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Analysis of Mathematics Teachers' Difficulties in Implementing Differentiated Learning under the Independent Curriculum

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ABSTRACT

Merdeka Curriculum promotes differentiated learning as a key strategy to address students' diverse learning needs. However, a preliminary study at SMA Negeri 3 Gunungsitoli indicates that this approach has not been implemented consistently in mathematics classrooms. This study aims to describe how mathematics teachers apply differentiated learning and to analyze the difficulties they face and the factors influencing these difficulties within the Independent Curriculum. This study employed a qualitative descriptive design. Data were collected through interviews, classroom observations, and document analysis involving five mathematics teachers. The data were analyzed using the Miles and Huberman interactive model, including data reduction, data display, and conclusion drawing. The findings show that teachers have begun to implement differentiation in content, process, and product. However, the implementation remains limited. Major difficulties include time management constraints, diverse student learning characteristics, and challenges in conducting initial diagnostic assessments. Contributing factors include limited facilities, insufficient teacher readiness, and a lack of structured professional training. These findings indicate that differentiated learning in mathematics is still at an early stage of implementation and requires systematic institutional support. This study contributes to the literature by highlighting context-specific challenges faced by mathematics teachers under the Independent Curriculum and provides practical implications for schools and policymakers in designing targeted professional development programs.

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Introduction

Education is a conscious and planned effort to develop students' potential through the acquisition of meaningful knowledge, skills, and attitudes (Fonger, 2019; Koskinen & Pitkäniemi, 2022). Law Number 20 of 2003 on the National Education System states that education aims to develop individuals who are intellectually capable, morally grounded, and equipped with essential life skills for personal, social, and national development. In this context, education and curriculum are inseparable components in improving the quality of human resources (Fitriyah et al., 2022; Rahayu et al., 2025; Tanudjaya & Doorman, 2020). Therefore, examining curriculum development is a critical step in understanding the direction of educational policy in Indonesia.

The history of Indonesian education reflects continuous curriculum reform in response to social change and global demands, ranging from the 1947 Curriculum to the 2013 Curriculum, and most recently the Independent Curriculum introduced in 2022 (Charitas et al., 2023; Voigt et al., 2020). These reforms represent the government's efforts to improve the quality of learning processes. The Independent Curriculum emphasizes flexibility by granting schools and teachers greater autonomy to design learning experiences aligned with students' characteristics and learning needs. This shift requires instructional approaches that accommodate learner diversity, including differentiated learning.

Differentiated learning is a key feature of the Independent Curriculum. It involves adjusting content, learning processes, and learning products based on students' readiness, interests, and learning profiles (Borji & Martínez-Planell, 2020; Hernandez-Martinez et al., 2024; Pitta-Pantazi et al., 2020). This approach positions teachers as facilitators who design flexible and meaningful learning environments that enable students to achieve learning objectives through pathways suited to their abilities (Álvarez et al., 2020; Tondorf & Prediger, 2022; Voigt et al., 2020). Consequently, examining the implementation of differentiated learning in core subjects such as mathematics becomes essential.

In mathematics education, differentiated learning is particularly relevant due to the subject's emphasis on logical reasoning, analytical thinking, creativity, and problem-solving skills (Chorney et al., 2024; Hackenberg & Sevinc, 2022). Students exhibit diverse ways of learning mathematics, including visual, symbolic, and procedural approaches. Differentiation therefore plays a critical role in accommodating these differences and supporting students' optimal mathematical development. The success of differentiation in mathematics classrooms largely depends on teachers' instructional practices.

Teachers play a decisive role in implementing the Independent Curriculum. They are required to master pedagogical, professional, social, and personal competencies, as mandated by Law Number 14 of 2005. However, empirical studies indicate that many teachers still experience difficulties in understanding and applying differentiated learning strategies and tend to rely on conventional teaching practices. These challenges suggest that policy expectations are not always aligned with classroom realities.

