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# Empowering Educators: Exploring Teacher Understanding and Implementation of Differentiated Instruction in Indonesian Primary Schools

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**Abstract.** Differentiated Instruction (DI) is recognized as an effective method for addressing varied student learning needs within a single classroom. However, integrating DI into teaching practices remains a challenge for many teachers. This non-experimental study employs a quantitative comparative design to examine the understanding and implementation of DI strategies among 330 in-service primary school teachers from 14 provinces in Indonesia, aged 22 to 60. The study utilized the Differentiated Instruction Scale, which was adapted into Bahasa Indonesia to ensure its relevance. The adaptation process followed the Guidelines for Cross-Cultural Adaptation of Self-Report Measures. Most respondents graduated from elementary school teacher education programs, with teaching experience spanning three months to 38 years. Results show that while teachers understand DI well, especially in the assessment category, implementation in product differentiation remains low. A significant gap exists between theoretical knowledge and practical application. Findings highlight the need for targeted professional development focusing on critical DI categories, especially Product differentiation. Recommendations stress the importance of structural support, ensuring teachers have the time and resources to develop varied learning products. Enhancing teachers' competence in DI is vital for meeting the diverse needs of students in Indonesian primary schools.

**Keywords:** Differentiated Instruction; Primary School Teachers; Teaching Strategies; Knowledge Gap; Indonesian School

## 1. Introduction

Globally, the shift toward inclusive and equitable education has been a focal point of 21st-century educational reforms. International frameworks like UNESCO's Sustainable Development Goal 4 emphasize ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all (UNESCO, 2021). As these global efforts are made, classrooms have become increasingly diverse regarding student abilities and socio-cultural backgrounds. Students now enter classrooms with a wide range of abilities, readiness levels, cultural backgrounds, experiences, interests, needs, and learning styles (Moosa & Sahreefa, 2019). Consequently, the need for instructional models that accommodate this diversity has grown significantly (OECD, 2020). In response to this growing diversity, educators and policymakers have sought innovative teaching approaches that cater to the varied needs of all students. To ensure no student is left behind, instructional methods must be flexible and adaptive, allowing teachers to tailor their approaches to individual learning needs.

Differentiated Instruction is one model designed to meet these varied needs by providing multiple pathways to learning based on students' readiness, interests, and learning profiles (Tomlinson, 2014). However, meeting the diverse needs of students in a classroom can be daunting for educators, particularly in mixed-ability settings. As classroom dynamics become more complex, educators are increasingly seek instructional models that allow flexibility and inclusivity in teaching. Educators require various pedagogical strategies to support their students effectively and accommodate differing readiness levels and learning profiles. For instance, a teacher might provide reading materials at varying levels of complexity, enabling students to engage with appropriately challenging content. Therefore, implementing DI is

crucial for fostering an inclusive classroom environment where all students, including those with special needs, can thrive (D'Intino & Wang, 2021).

In the context of Indonesia, the Ministry of Education and Culture introduced the *Kurikulum Merdeka* (Curriculum of Freedom) to embrace the principles of flexibility and adaptability in teaching, promoting student-centered learning as the key to addressing students' diverse needs (Kemendikbudristek, 2022). This reform represents a significant shift from more rigid, uniform teaching approaches, allowing teachers to craft lessons that respond to different learning profiles, interests, and abilities. As schools work to meet the demands of an increasingly heterogeneous student population, teachers' ability to effectively implement DI becomes a pivotal factor in achieving educational equity. However, while these reforms highlight the importance of DI, there is growing evidence that many teachers struggle to implement DI strategies effectively (Dack & Tomlinson, 2024; Yuen et al., 2023). For instance, Yuen et al. (2023) examined teachers' experiences with DI during the COVID-19 pandemic, revealing that while educators recognize the significance of DI, they encounter challenges in effectively applying it due to insufficient resources and support. Similarly, Dack and Tomlinson (2024) highlighted that many teachers grasp the principles of DI yet struggle to implement these strategies in diverse classroom environments. These findings underscore the necessity of prioritizing practical implementation to fully harness DI's benefits.

While existing research highlights a gap between teachers' understanding and the actual implementation of DI, it often fails to examine the specific categories that define DI comprehensively. To effectively bridge this gap, it is crucial to focus on aspects of DI that can impact its application in the classroom. Among these, six key categories emerge: Student Interest, Assessment, Lesson Planning, Content, Process, and Product (Whipple, 2012), which can be utilized to evaluate both knowledge and implementation of DI. Investigating these categories will help identify areas where teachers may need additional support, shedding light on the complexities contributing to their challenges in implementing DI. Thus, analyzing the current state of DI knowledge and its application in Indonesia is essential, especially regarding *Kurikulum Merdeka*'s implementation. Furthermore, by pinpointing specific areas that require attention, this study can guide future professional development and resource allocation for teachers, ensuring that the assistance provided aligns with their needs. Therefore, addressing these gaps in understanding and implementing DI is vital for enhancing educational practices in Indonesia and ensuring that all students, particularly those with diverse needs, receive the tailored support necessary to thrive in a rapidly evolving educational landscape.

