Designing Worksheets for the Mentally Retarded Student in Multiplication Operations

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Abstract—This study aims to design Student Worksheets, especially mentally retarded in Junior High School (especially in Special Needed School of Bhakti Kencana Berbah) on multiplication of natural numbers. The valid worksheet will be used to teach the material so that students understand the multiplication concept easily. The context used in this study is fruits satay. The many rows of fruits arranged to carry the concept of multiplication, from repeated summation until students conclude the concept of multiplication. This study uses Research and Development (R & D) in designing worksheets for mentally retarded students. The worksheet created will be developed to be applied in the class. In addition, the researcher hopes that it can be applied to normal students who have difficulty in multiplication learning or as a beginning to teach the multiplication concept.

Index Terms— Fruits Satay, Mathematics, Mentally Retarded, Multiplication Operation, RME, Special Needed School, Student Worksheet

1 INTRODUCTION

At present, there are still many students who experience difficulties in learning mathematics even though these subjects always exist at every level of education [1], [2]. One of the difficulties they experienced was arithmetic operations [3]. Other researchers also say that there are students who have difficulty with the number of operations [4]. The mathematics that is abstract and concepts that are not easy to understand make students usually make mistakes in answering [5]. So there are still many students who experience difficulties in mathematics because of the abstract nature they have.

Mental retardation is a condition of the integration ability of children having underdevelopment [6]. Usually, mentally retarded children have intellectual abilities around 51-70 [7]. This affects students' ability to calculate and estimate [8]. In addition, mentally retarded students with IQ often make mistakes in arithmetic operations or calculations [9]. Therefore mentally retarded students have obstacles in learning mathematics.

Mathematics really needs to be taught, considering children with special needs must take care of themselves in everyday life [10]. Besides that mathematics can make students like learning with certain material, solve problems faced, and explore their abilities [11], [12]. With that students can solve more complex problems using mathematics that they have learned [13]. The application of mathematics in everyday life, for example, when paying for groceries by estimating the money spent to pay for the item [14]. It appears that there are many uses of mathematics in everyday life, so it is very important for students with special needs to learn it.

From the above can be done to help students in their education through appropriate learning [15] or can use appropriate methods to improve students' speed in counting, for example in multiplication [16]. RME is learning that starts with contextual problems that provoke students to exert all of their abilities to solve problems with meaningful processes [17]. Such as the use of student worksheets that can make students more independent, creative, innovative, effective and efficient in their use [18]. Worksheets that can make students understand concepts when they contain images as contextual forms which are then converted into symbolic forms to obtain concepts [17]. Making Worksheets will be interesting when using the RME approach that can lead students to find concepts independently.

Looking at the description above the researcher makes a worksheet design that students will use as a medium to help understand the concept of multiplication operations. This worksheet will guide students to discover the concept of multiplication operations through several activities contained in the worksheet. Therefore, researchers design worksheets that contain the process towards concept discovery, and practice questions that support students finding multiplication concepts.

2 METHOD

This research uses the Research and Development (R & D) development method, which is a research to produce certain products that have effectiveness in its application. Product development in this study is the making of Student Worksheets in mathematics for 7th-grade students of junior high school in Special Needed School of Bhakti Kencana Berbah at the level of students with special needs (mental retardation). While the worksheet development model uses ADDIE (Analyze Design, Develop, Implement, and Evaluate) which is one of the development models with descriptive discussions, making it easier to explore from the research obtained.

The subjects in this study were 7th grade mentally retarded students who experienced delays in thinking. The instruments
used in the preliminary analysis which are the stages of the ADDIE model are interviews with teachers, documentation, and test results. All three are used to strengthen the results of previous research as the basis for researchers to develop Worksheets to help teachers and students in learning multiplication counting operations

### 3 Result and Discussion

Multiplication learning done in public schools and special schools have different levels. The difference between the two lies in giving the same material, but it is done at different levels of education and classes. Multiplication in normal students is given at elementary school to tens or even more. While in special schools the multiplication for mental retardation students is given at the intermediate level, especially grade 7, which is only up to number 10. The basic competencies of mentally retarded students in mathematics can be seen in Table 1.

<table>
<thead>
<tr>
<th>Basic Competence</th>
<th>Basic Competence</th>
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<tbody>
<tr>
<td>3.2 Get to know multiplication operations and divide up to 10</td>
<td>4.2 Perform multiplication operations and divide up to 10</td>
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</table>

Development research with the ADDIE model uses several stages, the first stage is analysis. This analysis is carried out on students and teachers which includes the curriculum used, the material experiencing difficulties, the things needed in the learning process, obstacles that often occur in each learning, and others. In the analysis phase of the curriculum, teachers in schools use the 2013 curriculum as a reference in learning. Basic competencies also use basic competencies specifically for junior high school mentally retarded students, except that the teacher adjusts students' abilities if the students' abilities do not match the applicable competencies. Some students have abilities under basic competencies and some have abilities that exceed basic competencies. For abilities above basic competencies, teachers usually optimize up to the limits of students' abilities so that students get learning according to their ability.