Preliminary observations at SMA Negeri 3 Gunungsitoli indicate that although the Independent Curriculum has been adopted in mathematics instruction, the implementation of differentiated learning remains limited. Teachers often employ traditional instructional methods and demonstrate insufficient understanding of differentiation principles. This condition reflects a gap between curriculum policy and actual classroom practice. Despite the growing literature on differentiated learning, most studies focus on conceptual frameworks or general implementation strategies. Empirical investigations that specifically examine mathematics teachers' difficulties in applying differentiated learning within the context of the Independent Curriculum remain limited. This gap highlights the need for in-depth qualitative studies grounded in authentic school contexts.

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Therefore, this study aims to analyze the difficulties faced by mathematics teachers in implementing differentiated learning within the Independent Curriculum. By focusing on teachers' experiences, this study provides empirical insights that can inform targeted teacher support strategies and strengthen curriculum implementation. The novelty of this research lies in its specific focus on mathematics teachers' difficulties in differentiated learning during the Independent Curriculum era. The findings are expected to contribute to the literature on mathematics education and offer practical implications for schools and policymakers in designing effective professional development and support programs.

Method

Type of Research

This study employed a qualitative approach with a descriptive design to gain an in-depth understanding of the difficulties faced by mathematics teachers in implementing differentiated learning within the Independent Curriculum. A qualitative approach was selected because it enables the exploration of phenomena in their natural settings without manipulation, while the descriptive design facilitates a systematic and accurate portrayal of instructional practices as they occur. In this study, the researcher served as the primary research instrument, overseeing all stages of the research process, from data collection to analysis. Given the researcher's close engagement with the research context, reflexivity was applied to recognize potential subjectivity. To maintain rigor, objectivity was strengthened through triangulation, member checking, and peer debriefing.

Research Subjects

The research subjects consisted of five mathematics teachers from SMA Negeri 3 Gunungsitoli, selected using purposive sampling. The selection criteria included: (1) a minimum of three years of teaching experience, (2) direct involvement in implementing the Independent Curriculum, and (3) willingness to participate as indicated by written informed consent. Teachers who were not involved in implementing the Independent Curriculum were excluded from the study. The sample size was considered sufficient, as qualitative research prioritizes depth of understanding rather than the number of participants. Data saturation was achieved when subsequent interviews no longer produced new or relevant information.

Research Instruments

The research instruments included classroom observations, semi-structured interviews, and document analysis. Classroom observations focused on the implementation of differentiated learning in terms of content, process, and product, guided by indicators such as variation of learning materials, flexibility of instructional strategies, and diversity of assessment methods. Semi-structured interviews were conducted to explore teachers' experiences and perceived difficulties. Sample questions included: "How do you design differentiated learning in mathematics classrooms?" and "What difficulties do you encounter most frequently?". Documentation, including lesson plans, assessment records, evaluation notes, and school policy documents, was collected to support data validation. Prior to data collection, the interview and observation instruments were reviewed by two experts in mathematics education and one practitioner in differentiated learning to ensure content validity.

Data Collection Procedures

The data collection process was conducted in several stages. During the preparation stage, the researcher developed research instruments, conducted a literature review, obtained permission from the school, and prepared ethical documents, including informed consent forms. Data collection involved classroom observations conducted over three instructional sessions for each teacher, two interview sessions per teacher lasting 45–60 minutes, and the collection of relevant documentation to enrich contextual understanding. Following data collection, interviews were transcribed, observation notes were organized, and documents were systematically categorized. Data validation was achieved through triangulation of sources, methods, and time, as well as member checking with participants to confirm the accuracy of interpretations. Peer debriefing with fellow researchers was also conducted to minimize interpretative bias. To ensure data trustworthiness, this study adopted the criteria proposed by Lincoln and Guba, namely credibility, transferability, dependability, and confirmability. Credibility was enhanced through triangulation and member checking. Transferability was supported by providing rich descriptions of the school context and teacher characteristics. Dependability was ensured through detailed documentation of the research process, enabling auditability. Confirmability was maintained through audit trails and peer discussions to ensure that findings were grounded in the data rather than researcher bias.

