

# Enhancing Math Problem Solving Skills in Slow Learners: The Impact of Differentiated Learning and Educational Games

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## Abstrak

Penelitian ini bertujuan untuk mengidentifikasi faktor-faktor yang memengaruhi kemampuan pemecahan masalah matematika siswa lamban belajar di tingkat sekolah dasar. Secara khusus, penelitian ini mengeksplorasi dampak metode pembelajaran diferensiasi dan media permainan edukatif serta alat bantu pembelajaran konkret terhadap peningkatan pemahaman dan keterampilan siswa lamban belajar dalam memecahkan masalah matematika. Penelitian ini dilakukan dengan menggunakan desain pretest-posttest dengan empat siswa dalam lingkungan yang terkontrol. Hasil penelitian menunjukkan peningkatan yang signifikan dalam kemampuan pemecahan masalah matematika siswa setelah penerapan pendekatan konten terdiferensiasi dan media edukatif. Hasil pretest dan posttest menunjukkan peningkatan rata-rata sebesar 22,5 poin pada seluruh siswa, yang menyoroti dampak positif dari intervensi tersebut. Selain itu, penggunaan balok Dienes sebagai alat bantu pengajaran konkret secara signifikan membantu siswa lamban belajar menghubungkan konsep matematika abstrak dengan objek konkret, sehingga meningkatkan keterampilan berhitung mereka. Lebih lanjut, penerapan permainan edukatif labirin matematika terbukti efektif dalam meningkatkan motivasi dan keterlibatan siswa, dengan tingkat kepuasan siswa sebesar 79,9%. Secara praktis, temuan ini dapat menjadi rujukan bagi guru sekolah dasar dalam merancang pembelajaran matematika yang lebih diferensiatif, konkret, dan interaktif untuk mendukung kebutuhan belajar siswa lamban belajar.

**Kata Kunci:** Slow learners; siswa; pemecahan masalah matematika.

## Abstract

This study aims to identify the factors influencing the mathematical problem-solving abilities of slow learner students at the primary school level. Specifically, the study explores the impact of differentiated instructional methods, educational game-based media, and concrete learning aids on improving the understanding and skills of slow learners in solving mathematical problems. The research employed a pretest–posttest design involving four students in a controlled setting. The findings indicate a significant improvement in students' mathematical problem-solving abilities following the implementation of differentiated content approaches and educational media. The pretest and posttest results show an average increase of 22.5 points across all students, highlighting the positive impact of the intervention. Furthermore, the use of Dienes blocks as concrete instructional aids significantly helped slow learners to connect abstract mathematical concepts with tangible objects, thereby enhancing their numeracy skills. In addition, the implementation of an educational mathematics maze game proved effective in increasing students' motivation and engagement, with a student satisfaction rate of 79.9%. Practically, these findings may serve as a reference for primary school teachers in designing more differentiated, concrete, and interactive mathematics instruction to better support the learning needs of slow learner students.

**Keywords:** Slow Learner; Students; Mathematical Problem-Solving.

## I. INTRODUCTION

Developing students' logical, analytical, and problem-solving skills. Not only does it aim to teach students how to count or solve procedural problems, mathematics learning is also directed at developing students' ability to solve problems, both in the context of mathematics itself and in various aspects of life (Ramadoni & Admulya, 2023; Efwan et al., 2024). This problem solving facilitates students to apply the knowledge they have acquired to solve more complex and diverse problems. However, for students with learning difficulties, such as slow learners, this process is often a major challenge (Sanjaya, 2022).

Slow learners are children who have low or slightly below average learning achievement from children in general that occurs in one or all academic areas (Pham et al., 2021). The abilities of slow learners are generally between normal children and mentally retarded children. When compared to normal children, slow learners have slower thought abilities and faster abilities compared to mentally retarded children. When learning mathematics, slow learners generally use their fingers when counting, so they have difficulty when the numbers are above ten. Based on the difficulties experienced by slow learners in arithmetic, children need special handling in their learning.

