



# Differentiated Learning in Inclusive Education in Secondary School Mathematics

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## ABSTRACT

*Inclusive education refers to the provision of learning for children and adolescents with disabilities together with their non-disabled peers in a single classroom in a general education environment. In its implementation, one of the biggest challenges in inclusive education lies in the abstract nature of mathematics learning. When instruction is uniform and does not consider the diversity of needs, difficulties in understanding mathematical concepts become more significant (Tomlinson, 2014). The purpose of this study is to examine how differentiated instruction is applied in inclusive education in mathematics and to identify the various difficulties encountered in its implementation. The method used in this study is a literature review. A literature review is the process of searching for written sources, such as books, archives, magazines, journals, and other documents related to the issues being studied (Sukaesih and Winoto, 2021). One strategy in differentiated learning is to form learning groups based on relatively similar ability levels. Teachers can use evaluation results to identify balanced learning groups (Ningsih & Yurnalis, 2022). Teachers can utilize concrete aids such as math blocks, tangrams, or other manipulatives to explain abstract concepts more concretely. This approach is particularly effective at the elementary level, but its principles remain relevant in providing concrete and visual learning experiences for all students (Gurita Aedi, 2020). There are factors that contribute to the difficulty of learning mathematics for children with special needs in inclusive classrooms. For example, children with mild to moderate autism require continuous repetition of material to understand it.*

## ABSTRAK

Pendidikan inklusif mengacu pada penyelenggaraan pembelajaran bagi anak-anak dan remaja penyandang disabilitas bersama dengan rekan-rekan mereka yang non-disabilitas dalam satu ruang kelas di lingkungan pendidikan umum. Dalam penerapannya, salah satu tantangan terbesar dalam pendidikan inklusif terdapat pada proses pembelajaran Matematika yang bersifat abstrak. Ketika pembelajaran yang diterapkan bersifat seragam dan tidak mempertimbangkan keragaman kebutuhan, maka kesulitan dalam memahami konsep matematika akan semakin besar (Tomlinson, 2014). Tujuan penelitian ini yaitu mengkaji bagaimana penerapan pembelajaran berdiferensiasi dalam pendidikan inklusi pada mata pelajaran matematika dan mengidentifikasi berbagai kesulitan yang dihadapi dalam proses implementasinya. Metode yang digunakan dalam penelitian ini adalah studi literatur. Studi literatur adalah kegiatan mencari sumber-sumber tertulis, baik berasal dari buku, arsip, majalah, jurnal, dan dokumen lain yang berkaitan dengan permasalahan dari topik yang dikaji (Sukaesih dan Winoto, 2021). Salah satu strategi dalam pembelajaran berdiferensiasi adalah membentuk kelompok belajar berdasarkan tingkat kemampuan yang relatif serupa. Guru dapat menggunakan hasil evaluasi untuk mengidentifikasi kelompok-kelompok belajar yang seimbang (Ningsih & Yurnalis, 2022). Guru dapat memanfaatkan alat bantu konkret seperti blok matematika, tangram, atau benda manipulatif lainnya untuk menjelaskan konsep abstrak secara lebih nyata. Pendekatan ini efektif khususnya di jenjang dasar, namun prinsipnya tetap relevan dalam memberikan pengalaman belajar konkret dan visual bagi semua siswa (Gurita Aedi, 2020). Terdapat faktor –faktor yang membuat kesulitan belajar matematika anak berkebutuhan khusus di kelas inklusi. Seperti misalnya pada anak autis rendah dan sedang, mereka membutuhkan pengulangan pemahaman materi secara terus menerus.

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## KEYWORDS

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## INTRODUCTION

Inclusive education refers to the provision of learning for children and adolescents with disabilities together with their non-disabled peers in a single classroom in a general education setting. Inclusive education is not merely the physical integration of students with special needs into regular classes, but also ensures that there is an adequate support system in place so that they can participate fully and meaningfully. This support can take the form of a flexible curriculum, teachers who are competent in managing inclusive classrooms, and a school culture that is friendly and accepting of differences (Susan, 2007).

In practice, one of the biggest challenges in inclusive education lies in the abstract nature of mathematics learning. At the secondary school level, mathematics poses a particular challenge for students, both from regular and special needs groups. When the learning approach is uniform and does not take into account the diversity of needs, the difficulty in understanding mathematical concepts becomes even greater (Tomlinson, 2014). Therefore, mathematics learning in inclusive education needs to be designed in such a way that all students have equal access and opportunities to learn optimally.

One relevant strategy to address the challenges of learning in inclusive classrooms is differentiated learning. This strategy adjusts learning materials, processes, and evaluations based on differences in learning readiness, interests, and learning styles of each student. In inclusive education, differentiated learning helps create a learning environment that is responsive to the needs of students with diverse characteristics, both those with special needs and regular students. Thus, differentiation is an important part of realizing fair and meaningful learning (Aisyah et al., 2024).

In practice, differentiated learning can be implemented by adjusting the content (learning materials), process (learning methods), products (learning outcomes), and learning environment to suit the diverse needs of students (Subban, 2006). This is particularly important in inclusive classrooms, where students have very varied backgrounds, abilities, and learning styles (Prastowo, 2022). These adjustments enable each student to learn in the way that suits them best, while creating a learning atmosphere that is fair and oriented towards individual potential. Given the important role of differentiated learning and the complexity of the challenges faced in the context of inclusive education, particularly in mathematics, a more in-depth study is needed.

