

MATHEMATICS TEACHERS' BELIEFS AND MATHEMATICAL MINDSET TOWARD DIFFERENTIATED INSTRUCTION: AN EXPLORATORY STUDY IN MADRASAH ALIYAH

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ABSTRACT

This small-scale exploratory study examined Madrasah Aliyah mathematics teachers' beliefs about differentiated instruction, implementation self-efficacy, mathematical mindset, reported practices, and perceived benefits and barriers. Thirteen mathematics teachers in the Special Region of Yogyakarta completed an online questionnaire containing closed-ended items and one open-ended question. Quantitative data were analysed descriptively, while open-ended responses were examined through content analysis. The findings showed that teachers strongly valued differentiated mathematics instruction ($M = 3.31$), although implementation self-efficacy was descriptively lower ($M = 3.08$). Most teachers reported prior experience with differentiation, with process differentiation used more frequently than content and product differentiation. Eleven teachers showed a high-value-high-self-efficacy profile, whereas two showed high value with lower self-efficacy. Teachers' overall mathematical mindset was classified as growth-fixed (GF), while the effort and persistence item reached growth-growth (GG). The main perceived benefit was accommodating learner diversity, whereas the principal barriers involved time, workload, classroom management, and limited experience. These findings highlight the need for practical and collaborative professional development that helps teachers translate positive beliefs into sustainable differentiated mathematics practices.

Studi eksplorasi skala kecil ini meneliti keyakinan guru matematika Madrasah Aliyah tentang pembelajaran berdiferensiasi, efikasi diri implementasi, pola pikir matematika, praktik yang dilaporkan, serta manfaat dan hambatan yang dirasakan. Tiga belas guru matematika di Daerah Istimewa Yogyakarta mengisi kuesioner daring yang berisi pertanyaan tertutup dan satu pertanyaan terbuka. Data kuantitatif dianalisis secara deskriptif, sedangkan tanggapan terbuka dianalisis melalui analisis isi. Hasil penelitian menunjukkan bahwa guru sangat menghargai pembelajaran matematika berdiferensiasi ($M = 3,31$), meskipun efikasi diri implementasi secara deskriptif lebih rendah ($M = 3,08$). Sebagian besar guru melaporkan pengalaman sebelumnya dengan diferensiasi, dengan diferensiasi proses lebih sering digunakan daripada diferensiasi isi dan produk. Sebelas guru menunjukkan profil nilai tinggi-efikasi diri tinggi, sedangkan dua guru menunjukkan nilai tinggi dengan efikasi diri yang lebih rendah. Pola pikir matematika guru secara keseluruhan diklasifikasikan sebagai Growth-Fixed (GF), sedangkan item usaha dan ketekunan mencapai kategori Growth-Growth (GG). Manfaat utama yang dirasakan adalah mengakomodasi keberagaman peserta didik,

sedangkan hambatan utama meliputi waktu, beban kerja, manajemen kelas, dan pengalaman yang terbatas. Temuan ini menyoroti kebutuhan akan pengembangan profesional yang praktis dan kolaboratif yang membantu guru menerjemahkan keyakinan positif ke dalam praktik matematika yang terdiferensiasi dan berkelanjutan.

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1. INTRODUCTION

Mathematics classrooms comprise students with different prior knowledge, readiness, learning pace, motivation, and confidence. Uniform instruction may therefore provide unequal opportunities for students to understand mathematical concepts and participate meaningfully. Differentiated instruction addresses this diversity by adapting content, learning processes, products, and instructional support according to students' readiness, interests, and learning profiles (Coubergs et al., 2017; Gheysens et al., 2022). In mathematics, these adaptations should provide appropriate access, challenge, and scaffolding while maintaining meaningful mathematical goals (Sujadi et al., 2024). Recent syntheses further show that the effects of differentiation depend on how learning needs are assessed, how adaptations are designed, and how instruction is supported in the classroom (Deunk et al., 2018; Smale-Jacobse et al., 2019).

The implementation of differentiated instruction depends partly on teachers' beliefs and perceived capability. Teachers may value differentiation as a responsive pedagogical approach but remain uncertain about diagnostic assessment, mathematical task adaptation, flexible grouping, differentiated assessment, and simultaneous support for students with different readiness levels. Previous studies show that differentiated practices are influenced by teachers' beliefs, self-efficacy, professional experience, class size, and organisational support (Bi et al., 2023; Suprayogi et al., 2017; Whitley et al., 2019). Teachers may therefore evaluate differentiation positively while still perceiving its implementation as challenging (Letzel et al., 2023; Porta & Gaunt, 2025). This complexity is also consistent with research on adaptive teaching and differentiated instruction as demanding professional practices that require continuous teacher decision making (Parsons et al., 2018; van Geel et al., 2019).