### 1.1. Problem Statement

Despite the recognized benefits of Differentiated Instruction (DI) in addressing diverse student learning needs, its implementation in Indonesian primary schools remains significantly underutilized. Teachers often acknowledge the importance of DI but face considerable challenges that hinder its practical application. This discrepancy between understanding and practice can be attributed to several factors: a lack of specific knowledge and strategies necessary for DI, insufficient training and resources, and the pressures of adapting to an increasingly heterogeneous student population. The consequences of this gap are significant, as ineffective implementation of DI not only limits educational equity but also undermines the potential for improved learning outcomes among students with varying abilities and interests. Teachers may struggle to meet their students' diverse needs effectively without understanding the categories that influence DI. To investigate these issues, it is essential to conduct a comprehensive study assessing the current state of teachers' DI knowledge and its practical implementation in the context of Indonesia's Kurikulum Merdeka. This research will identify the specific categories that impact the implementation gap and provide insights into how tailored support and professional development can enhance teachers' abilities to apply DI strategies effectively. Understanding these factors is crucial for improving educational practices and outcomes in Indonesian primary schools, particularly as the country strives for a more inclusive and adaptable educational system.

### 1.2. Related Research

Several studies have reviewed the practice of Differentiated Instruction (DI), especially in the Indonesian school context, exploring various aspects such as the relationship between teachers' knowledge and its implementation, ideal practices, and the impact of teacher training on effective differentiation. Considering student diversity, Suprayogi and Valcke (2016) suggested that DI suits for Indonesia's education context. However, their findings indicated that the implementation of DI was significantly below the mastery learning benchmark of 80%. They highlighted that while teachers understood the importance of supporting diverse student groups, they lacked specific strategies to engage all groups simultaneously (Suprayogi & Valcke, 2016). Building on these insights, Handayani et al. (2016) noted that Indonesian teachers have insufficient knowledge about DI despite recognizing its benefits. Teachers reported uncertainty about appropriately differentiating their classes, revealing a significant knowledge gap that could limit the application of DI (Handayani et al., 2016). Notably, this study did not clearly define the specific knowledge deficits among teachers, which points to the need for more targeted research.

In a related finding, Turner et al. (2017) discovered that content differentiation was the least practiced aspect of DI. Although teachers acknowledged the importance of supporting different student groups, they struggled to implement strategies that effectively engaged all learners. The latest research also sheds light on these challenges. For instance, Calabazaron-Ocampo (2022) found that while teachers significantly understood DI, student satisfaction with its implementation was only moderate. The study indicated that although content instruction was appreciated, student interests were the least understood and addressed (Calabazaron-Ocampo, 2022). Furthermore, Amoakwah and Donkoh (2023) revealed that primary school teachers lacked thoroughly understanding of DI and its classroom application. They noted that most teachers had not received adequate training through workshops or in-service programs, leading to a gap between knowledge and implementation. Similarly, Alsamiri et al. (2023) found that while primary school teachers in Saudi Arabia acknowledged the importance of differentiation for gifted students and those with learning disabilities, they were not effectively implementing these strategies.

While existing studies have identified gaps between teachers' theoretical understanding of DI and its practical implementation, they often lack a detailed examination of the specific categories that influence these gaps. This research aims to fill this gap by providing a focused analysis of the current state of DI knowledge and implementation among Indonesian teachers. It also seeks to identify which specific categories significantly influence the effectiveness of DI practices. By doing so, this study contributes to understanding DI's internal mechanisms. It offers insights that can inform tailored support and professional development for teachers. The novelty of this research lies in its approach to dissecting the internal categories of DI and examining how these categories interact with teachers' knowledge and practical implementation. This investigation is crucial for developing targeted interventions that enhance teachers' capacities to effectively differentiate instruction, ultimately leading to improved educational outcomes in Indonesia's diverse classroom settings.