Slow learners usually have a slower learning rate than other students, and often have difficulty understanding the abstract concepts taught in mathematics. This causes them to face greater obstacles in mastering problem-solving skills. These students often require a more structured

approach, accompanied by repetition, visualization, and simplification of the material to be able to master mathematical topics effectively. This challenge requires more in-depth attention from educators so that they can help students overcome the difficulties they face.

Good problem-solving skills, in addition to contributing to improved academic achievement, also play an important role in students' daily lives, providing them with the skills to face and solve problems in a structured way. Therefore, developing problem-solving skills from an early age is very important, especially for slow learners who need extra support to develop optimally. Therefore, there needs to be an adjustment in the way mathematics is taught so that slow learners can not only follow the material given, but are also able to develop these essential problem-solving skills (Hasanah et al., 2023).

Slow learners often have greater difficulty in solving mathematics problems compared to students with normal learning abilities. They tend to have difficulty in understanding and applying abstract mathematical concepts and are often unable to solve problems in an efficient manner. On the other hand, a general teaching approach that is not tailored to the specific needs of slow learners can worsen the difficulties they face. Although various strategies have been tried, there has been no systematic and consistent method that has been tested to optimally improve the mathematics problem-solving skills of slow learners (Kurniawan, 2020).

This study aims to identify and develop approaches that can help improve the mathematics problem-solving skills of slow

learners. Understanding the challenges faced by these students, and developing more appropriate teaching strategies, it is hoped that more effective ways can be found to improve their skills in mathematics, especially in terms of problem solving (Ulfa, Roza, & Maimunah, 2022; Astuti, 2024).

Several previous studies have investigated various methods that can help slow learners solve mathematical problems. Based on research conducted, the use of visual aids, such as pictures or diagrams, has been shown to improve the understanding of mathematical concepts for students with learning difficulties. In addition, showed that simple and gradual step-based learning helps students to master the material better and be more confident. The application of technology is also one of the topics widely discussed in the literature, where the use of visualization-based learning applications can strengthen conceptual understanding and provide students with the opportunity to learn independently (Nanang & Cucu, 2020; Afriansyah et al., 2024)

This study proposes a more integrative and adaptive approach to mathematics learning for slow learners one solution proposed is to combine the use of traditional teaching techniques with educational technology, using visual-based learning applications, such as educational games or mathematical simulations, students can understand mathematical concepts in a more interesting and interactive way (Saepuloh, Luritawaty, & Afriansyah, 2024). In addition, learning that is tailored to the individual abilities of

students through the use of simpler instructions and sufficient repetition can help students to follow the material better, providing more time for practice, as well as the use of supporting visual aids, can accelerate students' understanding of mathematics problems.

This approach will also involve providing practical tasks that aim to train students in solving problems independently by giving students the opportunity to solve problems in small steps, they can feel successful in completing each section, which in turn increases their confidence and motivation to continue learning. Project-based learning and collaboration with fellow students are also part of the proposed approach, in order to improve students' social skills and cooperation skills in solving problems.

The new value in this research lies in the learning approach that combines technology and traditional teaching methods to improve the problem-solving abilities of slow-learning students. By utilizing applications that can provide direct and in-depth feedback, students will have the opportunity to understand the material in a more interesting way and in accordance with their learning style. This innovation also includes adjusting the pace of learning more flexibly, as well as the use of visual aids to make it easier for students to understand mathematics problems. This research is expected to contribute to designing a more inclusive mathematics curriculum, which is able to meet the needs of all students, especially slow learners, in achieving better academic success in mathematics.

Although various approaches have been employed to enhance the mathematical problem-solving abilities of slow learner students, there remains limited research that systematically examines intervention models integrating pedagogical approaches, concrete learning media, and motivational elements within a single instructional framework. Therefore, this study combines differentiated instruction, an educational mathematics maze game, and the use of Dienes blocks as a complementary and unified intervention. Differentiated instruction serves as the primary framework for adapting learning content and processes to the characteristics of slow learners, while Dienes blocks are utilised to support the development of conceptual understanding through concrete learning experiences. Furthermore, the educational mathematics maze game is implemented to enhance students' motivation, engagement, and sustained attention throughout the learning process. These three components are not applied separately but are integrated within a single instructional sequence, thereby forming a holistic intervention structure to support the mathematical problem-solving abilities of slow learner students.