Research involving mathematics teachers has examined their knowledge, conceptions, and self-efficacy regarding differentiated instruction (Kyeremeh et al., 2022; Porta & Gaunt, 2025; Sujadi et al., 2024). These studies indicate that teachers may understand the principles of differentiation while experiencing difficulties in task design, assessment, classroom management, and instructional time. However, perceived value, implementation self-efficacy, reported content–process–product practices, and perceived benefits and barriers have rarely been examined together within mathematics education.

The relationship between teachers' acceptance of differentiation and their reported capacity to enact it therefore remains insufficiently understood.

Teachers' mathematical mindset may contribute to this relationship. Saefudin et al. (2023) conceptualise mathematical mindset as multidimensional beliefs about mathematical ability and intelligence, challenges, difficulties, effort, criticism or feedback, and others' success. These beliefs may reflect fixed-fixed (FF), fixed-growth (FG), growth-fixed (GF), or growth-growth (GG) characteristics. This multidimensional perspective recognises that teachers may strongly endorse effort and persistence while retaining less growth-oriented beliefs about failure, challenge, or feedback (Im & Park, 2023; Saefudin et al., 2023). Moreover, agreement with growth-oriented statements does not necessarily demonstrate corresponding instructional practices, as apparently positive mindset beliefs may coexist with less adaptive views of competence or failure (Barger et al., 2022). Contemporary mindset research also emphasises the role of supportive classroom contexts, teacher beliefs, and pedagogical practices in shaping whether growth-oriented beliefs can influence students' learning experiences (Dweck & Yeager, 2019; Yeager et al., 2022).

Although the mathematical mindset has been investigated predominantly among students, little is known about how teachers' mathematical mindset coexists with their perceived value, self-efficacy, and reported practices of differentiated mathematics instruction. In the Indonesian literature, research has examined junior-high mathematics teachers' conceptions and implementation of differentiation (Sujadi et al., 2024) and students' mathematical mindset (Saefudin et al., 2023), but evidence concerning Madrasah Aliyah mathematics teachers remains limited. To the authors' knowledge, their differentiated practices, mathematical mindset, perceived benefits, and implementation constraints have not been examined together within a single exploratory study.

Accordingly, this small-scale exploratory study examined Madrasah Aliyah mathematics teachers' reported differentiated practices, perceived value of differentiated instruction, implementation self-efficacy, mathematical mindset, and perceived benefits and barriers. The study sought to clarify the belief-to-practice tension and identify areas requiring practical professional support. It addressed the following research questions:

1. What experiences did teachers report in implementing content, process, and product differentiation in mathematics instruction?
2. What were the levels of teachers' perceived value of differentiated mathematics instruction and implementation self-efficacy, and what provisional descriptive profiles emerged from these dimensions?
3. How were teachers' mathematical mindset items classified within the FF, FG, GF, and GG framework?
4. What benefits and barriers did teachers perceive in implementing differentiated mathematics instruction?

2. METHODS

3. Research Design and Participant

This small-scale descriptive-exploratory survey examined teachers' reported differentiated practices, perceived value, implementation self-efficacy, mathematical

mindset, and perceived benefits and barriers. Participants were 13 mathematics teachers from public and private Madrasah Aliyah schools in the Special Region of Yogyakarta, selected through convenience sampling. Data were collected in March 2025. As shown in Table 1, the sample comprised eight female and five male teachers from four districts or cities, with varied teaching experience; 10 were civil servants, eight were professionally certified, and 11 had previously implemented differentiated instruction.

