

Teachers' Mindset and Readiness for Differentiated Mathematics Instruction: Case of Visually Impaired in Inclusive Classes

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Abstract: Teachers play an important role in determining the successful implementation of differentiated mathematics instruction (DMI) in inclusive classes. This success is strongly influenced by teachers' mindsets and their readiness to implement such instruction. This study aims to explore teachers' mindsets and readiness regarding DMI for visually impaired (VI) students in inclusive classes, as well as to examine the relationship between mindset and teacher readiness. The study used an explanatory sequential design, beginning with a quantitative phase followed by a qualitative phase. The quantitative phase utilized a questionnaire measuring teachers' mindsets and readiness. The questionnaire consisted of 20 items with five response options and was reviewed by two experts to establish instrument validity prior to administration. The quantitative data were analyzed descriptively and correlationally using Pearson's correlation test. The qualitative phase involved semi-structured interviews to further explain the quantitative findings. A total of 50 Indonesian mathematics teachers participated in the study and were selected through purposive sampling. The findings indicate that Indonesian mathematics teachers generally demonstrate a positive mindset and are prepared to implement DMI for VI students in inclusive classes. The results also reveal that teachers' mindsets significantly influence their readiness to implement DMI. However, several teachers reported feelings of anxiety and stress related to implementing DMI in inclusive settings. These findings highlight the importance of continuous teacher engagement in professional development programs to enhance understanding of DMI and its effective implementation, particularly in supporting VI students in inclusive classes.

Keywords: differentiated mathematics instruction, mindset, readiness, teacher, visually impaired

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Introduction

One of the significant changes in international education is the development of inclusive education, which aims to address the diverse learning needs of all students and promote educational equity (Letzel-Alt et al., 2022). Previous studies have demonstrated that inclusive education practices have a positive impact on students' learning and development, enabling them to reach their full potential (Lavin et al., 2022; Parkes et al., 2015; Putranto, 2018; Putranto & Marsigit, 2018; Putranto & Ratnasari, 2022). However, despite these documented benefits, the implementation of inclusive education remains challenging in practice (Ainscow et al., 2019). This highlights the continued importance of conducting research to better understand and support effective inclusive education practices.

Inclusive education provides opportunities for students with special needs to access the same educational services as their peers in general education settings (Onyishi & Sefotho, 2020). As a result, inclusive classes consist of increasingly diverse student populations (Mngo & Mngo, 2018; Saloviita, 2020). This diversity underscores the importance of adopting instructional approaches that

can effectively accommodate varying student needs. The use of a single, uniform instructional approach is often inappropriate in inclusive classrooms, as it may hinder the learning and development of students with special needs and prevent them from reaching their full potential (Siam & Al-Natour, 2016). To address this challenge, one pedagogical framework that can be effectively implemented in inclusive education is Differentiated Instruction (DI) (Griful-Freixenet et al., 2021). In Indonesia, the implementation of DI has gained increasing attention following the introduction of the Merdeka Curriculum in 2022, which emphasizes active student participation and prioritizes competency-based learning (Sofiana et al., 2024).

DI is an inclusive instructional approach designed to accommodate student diversity. DI aims to maximize student learning by aligning the learning environment, instructional strategies, and learning tasks with students' individual differences and learning needs (Onyishi & Sefotho, 2020; Valiandes & Neophytou, 2018; Walton, 2017). Addressing students' diverse learning needs can be achieved through modifications to content, processes, products, and the learning environment (Tomlinson, 2001). It can be done based on students' readiness, interests, and learning profiles (Maulana et al., 2020; Tomlinson, 2001; Tomlinson et al., 2013). Effective implementation of DI requires strong classroom management, the establishment of a positive classroom climate, and clear instructional practices (Maulana et al., 2020). Thus, the successful implementation of DI largely depends on teachers' ability to thoughtfully design instruction that responds to diverse student needs in inclusive learning environments.