## II. METHOD

This study employed an experimental research design using a pre-experimental one-group pretest–posttest approach, which is appropriate for small sample sizes and focuses on measuring changes in participants' performance before and after an intervention. This design was selected because the study involved only four slow

learner students and did not include random assignment or a control group, making the use of a quasi-experimental design inappropriate for this context (Sugiyono, 2020).

The participants consisted of four primary school students identified as slow learners. All participants received the same instructional intervention. The study aimed to examine changes in students' mathematical problem-solving abilities following the implementation of an integrated instructional approach combining differentiated instruction, concrete learning aids, and educational games.

The intervention was implemented as a single, integrated instructional sequence rather than as separate or isolated treatments. Differentiated instruction served as the overarching pedagogical framework, guiding the adaptation of content, learning processes, and instructional pacing to meet the individual needs of slow learners. Within this framework, Dienes blocks were used to support conceptual understanding through concrete manipulation of mathematical concepts, while an educational mathematics maze game was incorporated to enhance students' motivation, engagement, and sustained attention during learning activities.

Data were collected using both quantitative and qualitative methods. Quantitative data were obtained through pretests and posttests designed to measure students' mathematical problem-solving abilities before and after the intervention. The results were analysed using descriptive statistics to describe

changes in students' scores across the two testing phases. Given the small sample size, the analysis focused on individual score improvements rather than statistical generalisation.

Qualitative data were collected through teacher interviews and direct classroom observations conducted during the intervention. These data were analysed using a thematic analysis approach to gain deeper insights into students' learning behaviours, engagement levels, and challenges encountered during the learning process. The qualitative findings were used to complement the quantitative results and to provide a more comprehensive understanding of the effectiveness of the integrated instructional approach.

### III. RESULT AND DISCUSSION

#### A. Result

**Identifying factors that influence the mathematical problem-solving ability of slow learner students**

The results of this study focus on identifying factors that influence the ability to solve mathematical problems in slow learner students at the elementary school level. By understanding these factors, this study aims to provide a clearer picture of the obstacles faced by slow learner students in solving mathematical problems. Factors that may influence this ability include methods used in previous research.

**Learning media using differentiation method**

In this study of Agung subtraction material was applied using a special content differentiation approach for slow learner students. Subtraction, which often

involves the process of decreasing numbers, requires an understanding of the basic concept that the result is reduced from the initial number (Firmansyah, 2024). Slow learner students generally have difficulty understanding subtraction because it requires a more abstract understanding and deeper counting skills than addition. The results of the study showed an increase in students' understanding and motivation after they were given material adapted to the appropriate method, the following data in Figure 1.

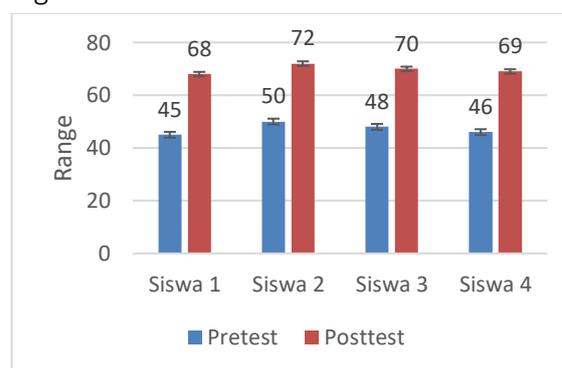


Figure 1. Pretest & Posttest.

