

Management of Differentiated Instruction in Improving Mathematics Learning Outcomes for Fifth Grade in Elementary School

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Abstract: Mathematics learning in elementary schools often faces challenges due to differences in students' readiness, interests, and learning styles. To address these issues, the systematic implementation of differentiated instruction management is necessary. This study aims to describe the implementation of differentiated instruction management in improving the mathematics learning outcomes of fifth-grade elementary school students, based on George R. Terry's management theory, which includes the functions of planning, organizing, actuating, and controlling. The research uses a qualitative approach with a case study design conducted at SDN Sukamanah and SDN Samudralaksana, Cianjur Regency, with data collected through observation, in-depth interviews, and document analysis, and then analyzed using the Miles and Huberman model through data reduction, data display, and conclusion drawing. The results show that in the planning stage, teachers design learning strategies that consider student diversity; in the organizing stage, teachers prepare media, resources, and methods to support the differentiation of content, process, and product; in the actuating stage, teachers implement collaborative and responsive learning that addresses individual needs; while in the controlling stage, formative and summative evaluations, teacher reflection, and follow-up improvements are carried out. Thus, this study concludes that the application of differentiated instruction management based on Terry's theory can increase student engagement, accommodate learning differences, and positively impact the mathematics learning outcomes of fifth-grade elementary school students.

Keywords: instructional management, differentiated instruction, mathematics achievement.

1 Introduction

Differentiated instruction is an approach designed to accommodate the varying learning needs of students. According to Tomlinson learning differentiation is conducted by adjusting the content, process, and product of learning based on students' readiness, interests, and learning profiles. In mathematics learning, this approach is crucial because students' abilities in understanding mathematical concepts vary. Some

students quickly master the material, while others require more time and support.[1] Kilpatrick, Swafford, & Findell emphasize that effective mathematics learning must accommodate this diversity so that every student can achieve mathematical proficiency optimally [2].

For differentiated instruction to be implemented effectively, a structured management is required. Teachers need to carry out management steps that include identifying student characteristics through initial assessment, planning varied learning strategies, organizing resources and time, implementing responsive instruction, and evaluation and follow-up. These steps ensure that learning is not only varied in method but also goal-directed and continuous [3].

This framework aligns with George R. Terry's management theory [4], [5] which includes four main functions: planning, organizing, actuating, and controlling (POAC). In the context of differentiated instruction, planning is done by designing learning based on student characteristics data. Organizing includes arranging resources and appropriate teaching methods. Actuating is realized through implementation that encourages active student engagement, while controlling is carried out with continuous evaluation and improvement. The POAC framework helps teachers manage learning differentiation systematically.

Several previous studies show the effectiveness of differentiated instruction in improving mathematics achievement. Gymnastiar [6], [7] asserts that differentiation can increase motivation and academic achievement of elementary students. Ulfha [8] found that the use of differentiation strategies based on diagnostic assessment can significantly improve students' achievement of basic competencies. International research by Tomlinson & Moon [1] also shows that differentiation plays an important role in supporting equitable and inclusive learning. However, most of these studies primarily focus on the aspects of teaching strategies or pedagogical practices, and have not comprehensively linked them with the principles of educational management.

Differentiated instruction is viewed positively because it can accommodate diverse student learning needs. However, research in several elementary schools in Agrabinta District shows its implementation is not yet optimal due to limited facilities and teacher practices that do not fully address students' individual needs, especially in mathematics where the average achievement remains low. This condition confirms the existence of a research gap between pedagogical theory emphasizing creativity and management theory demanding systematic planning and evaluation. By integrating both, a more operational and effective differentiation implementation model is needed to improve learning outcomes while optimally meeting students' learning needs [1], [9].

The gap does not only occur in the theoretical domain but also in practice in the field. Initial observations at SDN Sukamanah and SDN Samudralaksana, Cianjur Regency, show that teachers have tried to vary mathematics instruction, but its management has not fully followed structured management principles. Initial assessment has not been consistently carried out, resource management is still general, and follow-up evaluation is not focused on individual student needs. This phenomenon indicates the necessity of applying differentiated instruction based on a clear management framework.

