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Base Ten Blocks in Refusal Reassembling Students with Learning Problems

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ABSTRACT

Subtraction with regrouping is something complex for students to understand, especially students with learning disabilities. The main problem that students often face in this skill involves the process of borrowing where students do not pay attention to the position of the digits and are unable to regroup. The initial findings of the study show that students have a low level of mastery of the concept of subtraction and regrouping, which causes students to not be able to answer questions correctly. Therefore, this action research aims to help improve the mastery of the concepts and skills of students with learning problems regarding the operation of subtraction and regrouping. The study participants consisted of a Year 3 student who had a slow learning problem at a school in Malacca. This action research focuses on the use of Base Ten Blocks as an intervention tool to help study participants complete subtraction operations by regrouping. The initial findings of the study show that students have a low level of mastery of the concept of subtraction and regrouping, which causes students to not be able to answer questions correctly. Therefore, data collection tools such as document analysis, checklists and interviews were used to see the effectiveness of the intervention carried out. The findings from the document analysis show an increase in the mastery of concepts and skills of the study participants in the subtract operation by re-collecting. In summary, the findings of this study show that the use of Base Ten Blocks can improve mastery of the concept of subtraction by regrouping and skills in solving questions. The significance of this study is to encourage teachers to use visual aids, provide differentiated education and apply a multisensory approach in teaching Mathematics. Further research is needed to further explore and optimize the use of manipulative tools in mathematics education, especially in special education contexts.

1. Introduction

Special Education is a program specially designed to meet the needs of MBPK including the use of special teaching materials, special equipment and Teaching and Learning techniques according to the student's ability level [7]. Therefore, the Special Education Primary School Standard Curriculum

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(KSSR PK) for Learning Disabilities has been formulated with the aim of developing the potential of students in a comprehensive, balanced and integrated manner and in accordance with the level of functionality of students [1]. Mathematics is one of the subjects found in KSSRPK where the goal of this curriculum is to build students' understanding of the concept of numbers, basic skills in calculations, understanding simple mathematical ideas and the ability to apply knowledge and mathematical skills effectively in daily life [2,8].

Mathematics is a field of knowledge that is closely related to everyday life [6]. Among the basic operations that students need to master is the subtraction operation [9]. Subtraction is one of the topics that is difficult for students to understand, including MBPK, because it is non-commutative, non-associative and has no neutral elements [10]. The mathematics syllabus in KSSRPK starting from year one has again included topics related to the concept of subtraction. Beginning in year 2, students are exposed to the concept of subtraction without regrouping and then starting in year 3, students are exposed to the concept of subtraction with regrouping. Rejection without regrouping is not a problem to learn but it is said that rejection with regrouping is something complex for students to understand [3]. This issue is one of the causes of the gap in mathematics achievement.

Based on the reflection of past teaching, the most significant pattern of mistakes made by students in subtracting and regrouping skills is not subtracting in the correct order and not doing the regrouping process [12]. During the teaching and learning session for this topic, the researcher has produced a common teaching aids board to help students complete the operation. However, the teaching aids produced is seen to be less effective [13,16] in helping students improve their understanding of rejection by regrouping [15]. This is because the teaching aids produced does not involve concrete materials that can be seen in reality to explain the concept of place value [15] and the concept of re-collection clearly to students who have problems in understanding abstract concepts [11,12]. Therefore, in order to improve past teaching practices, the researcher has used Base Ten Blocks as an intervention for students who have mastered the subtraction skill without regrouping but have not yet mastered the subtraction skill by regrouping [15]. Therefore, the researcher hopes that the use of Base Ten Blocks can help students with learning problems understand and be able to complete subtraction operations by regrouping.

2. Methodology

This study uses an action research design with a qualitative approach. The action method is an approach to improve the quality of education [4]. This action research focuses on the use of Base Ten Blocks as an intervention tool to help study participants complete subtraction operations by regrouping. Therefore, the action method is used to improve the mastery of the concepts and skills of students with learning problems regarding subtraction operations by using document analysis methods, checklists and interviews. The study participants were Year 3 students who had slow learning problem at school in Malacca.

The action research model from Lewin [14] and Laidlaw [21] studies was used as the basis of this study design. There are five stages in the action research process namely identifying the problem, planning action, implementing action, data collection and reflection as shown in Figure 1.