The teacher said that the most difficult learning material for students to master was counting, which included addition, subtraction, multiplication, and division. In this study, the researcher wanted to take the topic of multiplication surgery which was used as material to develop worksheets for mentally retarded students. Researchers choose to develop worksheets so that students have a reference to learning that continues from the discovery of the concept to training students' abilities in multiplication material with a special approach namely Realistic Mathematics (RME). The researcher used the RME approach because basically, students would be easier if learning was associated with daily activities. This is supported by the opinion of other researchers that the presentation of examples relating to daily activities helps students solve problems and misconceptions in order to improve students' cognitive abilities [2]. During this time the teacher only uses objects around the class as a medium to explain the material to be conveyed. Sometimes the teacher uses money, as a medium that is very easy and always applied in daily life.

The second stage of developing worksheets is design related to the design or design to answer the needs analysis that has been done. At the design stage, the worksheet must pay attention to the abilities of students which will affect the content, breadth, and depth of multiplication operations to be discussed and the character of students in answering questions. Students who have low reading skills should use worksheets that use images rather than writing. This will make it difficult for students if forced to read and difficult to understand the instructions and problems presented in written form. Then it will give rise to new misconceptions like students and solving problems is not optimal according to students' abilities.

This worksheet design will use many images that are often encountered by students in daily activities. The researcher hopes that students who have low reading skills can still use this worksheet as an ingredient for learning multiplication operations. But still needing the help of teachers to assist students in learning, remembering students who use this worksheet are students who have special needs (different from normal students). Easy and simple language for students will help to understand the contents of the material and the commands conveyed. Selection of fonts is also considered because there are students who are confused to distinguish letters "a" and "e" in certain types of letters that affect students in reading. This will take longer for students to read. The researcher used the letters "Comic Sans MS" on the grounds that students were familiar with the style of this letter. Besides the differences in the letters "a" and "e" are also clearly visible with the font size "12", it is expected that students can read fluently. So that problems, messages, and worksheet instructions can be conveyed well to students.

Context is also very important as an intermediary in the delivery of multiplication operation material. The context that will be used should be selected which students are easy to find and visualize. As in this study using the context of fruit satay. The reason researchers choose this context is that students usually buy food at rest and the satay context is very easy for students to find. At school, students learn to sell from cooking practices that the teacher teaches, such as fruit juice, meatballs, fried sausages, and others. The researcher takes the fruit satay context as a prefix for students to know multiplication operations. In fruit skewer there are usually several kinds of fruit which are inserted into one using a skewer. One skewer has a certain number of pieces of fruit each type. The same amount of one fruit per stick will be the same addition (repeated). This repetition factor will be a multiplier in multiplication operations. If students already understand the concept of fruit satay to be used to calculate the number of certain types of fruit on several skewers, it will be easier for researchers to help students introduce multiplication operations.
The realistic context for RME is seen in using this fruit satay as an ingredient for students to know multiplication. The activities of students in recognizing satay and connecting the number of certain types of fruit on several skewers are the process of students to change concrete concepts into things that will be symbolized using numbers. For mentally retarded students this will be very interesting if done directly. In addition, students can also learn to sell fruit satay to their school friends. The process of selling students also uses mathematics to calculate such as addition and subtraction, so the student's process in learning multiplication operations can be associated with other counting operations.

The researcher has designed the cover of the worksheet that will be used later, as seen in Fig 1. Cover worksheets contain the title of the worksheet, class, student identity, and constituent identity. The title of this worksheet is very important to recognize the content to be delivered. The class identity will display the suitability of the material presented in it with the level of education of students in the school. Student identity is needed in order to make it easier for the teacher to recognize the owner of this worksheet to see the development of students in accordance with the activities or stages arranged. The author's identity is contained in the cover to show the work of the compiler of several worksheets.

The second page contains introductory words like in other books and worksheets. The forward will be filled with gratitude and thank you for completing the preparation of the worksheet properly, shown in Fig. 2. The introduction to this worksheet is "Thank you, the composer for the presence of Allah who has bestowed mercy and ease so that the compilers can complete preparation of Mathematics Worksheets for SLB-C Class VII Semester 1 student in multiplication operation material. The authors hope that this worksheet can help the learning process so that it can become a learning tool for students to make it easier to understand the material, and as a tool to measure the success of students in multiplication operations. Many thanks to all the good parties who helped the compiler to finish. The compiler realizes that the contents of the worksheet are far from perfect, for which suggestions and constructive criticism are expected to be even better ".