One of the challenges in implementing DI in Indonesia is in facilitating visually impaired (VI) students. VI students represent the largest group of learners with special needs in Indonesia and therefore have a high likelihood of participating in inclusive education settings. National data indicate that individuals with visual impairments account for approximately 63.7% of the total population of people with special needs in Indonesia (Bappenas, 2021). Previous studies have shown that VI students face difficulties in learning mathematics (Bell & Silverman, 2019; Putranto et al., 2024). This issue is of particular concern, as adequate mathematical competence plays an important role in individuals' cognitive and academic development (Skagerlund et al., 2019). Consequently, the implementation of effective differentiated mathematics instruction (DMI) is essential to appropriately support VI students in inclusive classes.

Teachers play an important role in determining the success of DI practice (Bi et al., 2023), especially facilitating VI students in inclusive classes. One of the factors that influences the success of DMI in inclusive classes is the teacher's mindset. Previous studies indicate that teachers' mindsets significantly shape the teaching and learning processes in the classroom (Blume et al., 2021). Mindset refers to individuals' beliefs about abilities, intelligence, and ways of understanding and interpreting the world (Dweck & Yeager, 2019). In general, mindset can be categorized into two types: fixed mindset and growth mindset (Blume et al., 2021). Research has consistently shown that teachers who hold fixed mindsets may negatively affect students' learning experiences and outcomes (Heyder et al., 2020).

Another important factor influencing the success of teaching and learning in inclusive classes is teacher readiness (Adams et al., 2023; Kwon et al., 2017; Pershina et al., 2018). Teacher readiness encompasses knowledge and understanding, skills and abilities, as well as attitudes toward teaching (Adams et al., 2023). In the context of this study, it is conceptualized as teachers' understanding, competencies, and confidence in implementing DMI to support VI students in inclusive classes. Despite its importance, there is relatively limited evidence on teacher readiness in developing countries (Adams et al., 2023), including in Indonesia. Therefore, it is important to reveal teachers' readiness for DMI in facilitating VI students in inclusive classes.

Although research on DMI, teacher mindset, and teacher readiness has expanded in recent years, the novelty of the present study lies in its conceptual integration and empirical examination of the

relationship between teacher mindset and teacher readiness specifically within the context of implementing DMI for VI students in inclusive classrooms. Previous studies have primarily investigated the benefits and effectiveness of DMI in enhancing the overall quality of mathematics instruction (Bobis et al., 2021; Courtney, 2021; Gervasoni et al., 2021; Herner-Patnode & Lee, 2021; Prast et al., 2018), without explicitly addressing its application to VI students. Findings from recent literature reviews indicate that DMI research has largely focused on instructional components, academic achievement, classroom dynamics, differentiated learning strategies, and student characteristics (Kurnila et al., 2025), yet has not incorporated teachers' psychological factors as potential determinants of successful implementation. Meanwhile, research on mindset has predominantly centered on students and its influence on motivation and academic achievement (Mesler et al., 2021), whereas studies examining teacher mindset remain relatively limited, particularly in relation to marginalized student populations, including students with special needs (Laine & Tirri, 2023). Furthermore, investigations of teacher readiness in inclusive education have generally emphasized pedagogical competence or attitudes toward inclusion (Nafiah et al., 2025; Putri & Siti Quratul Ain, 2022), without directly linking readiness to the implementation of DMI. Therefore, there remains a lack of research that simultaneously examines the relationship between teacher mindset and teacher readiness in the specific context of implementing DMI for VI students in inclusive classrooms. This study seeks to address this gap by positioning teacher mindset as a potential predictor of teacher readiness in implementing DMI.

Based on the discussion above, this study aims to address three main research questions:

- What are teachers' mindsets regarding the implementation of DMI for VI students in inclusive classes?
- How prepared are teachers to implement DMI for VI students in inclusive classes?
- Does the teacher's mindset influence teacher readiness regarding DMI for VI students in inclusive classes?