### 1.3. Research Objectives

This research aims to assess Indonesian primary school teachers' current understanding of Differentiated Instruction (DI) and to evaluate the implementation of DI practices in the classroom. The study focuses on six DI categories to identify knowledge gaps and practical challenges teachers face. By examining these categories in detail, the research seeks to bridge the gap between theoretical knowledge and practical application. Unlike previous studies that addressed DI broadly or focused on isolated aspects, this study offers a nuanced analysis of how each DI category impacts effective differentiation. The objective is to provide targeted recommendations that enhance DI practices in Indonesian primary schools, addressing the specific needs and gaps identified in teachers' current practices and improving overall DI effectiveness.

Research Question: How does the current understanding of Differentiated Instruction among Indonesian primary school teachers compare to its actual implementation in the classroom?

## 2. Theoretical Framework

### 2.1. Definitions of Differentiated Instruction (DI)

Differentiated Instruction (DI) is a pedagogical approach designed to address the diverse needs of learners by proactively modifying curricula, teaching methods, resources, learning activities, and student products (Tomlinson, 2014). This student-centered approach emphasizes adapting instruction to accommodate differences in students' prior knowledge, readiness, language, culture, learning preferences, and interests (Santangelo & Tomlinson, 2012; Suprayogi & Valcke, 2016). The core principle of DI is to ensure that all students receive tailored support that meets their unique learning needs, thereby enhancing their educational experience and maximizing their potential (Gaitas & Alves Martins, 2017; Whipple, 2012).

Differentiated Instruction (DI) aims to create a more effective and inclusive learning environment by focusing on several key goals. One of the main objectives is to enhance student engagement by aligning instructional methods with individual interests and learning preferences, which boosts motivation and participation (Whipple, 2012). DI also seeks to support diverse learners by providing appropriate levels of challenge tailored to varying abilities, ensuring each student can reach their full potential (Santangelo & Tomlinson, 2012). Additionally, DI facilitates continuous growth by offering multiple ways for students to interact with and demonstrate their understanding of the material. This approach helps students develop a more profound comprehension and supports their ongoing educational progress (Santangelo & Tomlinson, 2012).

### 2.2. Categories of Differentiated Instruction (DI)

Differentiated Instruction (DI) encompasses six categories for evaluating teachers' knowledge and implementation, as outlined by (Whipple, 2012). These categories address various aspects of teaching and learning to ensure that instruction meets the diverse needs of students. The first dimension is 1) Student Interest, which emphasizes the importance of aligning instruction with what students find engaging, which enhances their motivation and involvement in the learning process. 2) Assessment, is another critical dimension involving continuous and varied evaluation methods that help educators understand students' progress and adapt their teaching strategies accordingly. 3) Lesson Planning, is essential for creating lessons incorporating diverse instructional techniques and activities, allowing multiple pathways to engage with the content. 4) Content, differentiation involves adjusting the complexity and type of material based on students' readiness levels, ensuring that all learners are appropriately challenged. 5) Process, focuses on varying instructional methods and grouping strategies to cater to different learning styles and abilities. Finally, 6) Product differentiation allows students to demonstrate their learning in varied ways, reflecting their strengths and interests (Whipple, 2012).

### 2.3. Differentiated Instruction (DI) in Elementary Education

The theoretical framework for Differentiated Instruction (DI) in elementary schools is grounded in tailoring teaching methods to meet students' diverse needs, interests, and readiness levels. This approach is informed by research that emphasizes the importance of creating opportunities for all students to engage with the curriculum in ways that are meaningful and motivating for them (D'Intino & Wang, 2021). The theory behind DI posits that by differentiating instruction, teachers can foster increased motivation, participation, and continuous academic growth among students (Wong et al., 2023). Key to the DI framework is the understanding that effective teaching involves not just delivering content but adapting it to match the varied learning profiles of students. This theoretical perspective asserts that teachers should begin by thoroughly understanding students' needs through assessment and then design lessons responsive to these needs (David & Autin, 2020). Incorporating diverse instructional materials is another critical aspect, reflecting the theory that students may require different resources to fully engage with and understand the material (Faigawati et al., 2023).

Furthermore, the theory highlights the importance of using varied assessment methods, particularly formative assessments, to gauge student progress and adjust instruction accordingly continuously (Whipple, 2012). This iterative process of assessment and adjustment

is central to the DI approach. In planning lessons, the theoretical framework for DI emphasizes the importance of addressing a range of learning styles and abilities, ensuring that all students can access the curriculum in ways suit to their needs (Whipple, 2012). Moreover, the theory underscores the significance of modifying content, adapting instructional processes, and differentiating learning products, allowing students to demonstrate their understanding in diverse ways that reflect their unique strengths and preferences (Whipple, 2012).