Data Analysis

Data were analyzed using the interactive model proposed by Miles and Huberman, which consists of three stages. First, data reduction involved selecting, focusing, and simplifying data obtained from interviews, observations, and documents in accordance with the research focus. Second, data display was conducted through narrative descriptions, tables, and matrices to identify emerging patterns. Third, conclusion drawing and verification were performed iteratively, with findings continuously checked against the data until consistent and valid interpretations were achieved. This analytical process occurred concurrently with data collection, allowing for ongoing refinement of interpretations. Through this approach, the study provides a comprehensive portrayal of mathematics teachers' difficulties in implementing differentiated learning and offers an empirical foundation for developing targeted teacher capacity-building strategies and strengthening the implementation of the Independent Curriculum.

Research Results

To obtain a comprehensive picture of the difficulties of mathematics teachers in applying differentiated learning in the implementation of the Independent Curriculum, this study presents findings based on interviews, observations, and document analysis. The data obtained was then analyzed thematically to produce several main themes, namely teachers' understanding and readiness, the implementation of differentiated learning, and the difficulties experienced by teachers. Each theme is complemented by direct quotations from the informant as empirical evidence, accompanied by interpretations to affirm the meaning contained in the teachers' experiences.

Teacher Understanding and Readiness

Mathematics teachers at SMA Negeri 3 Gunungsitoli in general have shown a good understanding of the basic concept of differentiated learning. They agreed that differentiation is an effort to adapt teaching to students' learning readiness, learning style, and interests in the

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classroom. A teacher emphasized that learning design must always begin by paying attention to the competencies set in the curriculum as well as the real conditions of students in the classroom:

> *"If we want to design learning, of course we must first adjust it to the competence of the curriculum, then the class conditions, learning style, and learning readiness of students."* (Informant 4)

In addition to emphasizing the importance of planning, teachers also understand its role in the implementation process. For them, teachers are not only in charge of delivering material, but also act as facilitators who are able to direct the course of learning so that goals are achieved. This is reflected in the statement of one of the informants:

> *"As a facilitator, teachers must be able to direct the class so that learning goals are achieved. Teachers must be a source of learning that leads students to understand the material."* (Informant 5)

Teachers' awareness of the role of motivation also emerged. They assessed that the success of differentiated learning is highly determined by the teacher's ability to arouse students' enthusiasm for learning. As one of the teachers said:

> *"The expected achievement of teachers as motivators is that students become active in learning, and the potential that exists in students is growing."* (Informant 2)

Although teachers' conceptual understanding is quite in line with Tomlinson's principle of differentiation, their implementability is still limited. Some teachers emphasized the need for support from schools, especially through structured training, so that their competencies are more mature. One teacher asserted:

> *"It's good if schools hold training so that teachers' competence about differentiated learning is further developed."* (Informant 2)

These findings suggest that teachers understand the direction and principles of differentiated learning, but their practical skills still need to be strengthened through training and institutional support.

Implementation of Differentiated Learning

The practice of differentiated learning carried out by mathematics teachers at SMA Negeri 3 Gunungsitoli generally includes the stages of diagnostic assessment, curriculum analysis, the application of differentiation to content, processes, and products, and evaluation. However, this implementation is still partial and has not touched all aspects in a balanced manner.

Diagnostic Assessment

In the early stages, some teachers have tried to carry out diagnostic assessments to map students' learning readiness. One of the teachers explained:

"To find out the readiness of students before studying, I usually give a quiz about the basic material or material related to what will be studied." (Informant 3)

Another teacher added that assessments are not only in the form of written tests, but can also be short interviews or analysis of previous learning outcomes:

"I usually use a written test, a short interview before starting to study, or see how their previous learning fared was." (Informant 4)

Although diagnostic assessments are understood as an important step, time constraints make teachers tend to use only simple instruments. In this case, diagnostic assessments have already begun to be carried out, but they have not been thoroughly structured to describe the learning profile of students.

Curriculum Analysis

Teachers also show awareness of the importance of curriculum analysis as a basis for the preparation of learning objectives. One of the teachers said:

"Before planning learning, teachers must know what the expected goals of the curriculum are. That will be our reference." (Informant 2)

In line with that, other teachers emphasized that learning outcomes (CP) need to be well understood so that planning is in accordance with the policy direction of the Independent Curriculum:

"Now the term is CP or learning outcomes. Only after that will we describe the competencies that we want to achieve according to the teaching material." (Informant 4)

This shows that curriculum analysis has been carried out, but differentiation strategies are rarely explicitly written in teaching modules so that their implementation has not been systematic.