This research offers novelty by integrating POAC management into the implementation of differentiated instruction to provide a systematic guide for teachers. Therefore, the entire series of analysis and findings will be focused in a study titled:

"Management of Differentiated Instruction in Improving Mathematics Learning Outcomes for Fifth Grade in Elementary School" (A Case Study at SDN Sukamanah and SDN Samudralaksana, Cianjur Regency).

2 Method

This study uses a qualitative approach with a case study design to deeply understand the phenomenon of differentiated instruction management in the real context at SDN Sukamanah and SDN Samudralaksana, Cianjur Regency. Research subjects include the principal, fifth-grade teachers, and students in both schools, selected through purposive sampling. Data collection was carried out through three main techniques: classroom observation, in-depth interviews with research subjects, and document analysis of Lesson Plans/Teaching Modules, student achievement records, and supervision reports. Data validity was tested through source and method triangulation. The collected data were analyzed using the Miles and Huberman interactive model [10], which includes the stages of data reduction, data display, and conclusion drawing.

3 Result

The research results are analyzed based on George R. Terry's four management functions, followed by the identification of constraints and solutions found in both schools.

3.1 Planning Differentiated Instruction

Based on the analysis, the planning stage of differentiated instruction in both schools has been carried out with a strong foundation, driven by the need to respond to student diversity and challenges in Mathematics learning outcomes. This process is collaborative, involving the principal, deputy principal for curriculum, and the class teacher. This initiative aligns with the planning function in George R. Terry's management theory, which emphasizes the importance of setting goals and strategies to achieve desired results effectively.

The main focus of planning is to start from student needs, which begins with identifying the learning profile. SDN Samudralaksana applies a structured approach through diagnostic assessment, while SDN Sukamanah uses a qualitative approach through observation and interviews. Although the methods differ, both schools demonstrate an understanding of the fundamental principle of differentiated instruction: starting from a deep understanding of students, in line with the theory initiated by Carol Ann Tomlinson [1]. This practice is also relevant to Fitri Yani's findings [11] which highlight the importance of diagnostic assessment as the initial step in teacher readiness.

Although teachers in both schools have been able to compile differentiated teaching modules, challenges were found in designing comprehensive differentiation. As revealed at SDN Sukamanah, differentiation is still largely limited to adjusting academic ability levels, and has not fully accommodated student interests and learning

profiles. This finding is consistent with Aliyah's research [12], which found that the main difficulty for teachers often lies in designing truly varied learning. This indicates a gap between conceptual understanding and implementation ability in the field.

In preparing teaching materials, both schools showed extraordinary adaptability and innovation. SDN Sukamanah focuses on utilizing modern technology such as educational games, while SDN Samudralaksana shows high creativity by utilizing local media and natural materials from the surroundings. This approach is a real manifestation of the *Kurikulum Merdeka* (Independent Curriculum) spirit, which grants autonomy to educational units to innovate according to context. The use of varied media is supported by the research of Hana Zakiyyah et al. [13], which states that differentiated learning media is effective in supporting diverse learning styles and improving academic achievement.

3.2 Organizing Differentiated Instruction

Based on the analysis, the organizing stage of differentiated instruction in both schools has been carried out very well, marked by a clear and adaptive structure to the context. Whether through the formal model at SDN Sukamanah or the collaborative model at SDN Samudralaksana, organizing is focused on three key elements: flexible lesson scheduling, applying student grouping strategies, and creative management of teaching materials. This approach shows that both schools consciously arrange resources and processes to support the effective implementation of differentiation, aligning with the organizing function of Terry's management theory.

One main finding is the implementation of flexible lesson scheduling, which is not only daily but also designed with medium and long-term targets. This flexibility, as emphasized by Kristiyuana et al. [13], is very important for accommodating activities like project-based learning. Furthermore, student grouping is used as a core pedagogical strategy to manage heterogeneous classes. This practice is not only effective for process differentiation but is also in line with Marsela Nova Susanti's opinion [14] regarding the importance of fostering collaboration skills, which is a manifestation of the "Gotong Royong" (Mutual Cooperation) dimension in the *Profil Pelajar Pancasila* (Pancasila Student Profile).