Method

This study employed an explanatory sequential design, consisting of a quantitative phase followed by a qualitative phase. The quantitative phase involved administering questionnaires to the research participants, and the resulting data were subsequently analyzed and interpreted. The study then proceeded to the qualitative phase, which adopted a phenomenological approach. This approach was deemed appropriate because it allows for an in-depth exploration of the structure of phenomena and the lived experiences of individuals (Firouzkouhi et al., 2024). The phenomenon of DMI practice for VI students in inclusive classes has not been thoroughly examined in previous research, particularly in relation to teachers' mindset and readiness in the Indonesian context.

Research Subject

Table 1. Demographic Research Subjects

Aspect	Number of participants	Percentage
Gender		
Male	8	16,0 %
Female	42	84,0 %
Teaching experiences		
0-5 years	34 (S1-S34)	68,0 %
6-10 years	8 (S35-S42)	16,0 %
11-15 years	2 (S43 & S44)	4,0 %
16-20 years	6 (S45-S50)	12,0 %

The participants in this study were mathematics teachers working in inclusive classrooms who had experience implementing DMI for VI students. A total of 50 teachers participated, the majority of whom had less than five years of teaching experience. Each participant was assigned a code from S1 to S50. Detailed demographic information of the participants is presented in Table 1.

Participants were selected using purposive sampling. The inclusion criteria were as follows: (1) being a mathematics teacher, (2) having experience teaching in inclusive classrooms and implementing DMI for VI students, and (3) being willing to participate in all stages of the study from beginning to end.

Data Collection

Data were collected using questionnaires and semi-structured interviews. Both the questionnaire and the interview questions were reviewed by two experts to ensure their validity. The questionnaire consisted of 20 items with five response options and was administered via Google Forms. Mindset was measured based on teachers' frame of mind regarding VI students and the implementation of DMI for these students in inclusive classrooms. Teacher readiness was conceptualized as teachers' knowledge and understanding, skills and abilities, and attitudes. Each participant completed the questionnaire within 15–20 minutes. Following the questionnaire, semi-structured interviews were conducted to obtain more in-depth information. The interviews, conducted by telephone, lasted approximately 20–30 minutes, and all participants consented to having their responses recorded.

Data Analysis

Questionnaire data were first analyzed descriptively to examine teachers' mindset and readiness regarding DMI for VI students in inclusive classrooms. Teachers' mindsets were categorized based on the average scores from the questionnaire, using modified criteria from Saefudin et al. (2023) includes a Fixed-fixed mindset (FF/ bad), Fixed-growth mindset (FG/ less positive), Growth-fixed mindset (GF/ positive), and Growth-growth mindset (GG/ very positive). Teacher readiness was classified into four categories: not ready, less ready, ready, and very ready. The relationship between teachers' mindset and readiness was then analyzed using Pearson's correlation test at a 95% significance level with the assistance of SPSS. The results of the quantitative analysis were subsequently interpreted and complemented by qualitative data analysis to provide a more comprehensive understanding.

Interview data were analyzed qualitatively by adapting the analytical procedures of Chien et al. (2020) and Firouzkouhi et al. (2024), which include the following steps: (1) re-reading all participants' descriptions of the phenomenon under study; (2) extracting significant statements from each description that are directly related to the phenomenon; (3) formulating the meanings of these significant statements; (4) organizing the data by grouping meanings into themes; (5) integrating the results of the analysis into a comprehensive description of the phenomenon; (6) returning the findings to participants for validation; and (7) incorporating relevant new data into the fundamental structure of the phenomenon.

To ensure the rigor of the study, the researchers attended to credibility, confirmability, dependability, and transferability (Lincoln & Guba, 1985). Credibility was established through methodological triangulation, using both questionnaires and interviews. Confirmability and dependability were maintained through the researchers' ongoing engagement with the data and verification by the researchers and research assistants. To support transferability, detailed descriptions were provided for each stage of the research process.