Content, Process, and Product Differentiation

The implementation of differentiation is most visible in the process aspect. Teachers divide students into small groups based on learning styles to facilitate teaching.

"My strategy is to divide students into small groups according to their learning styles, and then provide different activities for each group." (Informant 1)

In addition, teachers also began to vary the content by using additional teaching materials in addition to textbooks:

"I use student package books, but I also add learning videos or ppt slides." (*Informant* 1)

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However, product differentiation is still limited. Most teachers only give project assignments or tests, although some try to tailor the product to the student's interests.

> *"If the average child is kinesthetic, I give him a project assignment. If you can do it with a presentation or an interactive quiz."* (Informant 3)

Process differentiation is the main focus of teachers, while content and products are still not optimal. This shows that teachers' practices do not fully reflect the principle of complete differentiation.

Evaluation

The evaluation stage is generally carried out by teachers as a reflection to improve the next learning.

> *"I do an evaluation by assessing the student's development, then the results become the next planning guideline."* (Informant 5)

The evaluation is already underway, but the emphasis is more on the assessment of learning outcomes, not specifically directed to assess the effectiveness of differentiation strategies. Therefore, mathematics teachers have tried to implement differentiated learning through initial assessment, curriculum analysis, process variation, content, and products, and evaluation. However, the practices carried out are still partial, more prominent on process differentiation, while content and product differentiation has not been consistently applied.

Teachers' Difficulties in Implementing Differentiated Learning

Although mathematics teachers at SMA Negeri 3 Gunungsitoli have tried to implement differentiated learning, the implementation process has not been running optimally. The results of interviews and observations show that there are a number of obstacles faced by teachers, which can be grouped into four main aspects, namely time management, diversity of student learning styles, limited facilities, and minimal school support.

Time Management

Teachers admitted that differentiation requires a longer time allocation than conventional learning. This causes them to have difficulty adjusting to the available learning time.

> *"The main difficulty or obstacle for me and maybe other teachers when we apply this varied learning is the problem of learning time that takes more time than usual, so sometimes the allocation misses what has been planned."* (Informant 1)

The same thing was expressed by other teachers who felt that varied learning activities often exceeded the predetermined time target:

> *"The problem I often face for this learning strategy is that the implementation time is sometimes not enough and somewhat misses what has been planned."* (Informant 5)

Time constraints are the most obvious obstacle, both in preparing learning variations and during implementation in the classroom.

Diverse Student Learning Styles

The diversity of students' learning styles is considered a big challenge in the preparation of teaching materials. Teachers found it difficult to prepare content that could reach all students in one meeting.

> *"I am constrained to determine suitable teaching materials because students' abilities and learning styles are different. We have to make sure that the teaching materials can be understood by all students, but it's difficult."* (Informant 3)

Another teacher added that the difference in the level of students' ability makes the preparation of teaching materials require additional effort:

> *"For the difficulty, I find it a bit difficult to determine teaching materials that are suitable for students with low abilities, especially since the learning styles are varied. So it is not necessarily that later they can understand the teaching materials that I prepare."* (Informant 1)

The heterogeneity of student profiles (both in terms of style and ability) makes it difficult for teachers to provide a variety of appropriate teaching materials.

Facility Limitations

The availability of infrastructure also affects the implementation of differentiation. Teachers are often unable to use supporting media due to device limitations.

> *"If you want to show learning videos or ppt, infocus is often used by other classes. So forced to go back to the board, the results were not optimal."* (Informant 4)

In addition, the relatively narrow classroom conditions also limit teachers when they want to implement group learning:

> *"The number of students is large and the room is small, so it is not free to make a group. Sometimes it even becomes noisy."* (Informant 5)

Minimal School Support

Teachers assessed that support from schools, especially in the form of training, was still inadequate. Most teachers only rely on online seminars or resources from the Independent Teaching Platform (PMM).

> *"If you haven't had the training, at least take part in an online seminar from PMM. That is only limited to initial knowledge."* (Informant 3)

This makes teachers feel the need for more structured training to strengthen their skills.