In the management of teaching aids and materials, both schools showed high resilience. SDN Sukamanah optimizes the surrounding environment as a learning resource, while SDN Samudralaksana applies a self-managed collaboration model by actively involving the school committee and parents to provide simple teaching aids. This mutual cooperation model is a tangible example of how resource limitations can be turned into strengths through solid partnership, a point consistent with the findings of Dona Fitriawan et al. [15] regarding the crucial role of partnership in the success of educational programs.

Overall, the organizing practice in both schools proved effective due to their ability to adapt to their respective conditions. Both formal and community-based structures are validated and supported by the spirit of the *Kurikulum Merdeka*, which gives autonomy to educational units to design the most suitable work process. Active community involvement, as shown by SDN Samudralaksana, is a real implementation of the *Kurikulum Merdeka* principle that views education as a shared responsibility.

3.3 Actuating Differentiated Instruction

Based on the analysis, the actuating stage of differentiated instruction in both schools shows a real shift from uniform teaching to student-centered learning, which is validated by positive responses from students. Teachers actively implement various strategies, including using different media, tiered assignments, and group work methods to respond to student diversity. This implementation is supported by flexible scheduling and continuous monitoring, collectively creating a dynamic and adaptive learning environment, fulfilling the actuating function of Terry's management theory.

One main strategy applied is the deliberate grouping of students to manage heterogeneous classes and maximize interaction. This practice is not only a tool for process differentiation but also supports the development of collaboration skills [14]. In addition, teachers routinely monitor student activity as a formative indicator to assess engagement and learning motivation. As emphasized by Kristiyuana et al. this continuous monitoring is an important part of formative assessment in the *Kurikulum Merdeka* pedagogical reform [16].

The variation in learning strategies is not coincidental but the result of deliberate planning documented in the Lesson Plans/Teaching Modules. Students in both schools confirmed that they experience varied learning experiences, such as through games, pictures, and different task choices. The use of diverse media and assignments is consistent with the findings of Hana Zakiiyah et al. [13], who concluded that differentiated learning media can improve student academic achievement.

Furthermore, teachers do not just follow the plan rigidly but also perform active and continuous monitoring during the learning process. The teachers' ability to make situational adjustments or responsive teaching as a direct response to classroom conditions demonstrates a deep mastery of differentiation principles. This practice is a real implementation of the assessment principle in the *Kurikulum Merdeka*, where formative assessment is used as an integral part of learning to guide and improve the learning process in real-time.

3.4 Evaluation of Differentiated Instruction

Based on the analysis, the evaluation stage of differentiated instruction in both schools shows a paradigm shift towards a comprehensive and continuous system, representing the controlling function of Terry's management theory. Teachers have consciously implemented a complete assessment cycle, starting from diagnostic assessment at the beginning to map student needs, formative assessment during the learning process to monitor progress, to summative assessment at the end. This practice signifies a transition from merely assessment of learning to assessment for learning, where evaluation serves as a tool to understand student needs and improve teaching.

The focus on formative assessment as a tool to guide learning is highly consistent with the findings of Kristiyuana et al. [16], who identified it as a major pillar in the *Kurikulum Merdeka* pedagogical reform. Nevertheless, challenges in its implementation, such as the lack of consistency in data analysis at SDN Sukamanah, also align with that research, which highlights that this transition requires teacher

expertise. The use of continuous assessment to adjust learning is also an important finding in the study on teacher readiness by Fitri Yani [11].

The evaluation conducted is also data-driven, where student learning outcomes are recapitulated and analyzed based on established learning objectives. This practice, along with formal and informal records of individual student progress, shows that teachers in both schools have understood the importance of viewing each student as a unique individual with a different learning trajectory. This approach is relevant to Aliyah's research [12], [17] which highlighted the need for teachers to design learning appropriate to student needs, which can only be done if their individual progress is monitored.

Finally, the culture of teacher reflection on the strategies used has become an integral part of the evaluation process. Teachers in both schools consciously conduct simple reflection, both oral and written, which is then followed up with revision of teaching modules and strategy improvement. This practice demonstrates the teachers' professionalism as reflective practitioners who continuously strive to improve the quality of their teaching. As emphasized by Marsela Nova Susanti [14], teacher work ethic and professionalism are the keys to successful *Kurikulum Merdeka* implementation.