## METHODS

The method used in this study is a literature review. A literature review is the process of gathering relevant information from various types of documents. This can involve searching through books, archives, magazines, scientific journals, and other documents directly related to your research topic. The goal is to gain a deep understanding and obtain data to support the arguments or analysis being developed (Sukaesih and Winoto, 2021). According to Triandini's (2019) research, there are several steps in the literature study method, namely: (1) Research Question, which is formed based on the idea or topic being researched by the researcher. (2) Search Process, which is used to answer the research question from the previous step by utilizing information from relevant sources. (3) Inclusion and Exclusion Criteria, in this step, a decision is made on whether or not the data used in SLR research is feasible. (4) Quality Assessment, in this stage, the data obtained will be evaluated based on predetermined criteria questions. (5) Data Collecting is the stage when all research data is collected into one. And (6) Data Analysis, the final stage where all the collected data will be analyzed to prove the results of the research questions that were made earlier and conclusions will be drawn.

The data analysis technique used is a literature review study. Data obtained from 14 relevant articles is analyzed to produce conclusions that provide an overview and ideas to be discussed on the topic being researched.

## RESULTS AND DISCUSSIONS

The application of differentiated learning in inclusive education in mathematics. The first step in the differentiated learning strategy is to identify the individual learning needs of students in understanding complex mathematical concepts. This process begins with assessing students' level of understanding through diagnostic assessments, observations, and pre-tests (Ramila, 2023). By understanding students' initial skills, teachers can develop targeted teaching strategies that are responsive to diversity.

In addition, teachers need to pay attention to each student's learning style. Some students are more sensitive to visual approaches, while others prefer auditory or kinesthetic methods. Identifying students' learning styles helps teachers choose appropriate learning methods and media (Burhanudin et al., 2023). Learning becomes more personalized and meaningful for each individual.

According to Salamah et al. (2014), differentiated learning is based on three main aspects, namely: learning readiness, interests, and student learning profiles. Through this approach, teachers can provide different but equal

treatment for each student, while still referring to the same learning objectives. This differentiation is key to creating inclusive and equitable mathematics learning.

One strategy in differentiated learning is to form learning groups based on relatively similar ability levels. Teachers can use evaluation results to identify balanced learning groups (Ningsih & Yurnalis, 2022). In these groups, students can interact and support each other, while teachers adjust their teaching strategies, such as providing additional material for groups with lower abilities and more advanced challenges for those with higher abilities.

The selection of varied learning resources is also an important part of differentiated learning. Teachers can use concrete aids such as math blocks, tangrams, or other manipulatives to explain abstract concepts more tangibly. This approach is particularly effective at the elementary level, but the principle remains relevant in providing concrete and visual learning experiences for all students (Gurita Aedi, 2020). Difficulties in implementing differentiated learning in inclusive classrooms in mathematics Inclusive education is more than just placing students with special needs in regular classrooms. The diversity of characteristics among students in inclusive classrooms requires teachers to be well supported and facilitated in order to meet the educational and social needs of all students. Therefore, a method or approach is needed to overcome these challenges. Loreman (2017) identifies various approaches to implementing inclusive education, one of which is differentiated learning.

Differentiated learning can be an appropriate approach for inclusive classrooms. Aspects of differentiated learning that focus on content, process, and product are applied according to the diverse needs of students. Thus, learning is flexible, responsive, and tailored to the interests of students in the classroom. In practice, students receive meaningful learning because the materials and methods used are tailored to their needs. According to Tomlinson (2014), one of the biggest challenges in inclusive education lies in the abstract nature of mathematics learning. At the secondary school level, mathematics poses a particular challenge for students, both from regular and special needs groups. When the learning applied is uniform and does not take into account the diversity of needs, the difficulty in understanding mathematical concepts will be even greater for children with special needs. There are a number of factors that make children with special needs experience difficulties in learning mathematics in inclusive classrooms. Children with mild to moderate autism need continuous repetition of material. To overcome this problem, a solution is proposed in the form of developing teaching materials that are appropriate for children with special needs that teachers encounter in inclusive classrooms, tailored to their type and difficulties.

In addition to the demand to create appropriate teaching materials, there are other challenges that hinder the use of differentiated learning approaches, including: limited training and teacher readiness; lack of contextual support; gaps between theory and practice; the discomfort of students with special needs due to the stigma that prevails among students regarding students with special needs; limited time to prepare all materials and other needs; lack of field research or lack of practical guidance.

## CONCLUSIONS

Inclusive education refers to the provision of learning for children and adolescents with and without disabilities in a single classroom in a general education environment. In its implementation, one of the biggest challenges in inclusive education lies in the abstract nature of mathematics learning. Therefore, mathematics learning in inclusive education needs to be designed in such a way that all students have equal access and opportunities to learn optimally. One relevant strategy to address the challenges of learning in inclusive classrooms is differentiated learning.

Identifying students' individual learning needs and selecting a variety of learning resources are important first steps in a differentiated learning strategy. In practice, differentiated learning can be carried out by adjusting the content (learning material), process (learning method), product (learning outcome), and learning environment to suit the needs of students. Although differentiated learning is able to address the challenges of learning in an inclusive classroom. In its application, one of the biggest challenges in inclusive education lies in the abstract nature of mathematics learning. There are a number of factors that cause children with special needs to experience difficulties in learning mathematics even though they are in inclusive classrooms. One of the proposed solutions to overcome these difficulties is to develop teaching materials tailored to the needs of each student with special needs that teachers encounter.

In addition to the demand to adapt the teaching materials to be used, there are other challenges that hinder the use of a differentiated learning approach, including: limited training and teacher readiness; lack of contextual support; the gap between theory and practice; the discomfort of students with special needs due to the stigma that prevails among students regarding students with special needs; limited time to prepare all materials and other needs; lack of

field research or lack of practical guidance.

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