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"It's a good idea for schools to hold special training for differentiated learning so that teachers' understanding is further developed." (Informant 2)

The lack of training programs and institutional support causes teachers to not have the full capacity to implement differentiation consistently. Mathematics teachers face real challenges in implementing differentiated learning. The main obstacles include limited time management, student diversity, inadequate facilities, and lack of school support. These barriers show that although teachers have an understanding of differentiation, they need structural support and competency enhancement for implementation to run optimally.

Exposure to interview and observation data showed variations in teacher experience leading to three main themes. To clarify the relationship between empirical citations and interpretation, the findings of the study are summarized in the form of a thematic table presented in Table 1. The analysis of interview and observation data resulted in three main themes, namely (1) teacher understanding and readiness, (2) the implementation of differentiated learning, and (3) teachers' difficulties in implementation. Each theme is broken down into a number of sub-themes with interview excerpts as empirical evidence. Table 1 presents a summary of the themes, sub-themes, quotes, and interpretation of the research findings.

Table 1. Thematic Table and Research Sub-Theme

Theme	Sub-Theme	Interview Quotes	Interpretation
Teacher Understanding & Readiness	Concept understanding	"If we want to design learning... must be adjusted to the competence of the curriculum and the learning style of the students." (Inf.4)	Teachers understand the basic concept of differentiation.
	Facilitator role	"Teachers must be able to direct the class so that learning goals are achieved." (Inf.5)	The teacher is aware of his role as a facilitator.
	Training needs	"It's good for schools to hold training on differentiation." (Inf.2)	Teachers need to strengthen practical competence.
Implementation	Diagnostic assessment	"Usually I use a written test, a short interview, or looking at the learning results." (Inf.4)	The initial assessment is understandable, but still simple.
	Curriculum analysis	"Before planning learning, teachers must know the learning outcomes." (Inf.2)	Curriculum analysis exists, but it has not been detailed to the differentiation strategy.
	Process differentiation	"I divide students into small groups according to their learning style." (Inf.1)	Teachers focus more on process differentiation.
	Content differentiation	"I use package books, videos, and ppt slides." (Inf.1)	Content began to be varied.
	Product differentiation	"If it's kinesthetic, I give project assignments; others can be presentations or quizzes." (Inf.3)	The product is still limited and inconsistent.

	Evaluation	"I do an evaluation by looking at the development of students..." (Inf.5)	The evaluation is more reflective, not yet assessing the effectiveness of differentiation.
Teacher Difficulties	Time management	"Variable learning takes more time, so the allocation is often missed." (Inf.1)	Time is the main obstacle.
	Diverse learning styles	"I am constrained to determine teaching materials because students' abilities are different." (Inf.3)	Heterogeneous student profiles make it difficult for teachers.
	Limited facilities	"If you want to show videos, infocus is often used by other classes." (Inf.4)	Facilities are not yet supportive.
	Minimal school support	"Training has never been, at least participating in PMM online seminars." (Inf.3)	School support is still minimal.

Based on Table 1, it shows that mathematics teachers have basically understood the concept of differentiated learning as an effort to adapt teaching to curriculum competencies, learning styles, and student readiness. They also realize the important role of teachers not only as material presenters, but also as facilitators who direct classroom interactions so that learning goals are achieved. In addition, there is an awareness that teachers also function as motivators who arouse students' activeness and encourage the development of their potential. However, even though the conceptual understanding is quite good, teachers consider that implementation in the field still needs support in the form of structured training so that their practical competence in implementing differentiation is further developed.

In implementation, teachers have made efforts to conduct diagnostic assessments to identify students' learning readiness, although the instruments used are still simple such as short quizzes, written tests, and oral interviews. Curriculum analysis is also carried out with reference to learning outcomes, but differentiation strategies have not been explicitly integrated into the teaching modules. In the process aspect, teachers try to divide students into small groups based on learning styles so that there is a variety of activities in the classroom. Learning content began to be varied using packet books, presentation slides, and learning videos, although the variety was still limited. Learning outcomes have also been adjusted, for example by providing projects, presentations, or interactive quizzes, but their implementation has not been consistent in all classes. Meanwhile, the evaluation functions more as a reflection on student development without specifically assessing the effectiveness of the differentiation strategy applied. Thus, the implementation of differentiated learning tends to be more prominent in the process aspect, while content and products are still not optimal.