Table 1. Demographic Characteristics of the Participants

Characteristic	Category	n	Percentage (%)
Gender	Female	8	61.5
	Male	5	38.5
School location	Sleman Regency	5	38.5
	Bantul Regency	4	30.8
	Kulon Progo Regency	3	23.1
	Yogyakarta City	1	7.7
Employment status	Civil servant	10	76.9
	Non-civil servant	3	23.1
Teaching experience	Less than 10 years	7	53.8
	10–20 years	1	7.7
	More than 20 years	5	38.5
Professional certification	Certified	8	61.5
	Not yet certified	5	38.5
Previous experience with differentiated instruction	Experienced	11	84.6
	No previous experience	2	15.4
Total		13	100.0

4. Data Collection and Research Instrument

Data were collected through a researcher-developed online questionnaire administered using Google Forms. The questionnaire comprised four sections: demographic and professional information, previous experience with differentiated instruction, closed-ended belief and mindset statements, and one open-ended question concerning the perceived benefits and barriers of differentiated mathematics instruction.

The first closed-ended section contained 10 items concerning teachers' beliefs about differentiated mathematics instruction. Eight items (B1–B8) measured the perceived value of differentiated mathematics instruction, while two items (B9–B10) served as a limited indicator of implementation self-efficacy. Responses were recorded on a four-point confidence scale ranging from 1 (strongly not confident) to 4 (strongly confident). The second closed-ended section consisted of six mathematical mindset items rated on a four-point agreement scale ranging from 1 (strongly disagree) to 4 (strongly agree). The items addressed mathematical ability and intelligence, challenges, difficulties, effort, criticism or feedback, and beliefs about success in mathematics. Their conceptual organisation was informed by Saefudin et al. (2023), although the present six-item set was not a full adaptation of the original instrument. The negatively worded item M1 was reverse-scored. The questionnaire also included one open-ended question asking teachers to describe the

perceived benefits and barriers of differentiated mathematics instruction. These responses were used to contextualise the quantitative findings.

Preliminary item analysis indicated acceptable item homogeneity, with corrected item-total correlations ranging from .716 to .898 for perceived value and from .351 to .953 for mathematical mindset. The two self-efficacy items correlated at $r = .769$. Internal consistency was high for perceived value ($\alpha = .951$), the two-item self-efficacy indicator ($\alpha = .825$; Spearman-Brown = .869), the overall differentiated-instruction belief items ($\alpha = .953$), and mathematical mindset ($\alpha = .861$). Given the small sample, these coefficients were interpreted only as preliminary evidence of score consistency and not as full construct validation.

5. Data Analysis and Ethical Considerations

Quantitative data were analysed using frequencies, percentages, means, and standard deviations. Perceived-value and implementation self-efficacy scores were interpreted using equal intervals: 1.00–1.75 (very low), 1.76–2.50 (low), 2.51–3.25 (high), and 3.26–4.00 (very high). Using the theoretical midpoint of 2.50, participants were descriptively grouped as high-value-high-self-efficacy, high-value-lower-self-efficacy, or limited-value. These groupings were used only to describe combinations of beliefs and were not derived through cluster or latent profile analysis (Letzel et al., 2023; Porta & Gaunt, 2025).

After reverse-scoring M1, mathematical mindset means were descriptively classified as fixed-fixed (FF; 1.00–1.49), fixed-growth (FG; 1.50–2.49), growth-fixed (GF; 2.50–3.49), or growth-growth (GG; 3.50–4.00), following an adapted interpretation of Saefudin et al. (2023). Because only six items were used, these classifications were not considered equivalent to the original instrument. Open-ended responses were analysed through qualitative content analysis by coding meaningful units and grouping them into categories of benefits and barriers (Elo & Kyngäs, 2008). Categories were non-mutually exclusive, and qualitative findings were integrated with the quantitative results during interpretation.

Participation was voluntary, and all identifying information was removed before analysis. Participants were assigned anonymous codes G01–G13, and findings and quotations were reported without identifying individual teachers or schools.

6. RESULT

6.1. Teachers' Experience with Differentiated Mathematics Instruction

All 13 teachers considered differentiated mathematics instruction important for supporting learning outcomes and responding to student diversity. As shown in Table 2, 11 teachers (84.6%) reported previous experience with differentiated instruction, whereas two teachers (15.4%) had not implemented it.

Table 2. Teachers' Experience with Differentiated Mathematics Instruction

Aspect	Category	n	Percentage (%)
Perceived importance	Important	13	100.0
Previous implementation	Experienced	11	84.6

Aspect	Category	n	Percentage (%)
Differentiated components ¹	No previous experience	2	15.4
	Content	6	60.0
	Process	7	70.0
	Product	4	40.0
	Content, process, and product	1	10.0

Note. ¹Percentages for differentiated components were calculated from the 10 teachers who specified the components implemented. Teachers could report more than one component.