3.5 Constraints of Differentiated Instruction Management

Based on the analysis, although both schools show strong commitment, the implementation of differentiated instruction management faces three main constraints that are systemic and interrelated: limited teacher competence (Human Resources), minimal facilities and infrastructure, and inadequate budget allocation. This finding indicates that good policies at the national level require strong capacity and resource support at the school level to avoid superficial implementation.

The most fundamental constraint is the limited teacher competence in designing and implementing differentiation in depth. There is a gap between teachers' conceptual understanding and their practical ability, as seen at SDN Sukamanah where the compiled teaching modules do not fully accommodate student interests and learning profiles. This finding is highly consistent with Aliyah's research [9], which highlighted teacher difficulties in designing varied learning, and aligns with Marsela Nova Susanti's opinion [14] that teacher professionalism is the main pillar of adaptive learning.

This competence limitation is exacerbated by the minimal facilities and infrastructure, especially interactive mathematics teaching aids. This condition forces teachers to innovate with makeshift resources, such as utilizing the surrounding environment or natural materials. As found by Kristiyuana et al. [18], limited resources are a major impediment to the application of new pedagogy because it makes it difficult for teachers to optimally accommodate various student learning styles.

The root of both constraints is often limited budget allocation (financing). This limitation not only hinders the procurement of decent learning resources but also the implementation of necessary teacher training. The "self-managed and mutual cooperation" model found at SDN Samudralaksana, while showing the strength of the community, also indicates a lack of systematic financial support. This asserts that the autonomy granted by the *Kurikulum Merdeka* must be balanced with affirmative budget

policies to ensure that innovation at the school level can proceed equitably and sustainably.

3.6 Solutions for Differentiated Instruction Management

Based on the analysis, both schools show high resilience and problem-solving capacity by applying practical and contextual solutions to overcome each constraint. Instead of waiting for external assistance, they proactively seek solutions appropriate to their respective conditions, focusing on three main areas: improving human resource competence, optimizing facilities through collaboration, and seeking alternative funding sources.

The main solution identified is teacher training and mentoring to overcome competence limitations. At SDN Sukamanah, this solution is planned in the form of structured formal training, especially in the use of digital media and the Project-Based Learning (PBL) approach. Meanwhile, SDN Samudralaksana implements a more organic Professional Learning Community (PLC) model through the Teacher Working Group (KKG) forum and direct mentoring from the principal. This approach is highly consistent with the recommendations of research by Aliyah [12] and Yurike [19] and is supported by the findings of Dona Fitriawan et al. [15] regarding the effectiveness of collaborative models in building sustainable partnerships.

To overcome the constraints of facilities and financing, both schools implement solutions of optimization and collaboration. SDN Sukamanah optimizes existing facilities by utilizing the surrounding environment as a learning resource. This solution is more prominent at SDN Samudralaksana, where they actively collaborate with parents and the school committee for the procurement of simple teaching aids from natural materials, with costs covered through a self-managed and mutual cooperation mechanism.

The proactive actions taken by both schools in seeking these solutions are a real manifestation of the spirit of the *Kurikulum Merdeka*. The ability of the school to independently and creatively overcome challenges, especially through the mutual cooperation collaboration model, is not only relevant to the mutual cooperation dimension in the *Profil Pelajar Pancasila* but also aligns with the curriculum principles that encourage agency or independence in educational units and the involvement of the community as strategic partners.

4 Discussion

The findings indicate that the implementation of differentiated instruction in the two case-study elementary schools has moved in line with George R. Terry's four management functions—especially in the domains of planning and organizing—although there is still a gap between conceptual understanding and implementation ability. In the planning stage, both schools began with student needs by mapping learning profiles: SDN Samudralaksana utilized a more structured diagnostic assessment, while SDN Sukamanah relied on qualitative observation and interviews. This difference in approach remains within the core principle of differentiation, according to Tomlinson, that instructional design must stem from a deep understanding

of students; this also confirms Fitri Yani's finding on the importance of diagnostic assessment as a prerequisite for teacher readiness [20]. In the preparation of teaching resources, SDN Sukamanah excelled in utilizing technology (educational games), while SDN Samudralaksana was creative in using local media and natural materials—two innovative paths that reflect the spirit of autonomy of the Kurikulum Merdeka (*Independent Curriculum*). The selection of diverse media is consistent with evidence that media differentiation is effective in supporting varied learning styles and contributes to academic achievement [13]