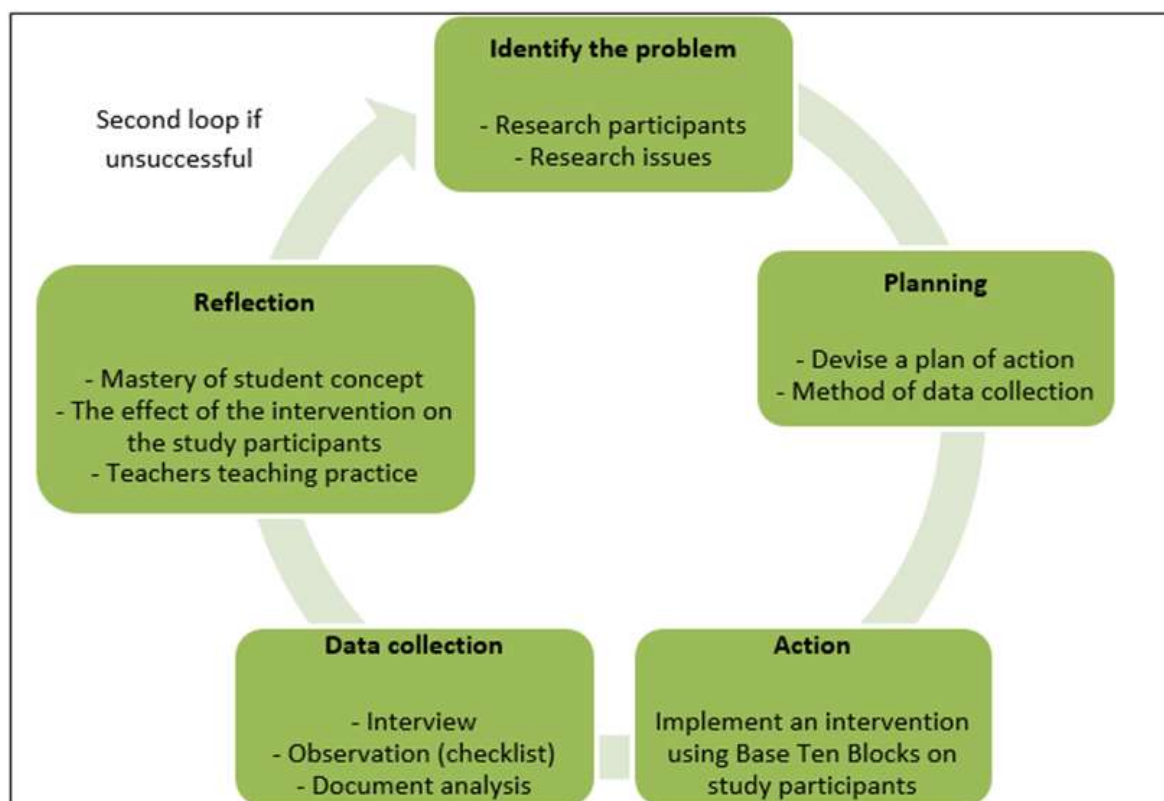


Fig. 1. Adaptation from Lewin [14] and Laidlaw [21]

2.1 Stage 1 : Identify the Problem

Throughout the observation carried out in the classroom, the researcher found that a student had mastered rejection without collecting again. However, the student did not master the subtraction skill and had significant problems in that skill.

2.2 Stage 2 : Action Planning

The researcher designed an intervention tool called Base Ten Blocks to improve students' mastery of concepts and skills in rejecting by regrouping. The researcher also planned the method of data collection to be used in the implementation of this study which consists of document analysis, interviews and observations.

2.3 Stage 3: Implementation of Actions

Actions were carried out according to the plan, namely giving worksheet 1, giving intervention using Base Ten Blocks, giving worksheet 2, giving worksheet 3 and giving worksheet 4. Observation using a checklist was also carried out before and after the intervention was given to the participants.

2.4 Stage 4 : Data Collection

All records such as worksheets, checklists and interviews were collected to be analysed to see the changes that occurred. All findings were analysed in the form of descriptions, tables and graphs in the study findings

2.5 Stage 5 : Reflection

The researcher concluded that the research conducted could help solve the problems faced by the selected study participants. The researcher can also see the strengths and weaknesses of the intervention tools throughout the implementation of the study and improvements that can be made by the researcher with suggestions of new ideas for further research.