Of the 11 teachers reporting previous implementation, 10 specified the components they had differentiated. Process differentiation was reported most frequently by seven teachers (70.0%), followed by content differentiation by six teachers (60.0%) and product differentiation by four teachers (40.0%). Only one teacher reported differentiating content, process, and product. The results indicate that teachers' reported practices were concentrated on modifying learning processes. Adaptations to mathematical content and students' learning products were reported less frequently.

6.2. Teachers' Beliefs about Differentiated Mathematics Instruction

Teachers reported positive beliefs about differentiated mathematics instruction. As presented in Table 3, the overall belief score was very high ($M = 3.26$, $SD = 0.44$). The perceived value of differentiated mathematics instruction obtained a mean of 3.31 ($SD = 0.46$), while the two-item implementation self-efficacy indicator obtained a descriptively lower mean of 3.08 ($SD = 0.45$).

Table 3. Teachers' Beliefs about Differentiated Mathematics Instruction

Code	Item summary	M	SD	Category
Perceived value of differentiated mathematics instruction				
B1	Learning according to the students' pace and ways of learning	3.38	0.51	Very high
B2	Supporting understanding at different ability levels	3.31	0.48	Very high
B3	Increasing students' active engagement	3.31	0.48	Very high
B4	Reducing gaps among students with different abilities	3.15	0.69	High
B5	Facilitating optimal learning outcomes for all students	3.31	0.63	Very high
B6	Providing relevant and meaningful learning experiences	3.46	0.52	Very high
B7	Supporting mastery of difficult mathematical concepts	3.23	0.44	High
B8	Increasing motivation by addressing learning needs	3.31	0.48	Very high
Dimension mean		3.31	0.46	Very high
Differentiated-instruction self-efficacy				
B9	Ability to adapt instruction for different ability levels	3.00	0.58	High
B10	Ability to provide effective additional support	3.15	0.38	High
Dimension mean		3.08	0.45	High
Overall belief score		3.26	0.44	Very high

The highest mean was obtained for B6, concerning the provision of relevant and meaningful learning experiences ($M = 3.46$). The lowest mean was found for B9, concerning teachers' confidence in adapting mathematics instruction for different ability

levels ($M = 3.00$). The perceived capacity of differentiated instruction to reduce ability gaps also received a comparatively lower score (B4, $M = 3.15$). Thus, teachers expressed stronger beliefs in the pedagogical value of differentiation than confidence in their own capacity to implement instructional adaptations.

6.3. Profiles of Teachers' Beliefs

Teachers were provisionally grouped by combining their perceived-value and implementation self-efficacy scores. The theoretical scale midpoint of 2.50 was used as a descriptive cut-off. As shown in Table 4, 11 teachers (84.6%) demonstrated a high-value-high-self-efficacy combination. Two teachers (15.4%) demonstrated high perceived value but self-efficacy at or below the scale midpoint. No teacher was included in the limited-value grouping.

Table 4. Teachers' Beliefs about Differentiated Mathematics Instruction

Profile	Characteristics	n	Percentage (%)
High-value-high-self-efficacy	Perceived value and self-efficacy scores above 2.50	11	84.6
High-value-lower self-efficacy	Perceived value above 2.50 and self-efficacy at or below 2.50	2	15.4
Limited-value	Perceived value at or below 2.50	0	0.0
Total		13	100.0

6.4. Teachers' Mathematical Mindset

Teachers' mathematical mindset was examined using the FF, FG, GF, and GG categories proposed by Saefudin et al. (2023). At the item level, the category was determined from the dominant response after reverse-scoring M1: FF represented the strongest fixed-oriented response, FG a predominantly fixed-oriented response, GF a predominantly growth-oriented response with some fixed characteristics, and GG the strongest growth-oriented response. As shown in Table 5, five of the six items were classified as GF, while the effort and persistence item was classified as GG. The predominant overall pattern was therefore GF.

Table 5. Teachers' Mathematical Mindset

Code	Item	M	SD	Category
M1 ¹	Mathematical intelligence can change and develop	3.23	0.44	GF
M2	Persistence in challenging tasks develops perseverance	3.46	0.52	GF
M3	Failure can encourage more persistent learning	3.23	0.83	GF
M4	Mathematical ability develops through effort and persistence	3.54	0.52	GG
M5	Suggestions and feedback improve mathematical work	3.38	0.51	GF
M6	Everyone can succeed in mathematics through persistence	3.46	0.52	GF
Overall mathematical mindset score		3.38	0.44	GF

Note. FF = fixed-fixed mindset; FG = fixed-growth mindset; GF = growth-fixed mindset; GG = growth-growth mindset. ¹M1 was negatively worded and reverse-scored. The overall category represents the predominant item-level response pattern.