The diagram illustrates the pretest and posttest scores of four students, all of whom demonstrated notable improvements following the intervention. S1 recorded the lowest pretest score (45) but showed a substantial increase to 68 in the posttest, reflecting an improvement of 23 points and indicating a positive response to the instructional approach. S2 achieved the highest scores in both assessments, improving from 50 in the pretest to 72 in the posttest, an increase of 22 points, and consistently outperforming the other participants. Student 3 (S3) improved from a pretest score of 48 to a posttest score of 70, representing a gain of 22 points and demonstrating steady progress, although

the final score remained slightly lower than that of S2. Similarly, Student 4 (S4) showed a marked improvement from 46 to 69, an increase of 23 points, matching the gain observed in S1 but achieving a higher final posttest score, which suggests a stronger overall performance relative to initial ability.

Overall, the lowest pretest and posttest scores were recorded by S1 (45 and 68, respectively), while the highest scores in both assessments were achieved by S2 (50 and 72). The average pretest score across all students was 47.25, increasing to 69.75 in the posttest, resulting in an average gain of 22.5 points. These results indicate a clear and consistent improvement in mathematical problem-solving abilities among all participants.

The findings suggest that the application of a content differentiation model has a positive impact on enhancing the mathematical problem-solving skills of slow learner students. By adapting instructional content to students' learning levels and needs, this approach supports deeper understanding of mathematical concepts and increases students' confidence when engaging with problem-solving tasks.

These results align with Tomlinson's theory of differentiated instruction, which emphasises the importance of addressing individual learning differences to optimise student outcomes. Furthermore, the findings are consistent with Vygotsky's scaffolding theory, as the use of gradual instruction and visual support appears to facilitate students' comprehension of more complex mathematical material.

Based on these findings, it is recommended that content differentiation

continue to be implemented when teaching slow learner students, particularly in mathematics topics that require problem-solving skills. This approach not only supports conceptual understanding but also fosters greater confidence and motivation, enabling students to engage more effectively with mathematics learning.

### **Learning media using educational game method**

In this study Angwarmasse explain of the validation of material experts on the math labyrinth educational game was carried out by PGSD lecturers. The purpose of material validation is to assess the relevance, accuracy, and systematic presentation of the math labyrinth educational game (Angwarmasse & Wahyudi, 2021). The validator will provide suggestions and comments if the material in the media is not appropriate. Suggestions and comments from the validator will be used as a basis for researchers to make revisions until the material is suitable for teaching. Material validation is carried out by providing a rubric for the material validation test instrument which contains 12 indicators with a maximum score of 4 and a minimum score of 1 for each indicator.

Various aspects in the development of this math maze educational game show that the media as a whole is appropriate and effective. In terms of appearance, the media has succeeded in being relevant to the learning material and can attract students' attention. The background design and color selection are also considered good and are able to support a pleasant visual experience. The font used is quite

easy to read, although it can still be adjusted further to make it clearer. The font size used is also appropriate to the media content, making the text easier to read and understand for students.

The interaction aspect shows that this media provides quite good feedback to students when they interact, such as pressing or clicking buttons. This makes it easier for students to understand the response to their actions. The discussion topics in the game are also arranged in a structured and sequential manner, ensuring that the learning material is delivered clearly. In addition, the notification of scores or grades after completing the quiz helps students to monitor their progress.

In terms of control, this media makes it easy for students to access materials and quizzes, although some buttons and interactivity panels can still be improved to make them easier to use. Finally, in terms of form, the animation in the game supports the material being taught very well, and although the animation is quite interesting and informative, there is an opportunity to improve its visual appeal to make it easier for students to understand. The data from the material expert validation results are presented in the following Table 1.

Table 1.  
Expert Validation Results

Aspect	Mean Score	Category
Appearance	3.85	Very Good
Interaction	3.78	Good
Control	3.70	Good
Form	3.82	Very Good
<b>Overall Mean</b>	<b>3.79</b>	<b>Good</b>

The next stage is implementation. The implementation stage is carried out if the media product has been revised based on suggestions from the validator. The subjects in this study were elementary school the product was tested on 4 students. After finishing using the learning media, students were asked to fill out a questionnaire. The results of student responses in the form of questionnaires will be used as a basis for determining the practicality of the mathematical labyrinth educational game media. The results of student responses can be seen in Table 2.