## 3. Method

### 3.1. Research Design

This study is a non-experimental study employing a quantitative comparative design. Quantitative comparative design in research involves comparing and analyzing quantitative data to draw conclusions and compare variables or groups (Ghanad, 2023). The research method utilized is a survey with a cross-sectional design. A survey consists of structured questions or statements to measure individuals' attitudes, beliefs, values, or tendencies to act (Goodwin & Goodwin, 2017). Cross-sectional studies emphasize data collection that occurs only once within a specific period (Ghanad, 2023). This quantitative survey study aims to measure the level of understanding and implementation of teacher instruction across six categories: Student Interest, Assessment, Lesson Planning, Content, Process, and Product. This research has obtained ethical approval from the University of Indonesia Depok Research Ethics Commission, with approval number 292/FPsi.Komite Etik/PDP.04.00/2023.

### 3.2. Respondent

The respondents in this study were elementary school teachers from 14 provinces in Indonesia: DKI Jakarta, West Java, Banten, Central Java, Yogyakarta, East Java, Bali, South Sulawesi, Central Kalimantan, South Kalimantan, East Kalimantan, South Sumatra, Riau, and Gorontalo. This study employed a non-probability sampling technique known as convenience sampling. This method emphasizes that not all population members are equally likely to be selected. Convenience sampling involves selecting samples based on ease of access, voluntary participation, practical criteria, and flexible timing (Gravetter et al., 2021).

Four hundred twenty-two respondents completed the questionnaire, but 92 were deemed not to fulfill the requirements, leaving 330 respondents who met the criteria. Respondents were excluded due to incomplete questionnaire responses or lack of seriousness and care in answering. The gender distribution among the respondents was notably skewed, with 82.4% female and 17.6% male participants. Their ages ranged from 22 to 60 years, reflecting a broad span of professional experience. Regarding educational background, a significant majority, 90.3%, were from elementary school teacher education programs (PGSD), while 9.7% had backgrounds outside PGSD. The majority of respondents held a Bachelor's degree (92.1%), followed by those with Master's degrees (4.8%), High School qualifications (2.1%), and other qualifications (0.9%). Professionally, 47% of the respondents were employed in general schools, while 53% worked in inclusive settings. Their teaching experience varied widely from 3 months to 38 years. Geographically, the respondents were distributed across 14 provinces, with the highest representation from DKI Jakarta (27%) and Jawa Barat (47.3%), providing a diverse regional perspective on the study.

### 3.3. Data Collection

Data was collected offline using paper questionnaires and online via Google Forms. The measuring instrument used in this study was the Differentiated Instruction Scale, adapted to Indonesian by researchers (Whipple, 2012) to fit the context and respondents in Indonesia. The adaptation process followed the "Guidelines for the Process of Cross-Cultural Adaptation of Self-Report Measures" by (Beaton et al., 2000). This process involved five stages: first, two translators translated the scale into Indonesian—one with a psychology background who understood the purpose of the scale and another without a psychology background who was unaware of the concept being measured. Second, the researchers synthesized the results from the two translators. Third, the synthesized translation was back-translated into the original

language by a different translator who was not involved in the initial translation. This step ensured that the translated version accurately reflected the same content as the original version (Beaton et al., 2000). Fourth, two expert committees, which are both professors and psychologists specializing in educational psychology, independently reviewed and assessed all translations, examining the original scale, the initial translations, the synthesis, and the back-translation results. Finally, the adapted questionnaire was distributed to respondents with relevant backgrounds for field trials. The data collected from these questionnaires were analyzed for validity, reliability, and descriptive statistics to address the research questions. The research data analysis utilized IBM SPSS Statistics version-23 for comparative and reliability tests and R Studio for Confirmatory Factor Analysis (CFA).

Items were developed to assess two areas related to Differentiated Instruction (DI): understanding of the DI concept and the level of DI implementation across six categories: Student Interest, Assessment, Lesson Planning, Content, Process, and Product (Whipple, 2012). The scale comprises two parts:

- Scale A: Evaluates teachers' understanding of DI.
- Scale B: Assesses the implementation of DI.

The initial instrument contained 26 items, but the final version used in this study consisted of 23 items retained for both scales, each employing different Likert scales. Three items were removed due to their inadequacy in measuring the DI construct. Simultaneously, both scales can be administered since they share the same items yet utilize distinct Likert scales. For Scale A, the Likert scale offers four options: (1) Not Important, (2) Somewhat Important, (3) Important, and (4) Very Important. For Scale B, the Likert scale includes four choices: (1) Never Do It, (2) Occasionally Do It, (3) Often Do It, and (4) Always Do It.