The strongest growth-oriented pattern was found for M4, which concerned the development of mathematical ability through effort and persistence ($M = 3.54$). The

greatest response variation occurred for M3, concerning the role of failure in encouraging further learning ($SD = 0.83$). One teacher provided a strongly fixed-oriented response to this item. Teachers' beliefs were therefore more consistently growth-oriented regarding effort than regarding failure.

6.5. Perceived Benefits and Barriers

The open-ended responses generated six categories of perceived benefits. As shown in Table 6, the most frequent benefit was the capacity of differentiated instruction to accommodate students' diverse abilities and learning needs.

Table 6. Perceived Benefits of Differentiated Mathematics Instruction

Category	Frequency
Accommodating students' diverse abilities and learning needs	6
Improving mathematical understanding or learning outcomes	3
Increasing engagement, motivation, and learning enjoyment	3
Supporting peer discussion and collaboration	1
Encouraging creativity and innovation	1
Facilitating individual monitoring	1

G12 stated that differentiated instruction could "accommodate students' diverse abilities and thereby improve their understanding and engagement." G13 similarly associated the adaptation of learning materials, processes, and tasks with greater understanding, motivation, and participation.

The reported barriers are presented in Table 7. Preparation time, instructional time, and workload constituted the most frequently identified barrier.

Table 7. Perceived Barriers to Differentiated Mathematics Instruction

Category	Frequency
Preparation time, instructional time, and teacher workload	6
Classroom management and supporting several groups	4
Limited experience, competence, or familiarity	4
Students' lack of focus or understanding	1
Difficulty applying differentiation to particular topics	1
No specific barrier reported	2

G10 explained that preparation, implementation, and evaluation could make the work "double or even triple" that of regular instruction. G13 similarly highlighted complex preparation, longer instructional time, demanding classroom management, and the need for greater teacher creativity. Because responses could contain several ideas, the categories in Tables 8 and 9 were not mutually exclusive.

7. DISCUSSION

7.1. Teachers' Experience with Differentiated Mathematics Instruction.

The predominance of process differentiation is consistent with research showing that teachers more readily adapt activities, grouping, explanations, and support than curricular content or assessment products (Pozas et al., 2020; Yuen et al., 2022). Process adaptations are often immediately manageable because they do not necessarily require teachers to redesign learning objectives or construct different assessment criteria. However, this pattern should not be interpreted simply as incomplete implementation. Differentiated instruction does not require content, process, and product to be modified simultaneously in every lesson. Its quality depends more fundamentally on whether adaptations respond to evidence about readiness, interests, and learning profiles while preserving meaningful learning goals (Coubergs et al., 2017; Gheysens et al., 2022). Thus, the concern is not the number of differentiated components but the basis and quality of teachers' instructional decisions. This interpretation is consistent with reviews showing that differentiation is multidimensional and that its implementation depends on assessment, grouping, instructional support, and classroom organisation rather than a single technique (Deunk et al., 2018; Smale-Jacobse et al., 2019; van Geel et al., 2019).

The less frequent reporting of content and product differentiation nevertheless signals a possible limitation in mathematics-specific pedagogical knowledge. Differentiating mathematical content or products requires teachers to vary representations, scaffolding, task complexity, or modes of demonstrating understanding without creating permanently easier mathematics for particular students. This interpretation aligns with Kyeremeh et al. (2022), who found that mathematics teachers required stronger knowledge for translating differentiated-instruction principles into subject-specific practice. It also corresponds with Sujadi et al. (2024), who reported that Indonesian mathematics teachers understood the differentiation conceptually but faced difficulties in lesson design, classroom management, and instructional time. Therefore, the results support—not the wholesale expansion of differentiated activities—but the development of more precise mathematics-specific adaptations grounded in formative assessment and common learning objectives.