The implementation of differentiated learning is still faced with a number of obstacles. The main difficulty lies in time management. The variety of strategies applied often requires a longer duration than the time allocated in the learning schedule, so teachers often have difficulty completing the material as planned. In addition, the diversity of learning styles and the level of ability of students in large classes is a challenge in itself. Teachers admitted that it was difficult to prepare teaching materials that were able to reach all students at once, especially for those with low abilities but different learning styles. Another obstacle is the limitation of facilities. The absence of sufficient projectors, narrow classrooms, and uneven facilities limit teachers' creativity in implementing learning variations. School support is also felt to be not optimal.

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Teachers consider that special training on differentiated learning is still rarely carried out, so their knowledge is more obtained from short seminars or online resources such as the Independent Teaching Platform. This condition makes teachers not have adequate practical competencies to implement differentiated learning thoroughly and consistently.

Overall, the results of this study show that mathematics teachers have understood the basic concepts of differentiated learning and have begun to implement them, even though the practice is still partial and emphasizes more on process aspects than content or products. Various obstacles that arise, such as time constraints, student heterogeneity, inadequate facilities, and lack of school support, show that the implementation of differentiated learning requires stronger systemic support. These findings are important to be discussed further in the context of differentiated learning theory and the Independent Curriculum policy, so that more appropriate strategies can be formulated in increasing teacher readiness as well as the effectiveness of implementation in the field.

Discussion

The findings indicate that mathematics teachers at SMA Negeri 3 Gunungsitoli demonstrate a reasonably sound conceptual understanding of differentiated learning. They recognize differentiation as an instructional strategy that responds to students' needs, interests, and learning characteristics, while positioning teachers as facilitators and motivators of learning. These findings align with Tomlinson's framework of differentiation, which emphasizes adapting learning content, processes, and products to students' learning profiles (Kotto et al., 2022; Nabila & Widjajanti, 2020; Rahayu et al., 2025). However, despite this foundational understanding, teachers' readiness to implement differentiation remains limited. This limitation is reflected in the need for structured professional training and sustained school support, consistent with international studies highlighting that effective differentiation relies heavily on teachers' professional capacity developed through continuous professional development.

In terms of implementation, teachers tend to apply differentiation primarily at the process level, while differentiation of content and products has not been fully optimized. This pattern suggests a pragmatic response to contextual constraints, with teachers prioritizing strategies perceived as more feasible within limited instructional conditions (Copur-Gencturk & Doleck, 2021; Csíkos & Szitányi, 2020; Schulz, 2023). Similar findings have been reported in previous studies in Indonesia, which indicate that teachers often vary instructional methods without substantially modifying learning content or expected outcomes (Gehrtz et al., 2024). International research likewise shows that mathematics teachers across different contexts face challenges in reconciling pedagogical ideals with classroom realities, particularly when addressing heterogeneous student needs under time constraints. These findings suggest that the gap between the theoretical ideals of differentiated learning and classroom practice represents not only a local issue but also a broader global challenge.

The difficulties identified in this study, particularly those related to time management, student learning diversity, limited facilities, and insufficient school support, indicate that challenges in implementing differentiated learning are multidimensional (Levisen, 2015). These obstacles stem not only from teachers' competencies but also from external and systemic factors (Charitas et al., 2023; Voigt et al., 2020). International studies confirm that the successful implementation of differentiation depends not solely on teacher capacity but also on the availability of adequate infrastructure and supportive institutional policies. In this regard, the findings of this study reinforce previous research emphasizing that the implementation of

the Independent Curriculum requires comprehensive systemic readiness, including facilities provision and institutional support mechanisms.

The implications of these findings are significant for educational policy and practice. First, professional development programs on differentiated learning should emphasize not only conceptual understanding but also practical skills, such as designing diagnostic assessments, adapting instructional content, and developing varied learning products. Second, schools need to ensure the availability of adequate facilities to support flexible and differentiated instructional practices. Third, strengthening teachers' classroom and time management strategies is essential to enable them to balance curriculum demands with the requirements of differentiated instruction. Evidence from studies in other educational contexts indicates a positive relationship between differentiated instructional practices and students' achievement in mathematics, underscoring the potential benefits of strengthening differentiation across content, processes, and products.