To ensure that online respondents pay attention to and understand the instructions, the researchers employed the Instructional Manipulation Check (IMC) method. IMC helps identify respondents who may not be attentive or thorough, thereby enhancing the validity and reliability of the data collected (Gosling & Mason, 2015). This method involves inserting questions that appear like other items but are designed to gauge respondent concentration through unexpected queries, such as "Choose number 3." Two IMC questions were included in this scale.

### 3.4. Data Analysis

This study employed a within-subject or two-related sample design, which involves repeated measurements on the same group of participants under two different conditions (Gravetter et al., 2021). The repeated-measures t-test statistic was utilized to test the hypothesis of a mean difference between two sets of scores from the same individuals. The advantage of this approach lies in its ability to eliminate between-participant variation, thereby allowing the differences observed to be directly attributed to the related variables (Gravetter et al., 2021). Data analysis commenced with a normality assumption test on the difference between the two sets of scores using the Shapiro-Wilk and Kolmogorov-Smirnov tests. The results indicated that the normality assumption was not met, prompting using the Wilcoxon Signed-Rank Test as a non-parametric alternative.

### 3.5. Validity and Reliability

The validity test in this study was construct validity, assessed through cognitive interviews with three elementary school teachers. These cognitive interviews aimed to ensure that the instrument effectively measured the intended constructs. A verbal probing technique was employed during this process, which involved asking directed questions about the participants' thought processes while responding to survey items. This technique was designed to ascertain whether the teachers interpreted the questions in alignment with the study's objectives (Ryan et al., 2012). The insights gained from these interviews are vital for the researchers in refining the instrument to enhance its construct validity (Knafl et al., 2007).

Additionally, content validity was evaluated using the Content Validity Index (CVI). Content validity pertains to the extent to which the items in an assessment tool are relevant and

accurately represent the specific construct being measured (Yusoff, 2019). In this study, the construct under examination was differentiated instruction. Two professors specializing in educational psychology and inclusive education were engaged as expert panelists (raters). These experts were asked to rate each item on the Differentiated Instruction Scale using a scale of 1 to 4 (from not relevant to very relevant). According to Davis (1992) a CVI value of at least 0.80 from two experts is the minimum threshold, indicating strong content validity of the instrument (Yusoff, 2019). The I-CVI results indicated a score of 0.99 for this scale.

To evaluate the fit of the theoretical model employed in this study, we utilized Confirmatory Factor Analysis (CFA). CFA was used to determine the degree to which the previously identified factors matched the collected data. The CFA results indicated that the expected factor structure was consistent with the obtained data, with the applied model fit criteria adhering to those established by Kyndt and Onghena (2014). The results of the CFA are as follows:

**Table 1.** Confirmatory Factor Analysis (CFA) Results

| Type Of Fit Index | Fit Index | Recommended cut-off value | Scale A (knowledge of DI) | Scale B (implementation of DI) |
|---|---|---|---|---|
| Absolute fit indexes | SRMR | ≤ 0.08; ≤ 0.05 | 0.053 | 0.052 |
| | GFI | ≥ 0.95 | 0.988 | 0.968 |
| | AGFI | ≥ 0.95 | 0.984 | 0.957 |
| Incremental fit indexes | CFI | ≥ 0.95; ≥0.90 | 0.901 | 0.901 |
| | NFI* | ≥ 0.95 | 0.841* | 0.834* |
| | TLI* | ≥ 0.95 | 0.887* | 0.888* |
| Parsimony-adjusted fit indexes | RMSEA | ≤ 0.06; 0.08 (reasonable error) | 0.064 | 0.071 |

*Do not fit the criteria.

Reliability of the Differentiated Instruction Scales was assessed using Cronbach's alpha, yielding values of 0.923 for Scale A and 0.939 for Scale B. These results were compared with the standards established by (Kennedy, 2022), which indicate a correlation coefficient ($r$) of 0.85 with a 95% confidence interval of (0.82, 0.88) for a sample size of at least 300. This strong correlation demonstrates that the variables measured by the scales are highly reliable. Consequently, the instruments used in this study are deemed reliable for consistently representing and measuring the concept of Differentiated Instruction in alignment with the research objectives (Kennedy, 2022).

## 4. Findings

This section presents the results of the statistical analyses conducted to evaluate the differences between Indonesian primary school teachers' understanding of Differentiated Instruction (DI) (Scale A) and their implementation of DI in the classroom (Scale B). The results are presented in the following tables. The analysis reveals significant differences across various categories, highlighting key areas where teachers' knowledge and implementation diverge. These results are organized into sub-findings that address overall comparisons, descriptive statistics for each category, and detailed component comparisons, ultimately aiming to identify knowledge gaps and practical challenges in DI implementation.