7.2. Teachers' Beliefs about Differentiated Mathematics Instruction

The strong perceived-value scores indicate that teachers accepted the educational rationale of differentiation. This supports studies showing that constructivist beliefs and positive attitudes toward student diversity are associated with greater willingness to use adaptive instruction (Pozas et al., 2020; Suprayogi et al., 2017). Nevertheless, the descriptively lower self-efficacy score reveals an important belief–capability tension. Teachers may accept that instruction should respond to diversity but remain uncertain about how to adapt mathematical tasks, coordinate several groups, or provide additional support. Whitley et al. (2019) similarly found that beliefs and self-efficacy were independently related to differentiated practices, indicating that philosophical acceptance cannot substitute for perceived implementation competence. In senior-secondary mathematics, Porta and Gaunt (2025) also showed that self-efficacy developed through

experience, reflection, feedback, and continued refinement rather than through conceptual understanding alone. Such acceptance can be understood as part of a broader adaptive-teaching orientation in which teachers adjust instruction in response to evidence of students' needs (Parsons et al., 2018).

A counter-interpretation is that the positive scores may partly reflect the normative appeal of differentiation. Because all teachers considered it important and responses were self-reported, social desirability may have elevated perceived-value scores. Moreover, high perceived value does not demonstrate that differentiation was enacted accurately or consistently. Evidence from Bi et al. (2023) and Whitley et al. (2019) indicates that implementation also depends on experience, class size, resources, and organisational support. The comparatively cautious response to reducing ability gaps is therefore meaningful. Differentiation may broaden access and participation, but it cannot independently eliminate achievement disparities. Poorly designed differentiation may even stabilise low expectations if some learners repeatedly receive less demanding tasks. Effective differentiation must combine adaptive support with consistently high mathematical expectations.

7.3. Profiles of Teachers' Beliefs

The descriptive profiles reinforce the distinction between valuing differentiation and feeling able to enact it. The two high-value-lower-self-efficacy teachers illustrate that positive attitudes can coexist with implementation uncertainty. This pattern is broadly consistent with Letzel et al. (2023), who identified teachers who evaluated differentiation positively while perceiving it as challenging. Their findings challenge the assumption that teachers can be positioned on a single continuum from supportive to resistant. Instead, beliefs may contain simultaneous commitment and concern. However, the present groupings should not be treated as equivalent to the statistically derived profiles reported by Letzel et al. The current classifications were based on a theoretical midpoint, a sample of 13 teachers, and a two-item self-efficacy indicator. Their value is therefore diagnostic rather than taxonomic: they help identify teachers who may require different forms of support, but they do not establish stable psychological types.

The practical implication is that professional development should not assume that all teachers need the same intervention. Teachers who already value differentiation but report lower confidence need modelling, guided planning, and implementation feedback rather than further persuasion about its importance.

7.4. Teachers' Mathematical Mindset

The GF-dominant pattern indicates that teachers generally held growth-oriented beliefs but did not express the strongest growth position consistently across all dimensions. This finding closely reflects Saefudin et al.'s (2023) argument that mathematical mindset is multidimensional and may combine growth- and fixed-oriented characteristics. The GG classification for effort is encouraging because teachers strongly believe that mathematical ability can develop through persistence. Such a belief is compatible with differentiated instruction: teachers who regard ability as developable are more likely to interpret differences in current attainment as starting points for support

rather than permanent limits. Research in mathematics and STEM contexts similarly indicates that teachers' and instructors' beliefs about the malleability of ability can shape students' motivation, engagement, and classroom experiences (Canning et al., 2026; Muenks et al., 2020; Sun, 2018).

Yet the GF classification and greater variability for failure provide an important counterpoint. Believing in effort does not necessarily mean that teachers regard mistakes, unsuccessful strategies, and difficulty as productive. Saefudin et al. (2023) distinguish beliefs about ability, challenge, difficulty, effort, criticism, and others' success precisely because growth orientation in one dimension may coexist with fixed tendencies in another. This distinction is also consistent with Barger et al. (2022), who warn that individuals may endorse growth-oriented language while retaining contradictory assumptions about ability or failure. In the present study, however, this should remain a theoretical interpretation rather than a conclusion about a false growth mindset, because teachers' classroom responses to student errors were not observed.

The result, therefore, challenges professional development that reduces mathematical mindset to messages about "trying harder." A robust mathematical mindset requires teachers to maintain cognitive demand, normalise errors, provide actionable feedback, and create opportunities for revision. Without these practices, an emphasis on effort may place responsibility on learners without changing the instructional conditions in which they struggle. This is consistent with research indicating that mindset-supportive pedagogy requires feedback, challenge, and classroom conditions that make growth-oriented participation possible rather than merely encouraging students to try harder (Burnette et al., 2023; Hecht et al., 2023; Rissanen et al., 2019).