In the organizing function, both schools established flexible scheduling (daily to medium-to-long-term targets), student grouping strategies, and adaptive management of teaching materials. Grouping as a core strategy not only facilitates process differentiation but also fosters collaboration as the "Gotong Royong" (Mutual Cooperation) dimension in the Profil Pelajar Pancasila (Pancasila Student Profile) [14], while scheduling flexibility proved crucial for accommodating project-based learning. Furthermore, the "self-managed – mutual cooperation" model through the school committee and parents (strongly evident at SDN Samudralaksana) illustrates how resource limitations can be transformed into strengths through partnership, aligning with findings on the strategic role of external collaboration in the success of educational programs [21].

In the actuating and controlling functions, classroom practices have shifted from uniform teaching to student-centered learning with positive student responses. Teachers combined diverse media, tiered assignments, group work, and continuous monitoring to maintain engagement and motivation—a set of strategies supported by flexible scheduling and documentation in Lesson Plans/Teaching Modules. Monitoring student activity as a formative indicator demonstrates the internalization of the "assessment for learning" paradigm in Kurikulum Merdeka pedagogical reform, and is supported by evidence that differentiated media and assignments correlate with achievement gains [13]. The evaluation cycle in both schools was complete: diagnostic assessment at the start for needs mapping, formative assessment throughout the process for instructional adjustment, and summative assessment at the end. However, the consistency of data analysis—especially at SDN Sukamanah—remains an ongoing challenge, reinforcing the observation that the transition to meaningful formative assessment demands more mature teacher competence [11]. Nevertheless, the culture of teacher reflection (oral and written), followed by module/strategy improvements, indicates professionalism as a reflective practitioner, a factor considered key to the successful implementation of the Kurikulum Merdeka. In other words, the controlling function is not merely present as results reporting, but as a feedback mechanism that closes the managerial cycle and ensures that differentiated instruction remains adaptive to classroom dynamics.

Three systemic constraints—teacher competence, facilities/infrastructure, and funding—explain why differentiation often stops at adjusting academic ability levels without fully addressing student interests and learning profiles. The finding that comprehensive differentiation design is still difficult (evident at SDN Sukamanah) is consistent with studies highlighting the challenges teachers face in designing truly rich learning variations and reasserts that teacher professionalism is the main pillar of adaptive learning [14]. The scarcity of interactive teaching aids—especially for Mathematics—encourages "makeshift" innovation, but also limits the scope for broader learning style exploration, aligning with the note that resource limitations hinder the

adoption of new pedagogy [16]. The root of these two problems often lies in budgetary constraints: ranging from the procurement of adequate learning resources to sustainable teacher training. The finding of the self-managed – mutual cooperation partnership at SDN Samudralaksana shows the potential for community-based solutions, but also serves as a reminder that the autonomy of the Kurikulum Merdeka requires affirmative financing policies to prevent innovation from being incidental or uneven among educational units. Thus, the practical implications are (a) strengthening targeted teacher capacity—for example, through step-by-step mentoring on designing interest/readiness/profile differentiation, accompanied by data-driven reflective practice; (b) a phased procurement strategy that prioritizes core Mathematics teaching aids and the development of local media; and (c) structured orchestration of school–committee–parent–external partner collaboration to close resource gaps. These steps maintain the continuity of the planning–organizing–actuating–controlling cycle, while ensuring that differentiation does not stop at policy commitment but is effective at the classroom level—measurable, equitable, and sustainable.

5 Conclusion

Based on the analysis, although both schools demonstrate strong commitment, the implementation of differentiated instruction management faces three main constraints that are systemic and interrelated. The most fundamental constraint is the limited teacher competence in designing and implementing differentiation in depth, where a gap still exists between conceptual understanding and practical ability. This limitation is exacerbated by the minimal facilities and infrastructure, which forces teachers to innovate with makeshift resources, and inadequate budget allocation.

The root of these various constraints is often limited financing, which not only hinders the procurement of decent learning resources but also the implementation of necessary teacher training. The self-managed and mutual cooperation model found, while showing the strength of the community, also indicates a lack of systematic financial support. This asserts that the autonomy granted by the *Kurikulum Merdeka* must be balanced with affirmative budget policies to ensure that innovation at the school level can proceed equitably and sustainably.

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