3. Results

3.1 Question 1: Can the Use of Base Ten Blocks Improve Students' Mastery of the Concept of Subtraction and Regrouping?

Through the data analysis that has been carried out, the researcher found that the use of Base Ten Blocks can improve the study participants' mastery of the concept of subtraction by regrouping. The interview analysis data shows that the use of Base Ten Blocks is effective in improving the study participants' mastery of concepts related to subtraction and accumulation. Among the things that study participants need to understand related to the concept of subtracting by regrouping is how to "borrow" or regroup a digit from a higher place value such as the ten's place value to be used in calculations at a lower place value. Based on the analysis of the interview transcripts, the study participants showed an understanding of the concept of regrouping when the study participants were able to identify situations that required regrouping and could explain how to do it. In addition, the interview analysis also found that the use of Base Ten Blocks was able to give the study participants the opportunity to experience the regrouping process in a concrete way during the intervention. The concrete experience that was given to the study participants was able to improve the study participants' mastery of the concept of subtraction and regrouping.

Analysis of serial worksheets can also support that there is an improvement in mastery of study participants' concepts when given intervention through the use of Base Ten Blocks. Based on the serial worksheet analysis data, it can be seen that there is an improvement in performance shown by the study participants before, during and after the intervention is given. This is said to be so because, after undergoing the intervention, the study participants no longer made the mistake of rejecting without following the order of numbers and were able to perform the regrouping process. Overall, the use of Base Ten Blocks proved to be able to improve students' mastery of the concept of subtraction by regrouping. This is said to be so because, after undergoing the intervention, the study participants showed an understanding of how to re-collect when the study participants were able to tell the researcher during the interview session. In addition, the study participants also have an understanding of how the regrouping process affects the overall value of the number on the borrowed digit and the one that is given a new value. The proof is that the study participants are able to solve the given questions correctly.

3.2 Question 2: How Effective is the Use of Base Ten Blocks in Improving Students Skills in Subtraction by Regrouping?

Through the data analysis that has been carried out, the researcher found that the use of Base Ten Blocks has a positive effect on students' skills in rejecting by regrouping. The results of the serial worksheet document analysis show a positive development of the study participants' skills in solving questions throughout the intervention. In addition, comparative analysis of worksheets before the intervention and worksheets after the intervention clearly shows that there is an improvement in the

students' skills in solving rejection questions. This is said to be so because the study participants managed to answer all the questions on the final worksheet correctly without relying on intervention tools and without needing the teacher's guidance. Study participants can also perform the regrouping process correctly, which is to borrow from the higher place value which is ten and reduce the value in that place while adding the value to the lower place which is the same place value to continue the subtraction operation.

In addition, the findings of observational analysis using checklists also support the findings of the study that Base Ten Blocks effectively improve the skills of the study participants in rejecting by regrouping. This point is proven through the results of analysis of observational data related to skill aspects [17]. The results of the analysis showed that the study participants showed a good mastery of the aspects of the skills tested in the checklist form. This is said to be so because, after the intervention was given, the study participants were able to perform subtraction operations starting from the right, were able to subtract according to the order of numbers in the same place value, were able to perform the regrouping process and the study participants were able to complete the questions correctly without needing guidance. Therefore, it is clear that the use of Base Ten Blocks is able to improve the skills of study participants in completing subtraction operations by regrouping efficiently and accurately.

In addition, interview instruments were also used to support the answers to the second research question. The results of the analysis of the interview transcripts prove that the use of Base Ten Blocks is effective in improving subtraction skills by regrouping the study participants. Based on the interview analysis, the study participants were able to tell how they used Base Ten Blocks to complete subtraction operations by regrouping. In addition, the study participants were also able to identify situations that required a regrouping process. The responses given by the study participants during the interview clearly show that the study participants understand that regrouping needs [18] to be done when the value of the digit in the same place is not sufficient to reject a larger digit value. This matter is in line with the main aspect of subtracting and regrouping skills, which is that students are able to identify the need to regroup [18].