7.5. Perceived Benefits and Barriers

The benefits align with the central rationale of differentiated instruction: broadening access to learning for students with different readiness levels. Similar perceptions have been reported in Indonesian studies, where differentiated instruction was associated with engagement, participation, responsiveness, and improved learning experiences (Rahmani et al., 2024; Sukarno et al., 2024). However, these are perceived benefits rather than measured student outcomes. The present data cannot establish that differentiation improved understanding, motivation, or achievement. Teachers' positive expectations should therefore be interpreted as pedagogical beliefs, not evidence of effectiveness.

Conversely, the barriers are not merely expressions of teacher reluctance. Time, workload, group management, and limited experience represent genuine implementation conditions. National studies have reported comparable constraints involving planning, classroom management, assessment, resources, and instructional time (Rahmani et al., 2024; Sujadi et al., 2024; Sukarno et al., 2024). International evidence likewise shows that differentiated practices are shaped by both teacher-level and school-level factors (Bi et al., 2023; Whitley et al., 2019).

The apparent contradiction between strong perceived value and substantial barriers is therefore central to the study. Teachers were not rejecting differentiation; they were questioning its feasibility under existing conditions. Framing the problem solely as a deficit in teacher motivation would overlook the organisational support, collaborative planning

time, adaptable resources, and manageable class structures required for sustainable implementation.

7.6. Overall Interpretation and Implications

Across Tables 2–7, a coherent pattern emerges: teachers valued differentiated mathematics instruction and generally demonstrated growth-oriented mathematical mindsets, but implementation confidence and reported practice were constrained by pedagogical and organisational demands.

The study, therefore, identifies a belief-to-practice problem rather than a belief deficit. Conceptual acceptance is already relatively strong. The more urgent need is to strengthen teachers' capacity to translate beliefs into subject-specific decisions while creating working conditions that make those decisions feasible.

Professional development should consequently combine:

1. diagnostic and formative assessment;
2. differentiated mathematical tasks with shared learning goals;
3. flexible rather than permanent ability grouping;
4. multiple representations and graduated scaffolding;
5. alternative products with common assessment standards;
6. feedback, error analysis, and revision;
7. collaborative lesson planning and reusable teaching resources.

These implications must be interpreted cautiously. The findings are based on 13 teachers, convenience sampling, self-reported data, a two-item self-efficacy indicator, and one open-ended question. The FF–FG–GF–GG categories were adapted for six item-level indicators rather than derived from the full instrument of Saefudin et al. (2023). No classroom observations were conducted to establish whether reported beliefs corresponded with enacted practice. The results, therefore, provide theoretically informed preliminary evidence, not population-level estimates or causal conclusions.

8. CONCLUSION

This study shows that the mathematics teachers in this small exploratory sample strongly valued differentiated instruction, but their confidence in implementing it was descriptively lower than their belief in its pedagogical importance. Most teachers reported previous experience with differentiation, although their practices were concentrated mainly on process differentiation, while content and product differentiation were less frequently reported. The descriptive belief groupings further indicate that positive attitudes toward differentiation were not always accompanied by equally strong implementation self-efficacy.

Teachers' mathematical mindset was predominantly classified as GF, indicating generally growth-oriented beliefs with some remaining fixed-oriented characteristics. Effort and persistence constituted the strongest aspect and were classified as GG, whereas beliefs concerning failure were more variable. These findings suggest that teachers' mathematical mindset should not be reduced to a general belief in effort; it also involves how teachers interpret challenge, difficulty, feedback, mistakes, and opportunities for revision.

Overall, the central issue identified in this study was not a lack of teacher support for differentiated mathematics instruction, but the difficulty of translating positive beliefs into sustainable classroom practice. Professional development should therefore prioritise diagnostic assessment, differentiated mathematical task design, flexible grouping, graduated scaffolding, feedback, error analysis, and collaborative lesson planning. The findings remain preliminary because they were based on 13 teachers, self-reported data, a limited self-efficacy indicator, one open-ended question, and an adapted six-item mathematical mindset classification. Future studies should involve larger and more diverse samples and combine questionnaires with interviews, lesson-plan analysis, and classroom observation to examine the relationship between teachers' stated beliefs and enacted differentiated practices.

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