Table 2.  
Student Responses

Question	Score
I feel happy when learning mathematics using the educational game media.	22
I am interested in learning mathematics with the use of this educational media.	22
I follow the lessons in mathematics until the end.	22
I get clear explanations of the topics provided by the educational game media.	20
I always ask questions about the media during the lessons.	20
I enjoy asking questions about the media and getting answers from the teacher.	20
I try to solve math problems using this media.	20
I enjoy studying with this media because it is attractive and fun.	20
I can easily use the educational game media for learning.	20
Using the educational game media improves my knowledge of mathematics.	21
Using the educational game media increases my problem-solving skills.	21
When I encounter difficulties, I ask the teacher through WhatsApp.	20
<b>Total</b>	<b>230</b>
<b>Percentage</b>	<b>79.90%</b>

Based on the responses from the students after using the educational math labyrinth game, the percentage score reached 79.9%, which falls under the "good" category. This indicates that students were able to understand the material and experienced practical benefits while using the math labyrinth educational game media.

The research resulted in the development of a math labyrinth educational game focused on the operations of addition and subtraction involving negative integers for 6th-grade elementary school students. This research and development followed the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) as outlined by Rayanto (Rayanto & Sugianti, 2020). The process began with data collection, including interviews with 6th-grade teachers, which revealed that prior to this, the teachers used videos and PowerPoint as teaching media, but had not incorporated educational games. This gap led to the development of the math labyrinth game.

According to Bintang using educational games can improve concentration and stimulate thinking while supporting the learning process through more creative and enjoyable activities. During the design phase, the researcher first determined the game's title, created content from various books and online resources, and ensured the content aligned with the curriculum, specifically focusing on negative integer operations (Bintang et al., 2024).

In the development phase, the math labyrinth educational game underwent validation tests by media experts and

subject matter experts. The media expert validation results showed that the game was feasible to use, scoring 45 with a percentage of 80.3%, placing it in the "very good" category. The subject matter expert validation also showed favorable results, scoring 40 with a percentage of 83.3%, indicating that the game was appropriate for use in teaching (Angwarmasse & Wahyudi, 2021).

After validation, the game underwent a practicality test, which was conducted with four students as part of a limited trial in an elementary school. Following the trial, students filled out a questionnaire, the results of which provided insight into the practicality of the media. The evaluation phase aimed to analyze the validity and practicality of the developed media. However, due to the COVID-19 pandemic, the testing could not be expanded further. Nonetheless, the results from the validation and practicality tests indicate that the math labyrinth educational game is effective and can be applied in elementary schools.

Similar research, such as the development of educational math labyrinth games by Erva Vorika (2019), showed that such media can motivate students to engage with mathematics. This aligns with findings that educational media can foster student motivation and learning. Other related studies also support the positive impact of interactive multimedia and educational games in enhancing students' understanding of mathematics.

#### **Learning media using dienes block media method**

The research data were obtained by using arithmetic ability tests and

observation. The test was conducted by having the child work on ten addition problems up to 99 and the observer observed the child's behavior and recorded using a value scale. The test instrument was compiled based on competency standards and basic competencies. The competency standards used as a reference in compiling the learning outcome test in this study were to perform arithmetic operations on adding numbers up to 99, while the basic competency was to perform arithmetic operations on adding numbers up to 99 using the technique of not storing and storing (Safitri, 2018). The Basic Competencies (BC) used in this instrument were to perform addition up to 99 in a downward manner. The indicators used are being able to add numbers up to 99 without storing between tens and units, children can add numbers up to 99 without storing between tens and tens, children can add numbers up to 99 by storing between units and tens, and children can add numbers up to 99 by storing between tens and tens. The observation instrument covers two aspects, namely affective and psychomotor (Rohani, 2020).

The affective domain that will be observed is attitude and interest, while the psychomotor domain is imitating, doing with procedures, doing activities naturally and accurately. Observers assess children's behavior and record using a value scale. Indicators from the attitude aspect include children's ability to be calm when learning mathematics using Dienes Block media (Viorika, 2019).