### 4.1. Comparative Analysis of Scale A and Scale B Scores

**Table 2.** Wilcoxon signed-rank test results

| Scale A-Scale B | N | Mean Rank | z | *p* |
|---|---|---|---|---|
| Negative Ranks | 275[a] | 154.20 | -14.382* | .000 |
| Positive Ranks | 18[b] | 37.00 | | |
| Ties | 37[c] | | | |

*Based on positive ranks.

a. Scale B < Scale A
b. Scale B > Scale A
c. Scale B = Scale A

The results in Table 2 reveal a significant difference between Scale A and Scale B, with Scale A showing higher scores overall ($z = -14.382$, $p < .001$). This indicates that Scale A scores were significantly greater than those on Scale B. The effect size is considered large, underscoring that the differences observed are substantial and consistent across the sample.

### 4.2. Descriptive Statistical Analysis of Category Scores

**Table 3.** Descriptive Statistic of Each Category

| Categories | Scale A | | | Scale B | | |
|---|---|---|---|---|---|---|
| | Mean | Std. Deviation | Variance | Mean | Std. Deviation | Variance |
| Student Interest | 14.267 | 1.625 | 2.640 | 12.179 | 2.356 | 5.552 |
| Assessment | 18.267 | 1.868 | 3.491 | 16.546 | 2.593 | 6.723 |
| Lesson Planning | 17.733 | 2.113 | 4.464 | 15.621 | 2.852 | 8.133 |
| Content | 14.373 | 1.618 | 2.617 | 12.940 | 2.158 | 4.659 |
| Process | 14.088 | 1.758 | 3.090 | 12.542 | 2.187 | 4.784 |
| Product | 13.064 | 2.230 | 4.972 | 11.494 | 2.490 | 6.202 |

The descriptive statistics in Table 3 reveal that Scale A consistently scores higher across all categories Student Interest, Assessment, Lesson Planning, Content, Process, and Product—compared to Scale B, indicating more favorable evaluations. Specifically, Scale A shows higher mean scores and lower standard deviations, reflecting a more positive overall perception and less response variability. Among the categories, Assessment has the highest mean score for Scale A and Scale B, suggesting that Assessment practices are viewed most positively. Conversely, the Product category has the lowest mean score across both scales, indicating it is perceived less favorably. This disparity underscores that while Assessment is regarded as a strong point, Product-related practices are seen as relatively weaker.

### 4.3. Categories-Level Comparative Analysis of Scale A and Scale B

**Table 4.** Wilcoxon Signed-Rank Test Results Comparing Each Category Between Scale A and Scale B

| Scale A-Scale B | | N | Mean Rank | z | *p* |
|---|---|---|---|---|---|
| SIB – SIA | Negative Ranks | 249[a] | 136.01 | -13.633* | .000 |
| | Positive Ranks | 13[b] | 45.15 | | |
| | Ties | 68[c] | | | |
| ASB – ASA | Negative Ranks | 212[d] | 115.91 | -12.012* | .000 |
| | Positive Ranks | 14[e] | 77.07 | | |
| | Ties | 104[f] | | | |
| LPB – LPA | Negative Ranks | 234[g] | 128.70 | -12.860* | .000 |
| | Positive Ranks | 15[h] | 67.27 | | |
| | Ties | 81[i] | | | |
| COB – COA | Negative Ranks | 197[j] | 113.63 | -11.515* | .000 |
| | Positive Ranks | 21[k] | 61.36 | | |
| | Ties | 112[l] | | | |
| PRB – PRA | Negative Ranks | 214[m] | 117.57 | -12.040* | .000 |
| | Positive Ranks | 15[n] | 78.33 | | |
| | Ties | 101[o] | | | |
| PDB - PDA | Negative Ranks | 205[p] | 110.88 | -12.262* | .000 |
| | Positive Ranks | 10[q] | 49.00 | | |
| | Ties | 115[r] | | | |

*Based on positive ranks.

Table 4 presents the Wilcoxon signed-rank test results, comparing the categories' differences across Scale A and Scale B. The findings reveal that all categories show statistically significant differences, as indicated by the negative z-values in each comparison. The negative z-values suggest that, across all categories, Scale A consistently scores higher than Scale B. Moreover, the p-values associated with these comparisons are all less than .05, indicating that the observed differences between Scale A and Scale B are statistically significant. This low p-value suggests that there is a less than 5% probability that these differences are due to random variation, providing strong evidence that the differences are not coincidental. Specifically, the analysis shows that the negative ranks, which represent instances where Scale A scores higher than Scale B, are more frequent and have greater mean ranks than the positive ones, where Scale B scores higher. This pattern is consistent across all dimensions, including Student Interest (SIB – SIA), Assessment (ASB – ASA), Lesson Planning (LPB – LPA), Content (COB – COA), Process (PRB – PRA), and Product (PDB – PDA). The consistently low p-values across these comparisons further reinforce the robustness of these findings, confirming that Scale A's evaluations are significantly more favorable than those of Scale B.