Results and Discussion

The Results and Discussion section of this study is organized into three main topics, corresponding to the three research questions. The first topic examines teachers' mindset regarding the

implementation of DMI for VI students in inclusive classrooms, addressing research question 1 and highlighting teachers' mindset profiles and characteristics. The second topic focuses on teachers' readiness to implement DMI for facilitating VI students in inclusive classrooms, addressing research question 2. The third topic explores the relationship between teachers' mindset and their readiness to implement DMI for VI students, addressing research question 3 and presenting findings on how variations in mindset correlate with or predict teachers' readiness. Together, these three sub-sections provide a comprehensive analysis of the empirical findings, linking teachers' psychological factors to their instructional preparedness and offering insights into effective strategies for implementing DMI in inclusive mathematics classrooms for VI students.

Teacher Mindset Regarding DMI in Facilitating VI Students in Inclusive Classes

The results of the descriptive analysis of the teacher mindset questionnaire regarding DMI for VI students in inclusive classes are presented in Table 2. The results show that the average teacher mindset is 23.80 in the Growth-fixed mindset (GF/positive) category. This positive mindset is expected to provide benefits to DMI practice so that it can optimize VI students' mathematical abilities. Yeager & Dweck (2020) revealed that the impact of a growth mindset provides benefits for both teachers and students. The meta-analysis conducted shows that teachers' mindsets play a mediating role in increasing student achievement (Zhang et al., 2017). Therefore, it is hoped that the positive GF/positive mindset possessed by teachers can improve the mathematics achievement of VI students or students in general in inclusive classes.

Table 2. Descriptive Analysis of Teacher Mindset

No	Aspect	Score
1	Maximum Score	30,00
2	Minimum Score	20,00
3	Mean	23,80
4	Deviation Standard	2,25

The interview shows that teachers have a positive mindset regarding VI students in inclusive classes. S4, S23, S24, and S28 reveal that VI students have the potential ability to learn mathematics optimally just like other students. The teacher's positive mindset towards VI students in the inclusive class is predicted to influence the teacher's positive attitude regarding DMI for VI students in the inclusive class. Previous research proves that teachers' previous understanding of students has an impact on teachers' mindsets (Patrick & Joshi, 2019). S9, S10, S29, S42, and S50 revealed that the mathematics learning strategies they use, including DMI, can influence the development of VI students. All research subjects revealed that VI students' experiences in the classroom and the way teachers accompany students will influence VI students' mathematical abilities.

The results of the teacher mindset questionnaire showed that the research subjects were in the positive and very positive categories. There were no subjects who had quite positive or bad mindsets. The complete level of teacher mindset is presented in Figure 1. However, several research subjects still felt worried about teaching and accompanying VI students in inclusive classes. This condition is often found in several teachers who have less than 5 years of teaching experience. S2, S11, S13, S17, and S24 stated that *"I feel worried about teaching mathematics with VI students in inclusive classes."* This condition shows that thought patterns are interrelated with many other affective factors (Liu et al., 2023). One related factor is anxiety (Ozdemir & Papi, 2022). This has implications for the importance of teachers being continuously actively involved in professional development programs to gain a deeper understanding of DI and its implementation (Hasanah et al., 2023). Active involvement is expected to be a solution to reduce the level of anxiety experienced by teachers.