Indicators from the interest aspect include children's ability to pay attention to

teachers when learning mathematics using Dienes Block media. Indicators of the response aspect include children being able to ask the teacher when learning using Dienes Block media, children being able to answer questions given by the teacher when learning mathematics using Dienes Block media, and children being able to answer questions given by the teacher when learning mathematics using Dienes Block media. Indicators of the aspect of doing with procedures include children being able to use Dienes Block media according to usage procedures and listening to explanations of the rules.

Indicators of the imitation aspect on the instrument are that children are able to follow the teacher's instructions in solving addition problems using Dienes Block media. Indicators of the aspect of doing activities naturally and accurately are that children are able to do tasks given by the teacher when learning using Dienes Block media, children are able to give their opinions when using Dienes Block media, and children are active in discussing when using Dienes Block media. Validation of the learning outcome test instrument and observation instrument is carried out with content validity the selection of content validation is because Content Validity is an important thing in measuring learning achievement (Fransukma et al., 2020).

A test instrument is said to have content validity when the instrument can measure the competencies that are developed along with indicators and learning materials (Ramadhany & Prihatnani, 2020). Content validity in this study was carried out with a practitioner test (Professional Judgment).

The Practitioner Test is a validity test that is carried out by asking for consideration from people who are engaged in a particular field that is in accordance with the study area of the instrument, for example teachers, mechanics, doctors, and so on to ask for their opinions and assess the accuracy of the instrument content (Purwanto, 2007).

Content validity is carried out by the teacher considering the suitability of the instrument in writing by giving a assessment categories (appropriate or inappropriate on the learning outcome test instrument and very good, good, lacking, or very lacking on the observation instrument) and through requests for suggestions and/or comments on the validation test sheet. The instrument is said to be valid if each item gets the category 'appropriate' on the learning outcome test instrument and at least 'less' without any notes on the observation instrument and is indicated by a validation certificate.

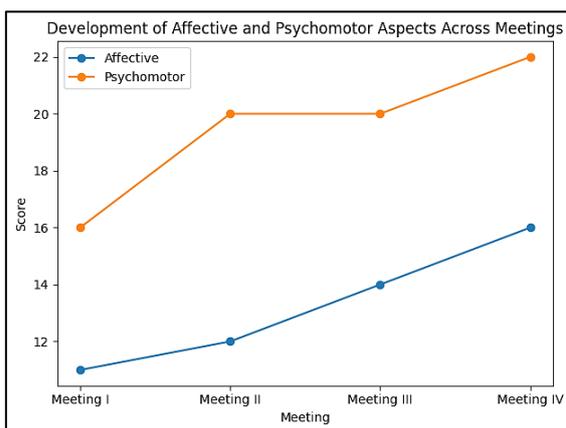


Figure 2. Development of Affective and Psychomotor Aspects Across.

The analysis using descriptive statistics shows that the test results for arithmetic abilities after the treatment were higher compared to the pre-test scores, with a difference of 40%. This was evidenced by

Student A's ability to perform addition without regrouping between tens-ones, ones-tens, and tens-tens, as well as performing addition with regrouping between tens-ones and ones-tens. Similarly, S1 was able to solve addition problems without regrouping between tens-ones, ones-tens, and tens-tens, and with regrouping between ones-tens.

The improvement in arithmetic skills is attributed to both the teacher's efforts and the students' participation in learning using Dienes blocks media. During the treatment phase with Dienes blocks, the teacher conducted intensive daily lessons, hoping to achieve optimal results. This approach aligns with the views of who stated that overcoming learning difficulties in slow learners at the elementary level requires intensive learning support.

The improvement in the arithmetic skills of both S1 and S2 was identical, at 40%. This similar increase in performance could be due to both students having similar intellectual abilities. This is consistent with the findings of Thaib who stated that a child's learning achievement is closely related to their intelligence level, with higher intelligence offering greater opportunities for better academic performance.