## 5. Discussion

The research results indicate that teachers possess a good understanding of Differentiated Instruction (DI), especially in the Assessment category, while the implementation of the Product category is the lowest. This means that although teachers demonstrate a strong understanding of the principles of DI, this knowledge does not always translate into classroom teaching practices. This gap is evident across all categories—Student Interest, Assessment, Lesson Planning, Content, Process, and Product—where Scale A (knowledge) consistently scores higher than Scale B (implementation). This suggests that while teachers may understand the theoretical aspects of DI, they face challenges in effectively applying these concepts in their teaching.

The Assessment category stands out with the highest average score for understanding and implementation, indicating that teachers are more comfortable with assessment practices, which have traditionally been emphasized in the education system. This shows that while teachers are capable of understanding assessment concepts, they still encounter challenges in adapting these practices to meet diverse student needs. Research by Cansoy and Turkoglu (2022) supports this finding, stating that assessment is often viewed as the most familiar tool for teachers in identifying student needs, making it easier to implement in varied contexts.

Conversely, the Product category scores lowest in understanding and implementation. This gap highlights teachers' difficulties in applying differentiation practices to student learning outcomes. This issue may be attributed to the systemic focus on standardized testing, which often limits opportunities for more creative and personalized assessment approaches. According to research by Dack and Tomlinson (2024), the development of varied products requires more significant resources and adequate structural support. In contrast, traditional educational systems tend to prioritize uniform and standardized evaluation. This underscores the need for more structural support to enable teachers to implement product variations in the classroom, which allows students to demonstrate their learning in diverse ways, reflecting their strengths and interests.

Furthermore, these findings align with Hidayat et al. (2024), who noted that implementing differentiated instruction remains particularly challenging for schools that have not yet achieved a certain level of development. Similarly, in this study, many participating teachers come from schools that may not have fully embraced inclusive practices or reached advanced status in implementing Kurikulum Merdeka. This highlights the ongoing challenges in applying DI effectively across various school contexts. Systemic factors, such as curriculum limitations and inadequate administrative support, complicate DI implementation in Indonesian schools (Sujadi et al., 2024). Additionally, well-documented obstacles significantly hinder effective DI practices, including limited time, restricted resources, and large class sizes (Roberts-Lieb, 2020). Teachers also face challenges in preparing diverse teaching materials and developing appropriate assessment instruments from those individualized teaching materials (Cayabas & Sumeg-ang, 2023).

External factors, such as workload, significantly affect teachers' ability to implement product differentiation optimally. Research by Skaalvik and Skaalvik (2020) demonstrates that high workloads often prevent teachers from applying more creative teaching methods, including product differentiation, due to limited time and energy. As a result, teachers tend to prefer more standardized and uniform methods in their teaching, as these are perceived to be more time-efficient and more accessible to implement (Garrison, 2023; Middleton & Millican, 2020). Middleton (2020) also highlights the long-term impact of COVID-19 on K-12 education, showing how the pressure to meet standards limits teachers' capacity to innovate in both student learning and assessment. Similarly, Garrison (2020) notes that high-stakes testing environments can stifle creative and responsive teaching practices as teachers focus more on meeting standardized requirements.

While external factors are significant in limiting teachers' capacity for product differentiation (Garrison, 2020; Middleton, 2020; Skaalvik & Skaalvik, 2020), internal psychological factors, such as self-efficacy and mindset, are equally critical (Porta & Todd, 2024; Wen & Chai, 2024). Self-

efficacy is the belief in one's ability to succeed in specific tasks, which directly influences teachers' motivation and willingness to adopt innovative teaching strategies, including DI (Scarparolo & Subban, 2021). Teachers with higher self-efficacy are more likely to implement these instructional methods confidently. In contrast, those with lower self-efficacy may hesitate, feeling less equipped to handle the complexities involved (Makeleni et al., 2023; Na & Isa, 2024). Teachers with low self-efficacy may struggle to implement inclusive education strategies, feeling unprepared to address diverse classroom needs (Arias-Pastor et al., 2024). Another study found that teacher self-efficacy accounted for 19.4% of the variance in student engagement, indicating that confident teachers foster more engaged learners (Emiru & Gedifew, 2024). Furthermore, a growth mindset amplifies this internal drive, fostering a belief in continuous improvement for teachers and their students (Wen & Chai, 2024).