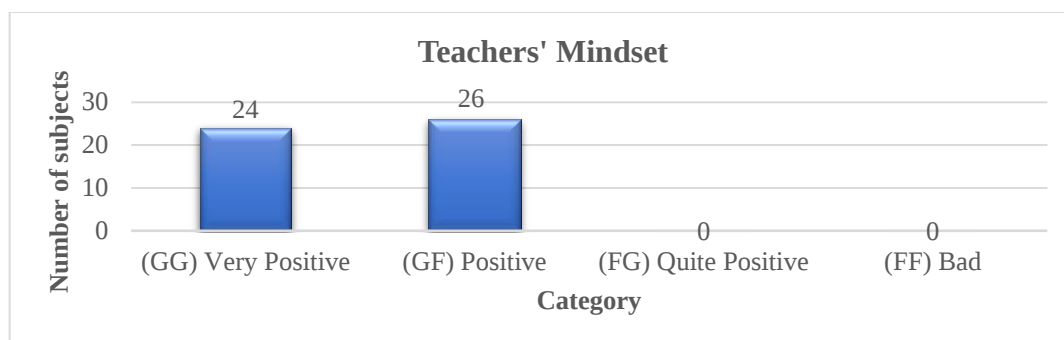


Figure 1. Teacher Mindset Level Regarding DMI for VI Students

The results of the interview revealed several negative mindsets that emerged and needed attention, including teachers considering mathematics as an abstract subject so it would be difficult to convey to VI students (S40, S41). Apart from that, teaching VI students with DMI will take a very long time (S39; S48). The teacher's negative mindset is also shown by the opinion that DMI for VI students in inclusive classes is more stressful because it requires extra preparation (S10). In interviews it was revealed that the majority of teachers did not receive the DMI curriculum during their undergraduate degree. This condition shows the importance of universities and policy makers to prioritize increasing teacher knowledge about DI. In this regard, university curricula as well as teacher training and professional development programs must cover aspects of DI, such as differentiation strategies, management in DI settings, and the use of learning resources that meet individual student needs (Hasanah et al., 2023).

Teacher Readiness for DMI in Facilitating VI Students in Inclusive Classes

The results of the descriptive analysis of the teacher readiness questionnaire regarding DMI for VI students in inclusive classes are shown in Table 3. The results show that the average teacher readiness is 48.28 in the ready category. Teachers' readiness is shown through their confidence in designing, implementing, and conducting assessments through DMI for VI students. S6 revealed that *"I understand the characteristics and learning needs of VI students, so I am able to design mathematics learning that is tailored to their needs."* S42 revealed that *"I am able to carry out various forms of assessment, for example providing various projects for VI students and other students to choose and complete. I am also able to provide assessments through oral tests for VI students while other students will take written tests."*

Table 3. Descriptive Analysis of Teacher Readiness

No	Aspect	Score
1	Maximum Score	65,00
2	Minimum Score	38,00
3	Mean	48,28
4	Deviation Standard	5,20

If we reveal every aspect of readiness including knowledge and understanding, skills and abilities, as well as teacher attitudes, everything is in the good (ready) category. This has positive potential for the development of inclusive education in Indonesia because teachers' knowledge of dealing with student diversity is important (Rabi et al., 2018; Sharma et al., 2018). Apart from that, knowledge regarding the abilities of students with special needs and DI is something that a teacher must have to teach in inclusive classes (Sucuoğlu et al., 2013).

Teacher readiness regarding DMI for VI students can be seen in detail in Figure 2. There are 5 teachers who are in the less prepared category. S30 revealed that *"I also have difficulty developing or using learning media that suits the needs of VI students in inclusive classes."* Apart from those problems, the interview results revealed several aspects that showed teachers were less prepared to use DMI to facilitate VI students, including teachers feeling unsure about being able to accompany VI students and having difficulty ensuring that discrimination did not occur.

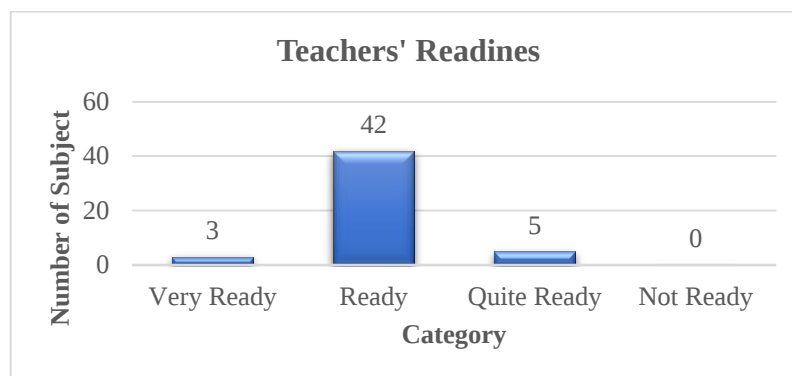


Figure 2. Teacher Readiness Level Regarding DMI for VI Students

The Influence of Teacher Mindset on Teacher Readiness

The results of the correlation analysis between mindset and teacher readiness are presented using the Pearson test as shown in Table 4 below. Analysis was carried out using SPSS with a significance level of 95%.

