (2002). The relationship between mathematics preparation and conceptual learning gains in physics: A possible "hidden variable" in diagnostic pretest scores. *American Journal of Physics*, *70*(12), 1259–1268. https://doi.org/10.1119/1.1514215

Miles, M. B., Huberman, A. M., & Saldana, J. (2020). *Qualitative data analysis: a methods sourcebook volume 14*. SAGE Publications.

Mills, S. (2016). Conceptual understanding: A concept analysis. *Qualitative Report*, *21*(3), 546–557. https://doi.org/10.46743/2160-3715/2016.2308

Moscatello, K., Kalmey, J. K., & Keller, C. C. (2017). Ten-year comparison of a traditional lecture curriculum with an independent study curriculum on COMLEX performance. *Medical Science Educator*, *27*(3), 447–449. https://doi.org/10.1007/s40670-017-0414-4

Mulyawati, Y., Zulela, M., & Edwita, E. (2022). Differentiation learning to improve students potential in elementary school. *Pedagonal : Jurnal Ilmiah Pendidikan*, *6*(1), 68–78. https://doi.org/10.55215/pedagonal.v6i1.4485

Ndani, Y. E., & Erita, S. (2023). Describe the understanding of mathematical concepts in class VII junior high school students regarding objective questions. *Didaktika : Jurnal Kependidikan*, *17*(2), 64–72. https://doi.org/10.30863/didaktika.v17i2.5751

Ningsih, Z. L., & Fitriani, W. (2022). Pentingnya asesmen dalam menyusun program pembelajaran di sekolah inklusi. *Jurnal Gema Pendidikan*, *29*(2), 151–157. http://dx.doi.org/10.36709/gapend.v29i2.25389

Nurani, M., Riyadi, R., & Subanti, S. (2021). Profil pemahaman konsep matematika ditinjau dari self efficacy. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *10*(1), 284–292. https://doi.org/10.24127/ajpm.v10i1.3388

Nursita, L., Yusril, M., Putri, H. E., Dahlang, D., & Taufik, R. (2022). Pemanfaatan IT pada evaluasi hasil belajar peserta didik melalui media google form. *Nazzama: Journal of Management Education*, *1*(2), 105–111. https://doi.org/10.24252/jme.v1i2.27016

Nurwiatin, N. (2022). Pengaruh pengembangan kurikulum merdeka belajar dan kesiapan kepala sekolah terhadap penyesuaian pembelajaran di sekolah. *EDUSAINTEK: Jurnal Pendidikan, Sains Dan Teknologi*, *9*(2), 472–487. https://doi.org/10.47668/edusaintek.v9i2.537

Pasha, V. F., & Aini, I. N. (2022). Deskripsi kemampuan pemahaman konsep matematis ditinjau dari self-regulated learning. *Teorema: Teori Dan Riset Matematika*, *7*(2), 235–246. https://doi.org/10.25157/teorema.v7i2.7217

Prediger, S., Dröse, J., Stahnke, R., & Ademmer, C. (2023). Teacher expertise for fostering at-risk students' understanding of basic concepts: conceptual model and evidence for growth. *Journal of Mathematics Teacher Education*, *26*(4), 481–508. https://doi.org/10.1007/s10857-022-09538-3

Purnawanto, A. T. (2023). Pembelajaran berdiferensiasi. *Jurnal Ilmiah Pedagogy*, *2*(1), 34–54. https://jurnal.staimuhblora.ac.id/index.php/pedagogy/article/view/152

Rachmawati, M. A., Widiasmara, N., & Nu'man, T. M. (2018). Effectiveness of Differentiated Instruction Training to Enhance Teachers' Sense of Efficacy in Inclusive Schools. *GATR Global Journal of Business Social Sciences Review*, *6*(1), 21–26. https://doi.org/10.35609/gjbssr.2018.6.1(4)

Ria, Ti. N., & Kurniati, L. (2023). Pelatihan pembelajaran berdiferensiasi bagi guru-guru SMPN 4 Demak. *Jurnal Awam*, *3*(1), 13–18. https://ejurnal.universitaskarimun.ac.id/index.php/awam/article/view/963

Rismen, S., Astuti, S., & Lovia, L. (2021). Analisis kemampuan pemahaman konsep matematis siswa. *Lemma: Letters Of Mathematics Education*, *7*(2), 123–134. https://doi.org/10.31949/dm.v4i2.2334

Sahril, S., N, A. S., & Nur, M. S. (2021). The impact of differentiated instruction on students' performance in critical reading. *Eralingua: Jurnal Pendidikan Bahasa Asing Dan Sastra*, *5*(1), 275. https://doi.org/10.26858/eralingua.v5i1.18937

Saputra, B. (2023). Systematic literature review: penggunaan quizizz sebagai evaluasi pembelajaran di prodi matematika Universitas Wanita Internasional. *JIIP - Jurnal Ilmiah Ilmu Pendidikan*, *6*(1), 382–386. https://doi.org/10.54371/jiip.v6i1.1501

Saputri, D. A., Nuroso, H., & Sulianto, J. (2023). Implementasi pembelajaran berdiferensiasi terhadap perkembangan kognitif peserta didik sekolah dasar. *Journal on Education*, *06*(01), 4083–4090.