These internal factors thus form a critical psychological foundation that enables teachers to overcome external challenges, pushing them to Differentiate Instruction despite external pressures like workload or time constraints. When teachers believe in growth for themselves and their students, they are more likely to embrace innovative teaching methods. However, misconceptions about Differentiated Instruction (DI) can obstruct this adoption. Studies, such as by Kharka & Kinley (2024), highlight that many teachers hold positive attitudes toward DI but struggle with its practical application due to misunderstandings about its nature and implementation. These misconceptions often lead teachers to rely on traditional methods, particularly in the Product category. Low scores indicate difficulties in designing and integrating differentiated learning products due to a lack of confidence or clarity about DI practices.

Based on these findings, addressing the identified challenges through targeted strategies, including enhanced teacher training, better resource allocation, and systemic support, is essential. This discussion highlights the complexity of implementing Differentiated Instruction (DI) while indicating improvement opportunities. Future research should focus on evaluating the effectiveness of various professional development programs and exploring innovative ways to support teachers in overcoming misconceptions and practical barriers. Additionally, policymakers and educational leaders need to collaborate closely to create environments that support the successful implementation of DI.

To tackle these issues, one actionable step is to implement professional development for all general and special education teachers in each school building, focusing on the least understood components of DI: understanding of process, interest, and product; and implementation in areas like process, lesson planning, assessment, and product. By addressing these areas, we can move closer to realizing the full potential of DI in various educational settings. The implications of this research indicate that although teachers' knowledge of DI is sufficiently good, implementation requires more attention, particularly in the Product category. Further practical and contextual training will be very helpful in enhancing teachers' confidence in designing varied learning products. Moreover, there needs to be structural support that enables teachers to have adequate time and resources to develop products that meet their students' needs.

## 6. Conclusion

Based on this study's findings, a significant discrepancy exists between Indonesian primary school teachers' understanding of Differentiated Instruction (DI) and its actual implementation in the classroom. While teachers demonstrate a firm grasp of assessment practices—an area traditionally emphasized in the educational system, enabling them to identify diverse student needs effectively—this strength is not reflected in the implementation of the Product category. Across all categories; Student Interest, Assessment, Lesson Planning, Content, Process, and Product, teachers' theoretical knowledge consistently outperformed their practical application. This suggests that although teachers are familiar with the principles of DI, they face challenges in translating this knowledge into varied teaching practices.

Consequently, while Indonesian primary school teachers possess commendable knowledge of DI, particularly in assessment, the difficulties in applying this knowledge, especially in product differentiation, underscore an urgent need for targeted support and professional development. Addressing the interconnected factors of teachers' knowledge, systemic constraints, and internal motivation is essential for enhancing the effectiveness of DI in classrooms. By focusing on these areas, educational stakeholders can work towards bridging the gap between understanding and implementation, ultimately fostering a more inclusive and responsive learning environment for all students.

## Limitation

This research offers valuable insights into Differentiated Instruction (DI) practices, though there are some limitations to consider. The study relies on self-reported data from teachers, which, while informative, may not fully encompass the complexities of DI implementation or account for all classroom dynamics. Additionally, the focus on primary school teachers within a specific region may limit the generalizability of the findings to other educational contexts. The research also does not address broader systemic factors such as administrative support and curriculum constraints, which can play a significant role in DI practices. Despite these limitations, the findings provide a valuable snapshot of DI implementation and highlight areas for future exploration. Future research could benefit from including a more comprehensive range of data sources, examining systemic influences, and considering the long-term application of DI strategies.

## Recommendation

Based on the research findings, it is recommended that future studies investigate the specific challenges and barriers to implementing Differentiated Instruction (DI) across various educational contexts. Utilizing a mixed-methods approach that combines quantitative and qualitative data will provide a more comprehensive understanding of DI practices and their effectiveness. Educational stakeholders, including policymakers and administrators, should prioritize the development of targeted professional development programs that address the identified gaps in DI, particularly in the Product component. Training should be implemented for all general and special education teachers within each school, focusing on enhancing their understanding of critical aspects of DI such as process, student interest, and product. Additionally, these programs should aim to improve implementation strategies in areas including lesson planning, assessment, and product development. Moreover, enhancing resources and support systems for teachers is vital to bridge the gap between theoretical knowledge and practical application. By investing in these areas, we can improve DI implementation and student outcomes. Ensuring that teachers feel supported and equipped will facilitate a more effective and inclusive learning environment for all students.

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## Conflict of Interest

The Authors declare that there are no conflicts of interest to disclose.

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