From a theoretical perspective, this study contributes to the literature on differentiated learning by situating its implementation within the context of the Independent Curriculum in Indonesia. The tendency of teachers to prioritize process differentiation over content and product differentiation highlights adaptive instructional patterns shaped by contextual constraints. This finding underscores that differentiation is not a uniform practice but is highly contextual, influenced by school conditions and institutional support. From a practical standpoint, the study highlights the importance of synergy among teachers, schools, and policymakers in ensuring that the Independent Curriculum is implemented effectively and contributes meaningfully to the improvement of mathematics learning quality.

Conclusion

This study shows that mathematics teachers generally possess a sound conceptual understanding of differentiated learning, including their role as facilitators and motivators in the learning process. However, its implementation remains partial, with differentiation predominantly applied at the process level, while content and product differentiation have not been fully optimized. The main difficulties faced by teachers include limited time management, the diversity of students' learning styles in large classrooms, inadequate facilities, and insufficient institutional support in the form of structured professional training and development. Nevertheless, teachers' efforts to adapt instructional strategies to students' needs indicate an awareness that aligns with the principles of differentiated learning promoted in the Independent Curriculum. The limitations of this study include the small number of participants and the focus on a single school context, which restrict the generalizability of the findings. Future research is therefore recommended to involve a broader range of schools with diverse characteristics and to employ mixed-methods approaches in order to strengthen the robustness and transferability of the results. From a practical perspective, these findings highlight the need to strengthen teacher capacity through continuous professional development in differentiated instruction, supported by the provision of adequate facilities and clearer institutional and policy support. From a theoretical perspective, this study contributes to the understanding that differentiated learning in mathematics is not implemented uniformly, but is strongly influenced by teacher readiness, institutional support, and contextual learning conditions. Accordingly, the effective implementation of the Independent Curriculum requires sustained synergy among teachers, schools, and policymakers to ensure that student-centered learning objectives are achieved more effectively.

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Conflict of Interest

The authors declare that there is no conflict of interest.

Authors' Contributions

Author D.R.Z. contributed to the development of instruments, research design, understanding of theoretical foundations, data collection and processing, data analysis, presentation of results and discussion, revision, and ensuring the consistency of the entire article. Author Y.N.T. contributed to the development of theoretical studies and approved the final manuscript. Author R.N.M and S.L.. contributed to the development of the theory and approved the final version of the article. The total percentage of author contributions to the conceptualization, drafting, and correction of this article is: D.R.Z.: 40%, Y.N.T.: 30%, R.N.M.: 15% and Y.N.: 15%.

Data Availability Statement

The authors state that the data supporting the results of this study will be provided by the corresponding author, [D.R.Z.], upon reasonable request.

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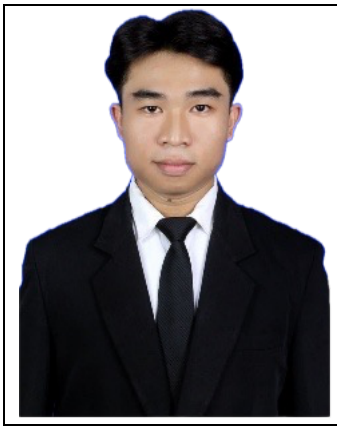	**Dedy Rahmat Zendrato** was born in Gunungsitoli City, Nias, North Sumatra, on September 3, 2003. He is the third of three children of the late Modeli Zendrato (father) and Yudika Zagoto (mother). He completed his elementary education in 2015 at UPTD SD Negeri 074038 Tohia. After graduating from elementary school, he continued his education at UPTD SMP Negeri 1 Gunungsitoli and completed it in 2018. He then pursued his secondary education at SMA Negeri 1 Gunungsitoli. In 2021, he continued his higher education at a private higher education institution in Nias, the Institute of Teacher Training and Education (IKIP) Gunungsitoli, which was officially transformed into Universitas Nias in 2022. He is currently enrolled in the Mathematics Education Study Program, Faculty of Teacher Training and Education. Email: dedyzendrato03@gmail.com
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