Dienes blocks are a concrete media consisting of blocks of varying sizes representing ones, tens, hundreds, and thousands. These blocks are used to help students understand mathematical concepts at the elementary school level, particularly for first and second graders. Dienes blocks were chosen as the media in this research because they are a concrete tool that can clarify abstract concepts,

particularly for slow learner students who struggle with abstract ideas. This media was chosen to improve the students' ability to perform addition up to 99, helping slow learners connect abstract symbolic numbers with concrete blocks.

According Anwar slow learners require specific teaching approaches, such as using appropriate and varied media, including concrete media, which helps them with abstract concepts. Additionally, slow learners may need more time to complete tasks and require greater patience from the teacher. These students often work on more problems rather than relying on memorization and benefit from remedial learning (Syaeful, 2023).

The characteristics of slow learners, who face difficulties with abstract concepts like addition, mean they need concrete media like Dienes blocks to help them understand these concepts. The steps involved in using the Dienes blocks for teaching addition include placing the blocks on an addition board according to the given problem, with tens blocks placed on the tens row and ones blocks on the ones row. Then, the blocks are combined, and the total number of blocks is counted in the result column. Students are then asked to write down the procedure for solving the addition problem using the steps previously performed with the Dienes blocks (Switri, 2022).

These instructional steps align with the views of who emphasized that in planning math instruction for students with special needs, the ability and needs of the child should be considered, with the material being arranged from simple to complex, from concrete to abstract.

Based on the above discussion, when related to the criteria for effectiveness, Dienes blocks can be said to be effective if there is an improvement in test scores from pre-treatment (pretest) to post-treatment (posttest), reaching a "good" category, as well as an increase in observation scores reaching a "very good" category. Therefore, it can be concluded that the use of Dienes blocks media is effective in improving the arithmetic skills of slow learner students.

## **B. Discussion**

### **Providing recommendations that can help teachers design more effective teaching strategies to improve the mathematical problem-solving ability of slow learner students**

The results of this study focus on identifying the factors that influence slow learner students' ability to solve mathematical problems at the elementary school level. By understanding these factors, the study aims to provide a clearer picture of the challenges faced by slow learner students in mathematical problem-solving.

In this study, subtraction material was taught using a content differentiation approach specifically designed for slow learner students. Subtraction, which often involves decreasing numbers, requires a basic understanding that the result is smaller than the initial number. Slow learner students generally face difficulties understanding subtraction as it requires more abstract thinking and deeper counting skills than addition.

The results from the study showed significant improvements in students' understanding and motivation after they received the material adapted with the appropriate method. The pretest and posttest scores of students demonstrated substantial progress. For example, Student 1 scored 45 on the pretest and 68 on the posttest, showing an improvement of 23 points, while S2 scored 50 on the pretest and 72 on the posttest, showing an improvement of 22 points. The lowest pretest score was 45, and the lowest posttest score was 68. The highest pretest score was 50, and the highest posttest score was 72. The average pretest score for all students was 47.25, and the average posttest score was 69.75, indicating a clear overall improvement with an average increase of 22.5 points.

This positive outcome aligns with Tomlinson's theory on differentiation in learning, which emphasizes the importance of adapting content to students' individual learning needs. Moreover, Vygotsky's scaffolding theory is also relevant here, as a gradual and supportive approach helps slow learners better understand complex material. Based on the findings, it is recommended that content differentiation continue to be applied for slow learner students to improve their problem-solving skills, especially in topics that require critical thinking and abstract reasoning.

### **Learning Media Using Educational Game Method**

This study also explored the use of the math labyrinth educational game, where the validation of the game was carried out by material experts. The purpose of the material validation was to assess the

relevance, accuracy, and systematic presentation of the educational game content. The material was validated using a rubric with 12 indicators, each scored between 1 (low) and 4 (high).

The results of the validation showed that the educational game was effective in several aspects:

#### a. Appearance

The game was relevant to the learning material and was visually engaging, with a good background design and color choices. The font was legible, although it could be adjusted for further clarity.