Furthermore, the basic competencies are lowered into the Indicator of Competency Achievement to be achieved by the students, in Fig. 4. Indicators of Competency Achievement that the authors compose are summing the natural numbers, summing the natural numbers repeatedly, and concluding the concept of multiplying the natural numbers. The author uses a summation operation to make it easier for students to find the multiplication concept and make the extension operation a bridge to deliver to multiplication operations. If students can do addition operations it
will be easier to teach multiplication operations to students. This becomes very important to note for normal students and special needs, the difference is usually only the speed of thinking. The Competency Achievement Indicators prepared are also used to formulate the goals to be achieved after students learn with the worksheet.

The contents of the Indicator of Competency Achievement in this worksheet are "First, mention the number of objects that have different amounts. Second, shows the part of the multiplication operation to 10. Third, calculates the sum of the two numbers. Fourth, calculate recurrent summation up to. Fifth, writing repetitive summation is a form of the multiplication operation. The sixth, calculates multiplication operations of numbers to 10. the seventh, calculate multiplication of numbers to 10 in the matter of stories in everyday life ".

This worksheet with the RME approach is divided into several activities that lead to the discovery of the multiplication concept. The first activity of the students will be invited to observe the problems in the fruits that will be made satay, like the example in Fig. 5.

In order for each satay to have a certain amount, it is necessary to set rules for it. Suppose that there are 2 pieces of apples, 3 pieces of watermelon, 1 piece of melon, and so on. To start on the addition operation the students are asked to count the number of melons for 4 satay sticks or the number of other fruits on some skewers as in Fig. 5. The worksheet format for each activity is the same as activity 1, there are problems and work instructions for each activity.

Then the students are asked to describe the satay fruit on the worksheet with paper to form a line to make it easier for students to count. This paper looks like Fig. 6. The next activity students are guided to describe the shape of the line as they illustrated the previous activity. From the form of the line, the students compose it into a form of repeated summation by filling in the answer sheet and calculating the results. Researchers provide images that can be affixed to paper to make it easier and shorter when students learn. The form of recurring summation that has been successful students is arranged into a form of multiplication as in the instructions the researcher gave.

Students will better understand the concept of multiplication when compiling and differentiating the number of sequences and the number of skewers per row. This activity continues by concluding what is meant by multiplication operations, namely summation carried out repeatedly. Taking this conclusion is also helped by only filling in the appropriate answer, seen in Fig 7.

The third stage of the ADDIE development model is development, the fourth application, and finally the evaluation. The last two stages have not been carried out by researchers, because currently researchers are still at the stage of designing student worksheets and have not received valid results from the validation process carried out. The validation results state that this worksheet is still needed to be repaired to obtain valid and feasible results for development. The score obtained from this validation is...
24 with sufficient criteria. This states that this worksheet can be used, but it is even better if it is fixed to obtain more feasible results. The following are suggestions given by the validator to the researcher, as shown in Table 2.

**TABLE 2**
**FEEDBACK RESULTS OF VALIDATION**

<table>
<thead>
<tr>
<th>Number</th>
<th>Topic</th>
<th>Suggestion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Content</td>
<td>The level of material content and problems should be adjusted according to the basic competencies that apply (not exceeding, except for enrichment)</td>
</tr>
<tr>
<td>2</td>
<td>Initial Ability</td>
<td>It is better to include the initial ability of students who are expected to be able to solve problems and can take part in learning if using worksheets</td>
</tr>
<tr>
<td>3</td>
<td>Figure</td>
<td>The problem for mentally retarded students should be to use a lot of images, so students learn easily</td>
</tr>
<tr>
<td>4</td>
<td>Teaching Aids</td>
<td>Image fruits used is adjusted to the motor skills of students. For students who are not good at motor skills, the image should be made bigger</td>
</tr>
</tbody>
</table>

One of the input validators is given a picture illustration or multiplying images, not just writing. Mentally retarded students will be easier to understand when using images. Then fix it to Fig 8 by giving an example of how to put the image.

![Image](image_url)

Fig. 9. The Result after Revision.

These improvements will continue to be carried out to get the best results and can facilitate students to learn multiplication. Another study that also used a worksheet was conducted on a mentally retarded child [20]. This worksheet will then be completed with activities for the multiplication concept discovery process. The first activity that contains problems and instructions for students to make fruit satay is different from the next activity. Each activity has a higher level than the previous activity. This worksheet will be developed and tested for implementation before being used on the subject to be studied. The results of the implementation will be evaluated until they get results that match with the needs of students.

4 CONCLUSION

The design production of multiplication student worksheet produced by this study uses fruits satay as a problem by making rows. The development of this worksheet will be applied to 7th grade mentally retarded students. The design of this worksheet will still be developed and refined until it is suitable for use.

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REFERENCES