Table 4. Output of Pearson Correlation test

		Mindset	Readiness
Mindset	Pearson Correlation	1	.407**
	Sig. (2-tailed)		.003
	N	50	50
Readiness	Pearson Correlation	.407**	1
	Sig. (2-tailed)	.003	
	N	50	50

**. Correlation is significant at the 0.01 level (2-tailed).

The Pearson correlation analysis indicated a moderate positive relationship between teachers' mindset and their readiness to implement DMI for VI students in inclusive classrooms, $r(48) = 0.41, p = 0.003$. The positive correlation suggests a unidirectional relationship, meaning that teachers with a more positive mindset tend to exhibit higher readiness to implement DMI. The p-value being below 0.05 indicates that this relationship is statistically significant. These findings highlight that teachers' mindset is an important factor influencing their preparedness to carry out differentiated mathematics instruction in inclusive classroom settings. This finding strengthens previous research which proves that mindset significantly influences a person's readiness (Puspitasari, 2023).

Understanding the influence of mindset on teachers' readiness to implement DMI in inclusive classrooms is essential for designing professional development programs that strengthen this relationship. Previous research has shown that teachers' mindset significantly affects their attitudes toward students with special needs in inclusive settings (Gutshall, 2013), and attitude is a key component of teacher readiness. These findings underscore the importance of considering teachers'

mindsets when developing inclusive education practices (Blume et al., 2021), including the implementation of DMI for VI students in inclusive classes.

Participant S48, who demonstrated a very positive (GG) mindset, exhibited strong knowledge regarding DMI. In the interview, S48 explained: *"I consider the individual needs of students by providing accessibility tailored to their requirements, for example through braille and screen-reading software. In addition, I allow students to use necessary tools during assessments and employ clear and flexible rubrics to evaluate their progress."* Similarly, S1 stated: *"I am able to collaborate with other teachers and/or special assistant teachers to develop DMI for VI students. Through this collaboration, feedback is obtained to improve the learning process."* These statements indicate that teachers are prepared to collaborate with others in developing DMI. Previous research suggests that individuals with a growth mindset positively receive input from others and, when facing challenges, focus on problem-solving (Lim et al., 2020).

Conclusion

The findings of this study indicate that teacher mindset and readiness are critical factors in the successful implementation of differentiated mathematics instruction (DMI) for students with visual impairments (VI) in inclusive classrooms. Indonesian mathematics teachers generally demonstrate a positive or growth-oriented mindset and show readiness to implement DMI for VI students. Moreover, the study reveals a significant positive relationship between teachers' mindset and their readiness, suggesting that a more positive mindset contributes to greater preparedness in applying DMI practices. These results highlight the important role of teachers' beliefs and attitudes in shaping inclusive educational practices.

Despite the overall positive findings, some teachers reported experiencing anxiety and stress when implementing DMI in inclusive settings. This underscores the need for continuous professional development programs that provide teachers with opportunities to strengthen their understanding of DMI and its practical application, particularly in facilitating VI students. Supporting teachers in developing both their mindset and instructional competencies can enhance their confidence, effectiveness, and the overall quality of inclusive mathematics education.

This study has several limitations. The sample consisted of 50 teachers, the majority of whom were female and from the same geographic area, which may limit the generalizability of the findings. Future research should involve larger and more diverse samples to gain a broader understanding of teacher mindset and readiness in different contexts. In addition, future studies could investigate how teachers implement DMI in practice and the challenges they face, providing valuable insights for refining strategies and policies to support inclusive education for students with visual impairments.

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