Overall, the use of Base Ten Blocks proved to be able to improve the skills [19] of study participants in regrouping rejection. This is said to be so because, after undergoing the intervention, the study participants were able to identify the need to collect again and were able to do the process of collecting again correctly.

3.3 Question 3: How Do Teachers Improve Teaching Practices in Teaching Subtraction Skills by Regrouping using Base Ten Blocks?

The use of fuel in the Teaching and learning process is one of the important factors in achieving the objective [5]. This is because the level of understanding and mastery of students in a teaching topic is more effective if assisted with the appropriate use of teaching aids [20]. In the context of this study, Mathematics teachers should strive to meet the requirements of MBPK by choosing teaching aids that suits their learning style. Therefore, this action research has given experience to the researcher to solve the problems of the study participants related to subtractive operation skills by recollecting [4]. Throughout this study, the researcher has maximized the use of Base Ten Blocks to improve teaching practices in teaching subtraction skills by regrouping students with learning problems.

Among the practices carried out by the researcher in teaching subtraction skills by recollecting is to give the study participants the opportunity to build a basic understanding related to the value of place in a concrete way. While conducting the study, the researcher has used Base Ten Blocks to

show the difference between the unit's place value and the tens place value. The unit block is used to represent the digit in the same place while the long block is used to represent the digit in the tens place. The use of intervention tools has helped study participants understand the concept of place value as well [16] as understand how value in the place system works in a more concrete way. This is because the use of Base Ten Blocks allows study participants to hold and move these blocks to see the difference between the values of different places. Therefore, through the use of this material, teachers can meet the requirements of MBPK that require visual aids to understand abstract mathematical concepts.

Next, the use of Base Ten Blocks in subtracting and regrouping skills can help teachers visualize the regrouping process clearly. During the intervention, the researcher gave a mathematical sentence involving regrouping. For example $42 - 7$. Study participants have used Base Ten Blocks to represent 42 by placing 4 tens blocks in the tens place and 2 units blocks in the same place. When the research participant wanted to subtract 7 from 2 in the same place, he regrouped by borrowing a block of tens in the tens place because two blocks of units were not enough to do the subtraction. Next, the study participants were given the opportunity to break a borrowed tens block into ten unit blocks concretely making the place where there are enough blocks to do subtraction. Therefore, it is clear that the use of Base Ten Blocks can give a concrete picture and understanding to the study participants on how to do the regrouping process.

The use of Base Ten Blocks can also improve the teacher's teaching practice in the subtraction skill by collecting again because the teacher can apply a multisensory approach in teaching. The use of Base Ten Blocks involves various senses such as touch, sight, hearing and movement. The sense of touch is involved when the study participant can physically hold and feel the blocks to help him understand the concept of place value. In addition, Base Ten Blocks provide a concretely clear visual of the place value of each block, i.e. small blocks represent units while long blocks represent tens. The use of this tool also uses the student's sense of sight to see for himself how the regrouping process takes place. Next, the sense of hearing is also involved when the researcher gives instructions verbally and explains each step in the subtractive process. In addition, the use of Base Ten Blocks also involves hand movements to move blocks, add, subtract and separate blocks during intervention activities to give direct experience to study participants to help strengthen abstract mathematical concepts

4. Conclusions

This study has proven the effectiveness of using Base Ten Blocks in helping MBPK master the concept and skills of subtraction by regrouping. The findings of this study support the constructivist learning theory and evidence-based teaching approach in special mathematics education. This intervention tool is not only beneficial for MBPK. In fact, it can be applied to mainstream students. However, the success of using this tool depends on the teacher's skills in integrating it into teaching effectively. Therefore, teachers need to be given competency training on how to effectively use teaching practices in teaching subtraction skills by regrouping using the Ten Basic Blocks to ensure that teachers feel equipped to support students with learning disabilities. It is hoped that the findings of this study can be used by teachers to improve the quality of teaching and learning Mathematics, further helping to achieve the set learning objectives. Further research is needed to further explore and optimize the use of manipulatives in mathematics education, especially in the context of special education. For future studies, it is suggested that a longitudinal study design be used to assess the long-term effects of the intervention and also to identify any follow-up strategies that are needed. In

addition, future studies are also recommended to use a larger and more diverse sample to assess the applicability of the Ten Basic Blocks, across different age groups and learning abilities.

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