#### b. Interaction

The game provided adequate feedback when students interacted with it, helping them understand their actions. The topics were presented logically and in a structured order, which made it easier for students to follow. The game also included notifications for scores or grades after completing quizzes, which helped students track their progress.

#### c. Control

The game allowed students to easily navigate the material and quizzes. However, some aspects, such as interactive panels, could still be improved for easier use.

#### d. Form

The game included animations that supported the learning material. Although the animations were interesting and informative, they could be enhanced to increase student engagement and comprehension.

The data from the validation results showed that the game was rated positively overall. Following the validation, the game underwent a practicality test with four

students. After using the game, students filled out a questionnaire, and the results showed that 79.9% of students felt the game was beneficial and helped them understand the material. This is considered a "good" result, indicating that the game can be effectively used as an educational tool in elementary schools.

### **Learning Media Using Dienes Blocks Method**

In this part of the study, the effectiveness of Dienes blocks as a teaching tool for arithmetic operations was assessed. A test was given to slow learner students to solve 10 addition problems up to 99, with the observers recording their behavior and performance. The competency standards used in the test focused on addition operations involving numbers up to 99.

The analysis of the test results showed significant improvement in students' ability to solve addition problems using Dienes blocks. The students showed a 40% improvement from the pretest to the posttest. Specifically, Student A demonstrated the ability to perform addition without regrouping between tens-ones, ones-tens, and tens-tens, and also with regrouping. Similarly, S1 showed improvement in addition without regrouping and with regrouping.

Dienes blocks were chosen as the teaching medium because they are concrete tools that help slow learner students grasp abstract concepts more effectively. By physically manipulating the blocks, students can better understand addition operations, as the blocks

represent the ones, tens, hundreds, and thousands.

The results suggest that Dienes blocks are an effective tool for improving slow learner students' arithmetic skills. The improvement is likely due to the hands-on, concrete nature of the media, which helps students connect abstract concepts to tangible objects. This aligns with Ningrum Setiawan's (2013:42-44) view that slow learners need appropriate and varied media, such as concrete tools, to help them understand abstract concepts. Moreover, students who struggle with abstract ideas benefit from the patience, extra time, and remedial instruction that Dienes blocks can provide.

### **IV. CONCLUSION**

This study concludes that the instructional intervention implemented integrating differentiated instruction, educational mathematics games, and the use of Dienes blocks was effective in improving the mathematical problem-solving abilities of slow learner students at the primary school level. The findings consistently indicate that adapting instructional content and processes to students' individual needs, supported by concrete learning aids and interactive media, facilitates better understanding of mathematical concepts and enhances students' ability to solve arithmetic problems.

The positive outcomes observed in this study highlight the contribution of differentiated instruction as a pedagogical framework that accommodates the diverse learning characteristics of slow learners.

The integration of educational games helped increase students' engagement and motivation during the learning process, while the use of Dienes blocks supported the development of conceptual understanding by linking abstract mathematical ideas to concrete representations. Collectively, these approaches demonstrate the value of a holistic and integrated instructional design in mathematics education for slow learner students.

Despite these findings, this study has several limitations. The small number of participants limits the generalisability of the results, and the absence of a control group restricts causal inference. In addition, the intervention was implemented over a relatively short period, which does not allow for conclusions regarding the long-term effects of the instructional approach on students' mathematical development.

Nevertheless, this study contributes to the field of mathematics education by providing empirical evidence on the effectiveness of an integrated instructional approach tailored to the needs of slow learners in primary schools. The findings offer practical implications for teachers and curriculum developers, suggesting that the incorporation of differentiated instruction, concrete learning materials, and game-based learning can support more inclusive and effective mathematics instruction.

Future research is recommended to involve larger samples and longer intervention periods to examine the sustainability of learning outcomes. Further studies may also explore the application of similar instructional approaches across

different mathematical topics and investigate their impact on students' long-term academic achievement, motivation, and self-confidence in learning mathematics.

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