Setiawan, Y., Kurnia, G. J., Soetedja, Z. S., & Taswadi. (2023). Implementasi pembelajaran berdiferensiasi berbasis asesmen diagnosis pada pembelajaran seni rupa di SMA. *Edukatif: Jurnal Ilmu Pendidikan*, *5*(2), 1584–1594. https://edukatif.org/index.php/edukatif/index

Setiawati, F. (2022). Dampak kebijakan perubahan kurikulum terhadap pembelajaran di sekolah the impact of curriculum change policy on learning activities at school. *Nizamul 'Ilmi: Jurnal Manajemen Pendidikan Islam (JMPI)*, *07*(1), 1–17.

Subban, P. (2006). Differentiated instruction: A research basis. *International Education Journal*, *7*(7), 935–947. https://files.eric.ed.gov/fulltext/EJ854351.pdf

Sugiyono. (2020). *Metode Penelitian Kuantitatif Kualitatif dan R&D (2nd ed.).* Alfabeta.

Suwastini, N. K. A., RInawati, N. K. A., Jayantini, I. G. A. S. R., & Dantes, G. R. (2021). Differentiated instruction across EFL classroom: a conceptual review. *TELL-US Journal*, *7*(1), 14–41. https://doi.org/10.22202/tus.2021.v7i1.4719

Tanjung, Y. I., Wulandari, T., Lufri, L., Mufid, F., Andromeda, A., & Ramadhani, I. (2023). Model dan pengaruh pembelajaran berdiferensiasi pada pendidikan IPA: tinjauan literatur sistematis. *Elementary School Journal*, *13*(1), 68–80. https://doi.org/10.24114/esjpgsd.v13i1.42751

Tapper, N., & Horsley, J. (2017). Differentiation in the secondary school classroom. *Kairaranga*, *18*(2), 40–46. https://doi.org/10.54322/kairaranga.v18i2.229

Tarmini, W., Safi'i, I., Witdianti, Y., & Larassaty, S. (2020). Peningkatan kompetensi profesional guru melalui webinar evaluasi hasil belajar bagi guru-guru MTs Al-Ma'arif 1 Aimas. *Transformasi: Jurnal Pengabdian Masyarakat*, *16*(1), 53–62. https://doi.org/10.20414/transformasi.v16i1.2049

Tomlinson, C. A. (2001). How to Differentiate Instruction in Mixed Ability CLassrooms 2nd Edition. In *Toxicology* (Vol. 44, Issue 1). ASCD Association for Supervision and Curriculum Development. https://doi.org/10.1016/0300-483X(87)90046-1

Variacion, D. A., Salic-Hairulla, M., & Bagaloyos, J. (2021). Development of differentiated activities in teaching science: Educators' evaluation and self-reflection on differentiation and flexible learning. *Journal of Physics: Conference Series*, *1835*(1). https://doi.org/10.1088/1742-6596/1835/1/012091

Wahyudi, A. B. E., Suhartono, Ngatman, Wahyono, Susiani, T. S., Salimi, M., & Hidayah, R. (2023). Pelatihan implementasi pembelajaran berdiferensiasi bagi guru sekolah dasar. *Seminar Nasional Inovasi Pendidikan (SHEs: Conference Series)*, *6*(3), 357–363. https://doi.org/10.20961/shes.v6i3.82371

Wahyuni, S., Khoiri, N., & Novita, M. (2023). Learning transformation: optimizing student potential through inclusive and meaningful differentiated learning. *Jurnal Pendidikan MIPA*, *24*(2), 453–466. https://doi.org/10.23960/jpmipa/v23i2.pp453-466

Wiranti, N., Indahsari, R. A., Rahmawati, S. A., & ... (2023). Implementation of differentiate learning to

students with types of speech delay disorders. *Genius Indonesian Journal of Early Childhood Education*, *4*(1), 81–92. http://genius.uinkhas.ac.id/index.php/gns/article/view/125

Yasir, M., Yamin, Y., Hadi, W. P., & Purnomo, P. (2023). Differentiation learning training in projects as an implementation strategy for the merdeka curriculum at Yas'a Sumenep middle school. *Salus Publica: Journal of Community Service*, *1*(2), 47–52. https://doi.org/10.58905/saluspublica.v1i2.156

Zebua, N. S. A., Zalukhu, A., Herman, Hulu, D. B. T., Tambunan, H., & Pangaribuan, F. (2023). Analisis kemampuan guru dalam menanamkan kemampuan pemahaman konsep dan mengembangkan kemampuan pemecahan masalah terhadap hasil belajar siswa. *Journal on Education*, *05*(03), 6047–6053. https://doi.org/10.31004/joe.v5i3.1370

Zulkarnain, I., & Budiman, H. (2019). Pengaruh pemahaman konsep terhadap kemampuan pemecahan masalah matematika. *Research and Development Journal of Education*, *6*(1), 18–27. https://doi.org/10.30998/rdje.v6i1.4093