Teaching the concept of number to students’ with mathematics learning disability

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Abstract. This research is motivated by the need for effective mathematics learning models for students with Mathematics Learning Disability (MLD) in the elementary schools. The research problem is what learning model that can be used to help children with MLD in understanding numbers concept. This research uses the qualitative method. Research data is obtained from the results of student tests and observation of student and teacher interaction. This research produced a model of number concept learning for students with learning difficulties.

1. Introduction

There is a case of a student experiencing difficulties in mathematics, but the student does not experience obstacles in other subjects in school. After further observation, it turns out that the IQ of the student is at an average level even above average. For cases like this, the student can be suspected of having dyscalculia or mathematics learning disability (MLD) symptoms. The number of persons with difficulties in learning mathematics in Indonesia according to the Balitbang-Kemdikbud is 62.2% for the population of elementary school students [1].

In general, based on the research, the number of people with learning difficulties in mathematics according to Strauss's study is 5-8% of school-age children [2], whereas according to Adler, the number of people with dyscalculia is 5-6% of all children [3]. One thing that is quite difficult for children with Mathematics Learning Disability is the spoken language for the numbers 12 to 19. For example, the number 12, we call it twelve. From back to front. But when the numbers 21, 31, and so on, we call it twenty-one, thirty-one. From front to back, so to understand the pronunciation of the numbers 12 to 19, for children with Mathematics Learning Disability takes a long time.

Another thing that is confusing for children Mathematics Learning Disability is related to the number zero (0). Suppose 2, 20, 200. A child with Mathematics Learning Disability is confused with the statement that the number zero (0) does not mean "nothing" that can then be omitted or not calculated. We must instill that the numbers 0 (zero) in 20 and 200 are "place value guides". If this fails to be implanted in a Mathematics Learning Disability child then when a child with the symptoms of Mathematics Learning Disability sees the numbers 2, 20, and 200, then he will say everything is number 2.
To help provide learning resources for teachers in guiding children with MLD, researchers intend to research the development of learning model of numbers concept for students with MLD in the elementary school.

The problem in this research is what learning model that can be used to help children with MLD in understanding numbers concept.

1.1. Mathematics learning disability
Mathematics Learning Disability is also called dyscalculia [4]. The term dyscalculia has a medical connotation, which views an association with central nervous system disorders. In this paper, we will focus on the term Mathematics Learning Disability (MLD) in the education context. According to Lerner there are several characteristics of children with MLD, that are (1) the existence of interference in spatial relations, (2) visual perception abnormalities, (3) visual-motor associations, (4) preservation [4]. Furthermore, some experts discuss the criteria of MLD students:

- students with an average IQ whose test scores are standardized below the 20th or 25th percentile [5];
- Slower and often make mistakes in processing number representations, for example the symbol number "3" and the equivalent symbol "◆◆◆" [6];
- Make mistakes in comparing and estimating numbers [7];
- Wrong in doing arithmetic calculations [8];
- wrong in solving the problem of numbers that are very easy, for example 4 × 5 = 20 [9].

2. Method
This research used the qualitative approach. The approach used in this research is more emphasis on interpretative study for data analysis. The data collection conducted through observation, interview, and test.

Research subjects were 26 elementary school children with four students diagnoses of learning difficulties in the primary school. Determination of research subjects conducted purposive sampling, i.e. sampling as a source of information is based on the existence of consideration of a particular purpose, because the researcher considers the sample has the necessary information for the research that will do. The purpose of intentional sampling, researchers determine their samples taken, and samples taken to be the object of research is the Primary School in Purwakarta District. The criteria of students who used the object of research are the third graders of primary school.

3. Result and discussion
From the literature review, the criteria for determining students that suspected of having MLD are as follows:

- The value is less than Q1
- Have difficulty in calculating the money
- The results of interviews with teachers conclude that the students did have difficulty learning math

Based on the results of tests on 26 students, the data obtained as follows:

| Key/NO | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | Q11 | Q12 | Q13 | Q14 | Q15 | #Correct | % Correct |
|--------|----|----|----|----|----|----|----|----|----|------|-----|-----|-----|-----|-----|---------|-----------|
| 1      | 0  | D  | A  | B  | B  | B  | B  | B  | A  | B    | B   | C   | B   | C   | B   | 7       | 46.67%    |
| 2      | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 1  | 0    | 0   | 0   | 1   | 1   | 1   | 9       | 60.00%    |
| 3      | 1  | 1  | 1  | 0  | 0  | 1  | 1  | 1  | 1  | 0    | 1   | 1   | 1   | 1   | 1   | 12      | 80.00%    |
| 4      | 0  | 1  | 1  | 0  | 1  | 1  | 1  | 1  | 0  | 0    | 1   | 1   | 1   | 1   | 1   | 11      | 73.33%    |
| 5      | 1  | 1  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 0    | 1   | 1   | 1   | 1   | 0   | 9       | 60.00%    |
Steps of learning model development:

- Multiplication with number 10 (involves place value)
- The concept of rational numbers (fractions, decimal, and percent)
- Problem story
- Comparison of fractions
- Unit problems

The results of this analysis are in line with several previous studies, including the following: MLD students make mistakes in comparing and estimating numbers [7]; MLD students are wrong in doing arithmetic calculations [8]; MLD students mistakenly solve very easy number problems, such as multiplication of integers [9]; and MLD students often make mistakes in processing number representation [6].

3.1. Development of learning model

Researchers and teachers design a learning model that will be applied to the implementation of model testing. In the early stages of the experiment the model is devoted to the topic of integer operations. The development of the research model of design result can be seen from the learning steps that use mathematics props, with the help of a power point program.

Steps of learning model developed:

From table 1, obtained Q1 it is 60. There are three students who scored under 60, the students with serial number 1, 19, and 25. There is a student who scores equal to Q1, the students with number 23, who concluded that he had difficulty in calculating pocket money. With the recognition, the researchers entered the number 23 students as suspected of having MLD. The results of the analysis were confirmed to teachers at the school. From the results of confirmation to the teacher and by looking at the above criteria, students that suspected of having MLD are four students. Students are respectively respondents no 1, 19, 23, 25. The four students, will then be subjected to the model trial phase.

So, based on the test results, MLD students have difficulty in the following topics or materials:

| # | Correct Respon ses | % Correct/ Question |
|---|------------------|---------------------|
| 6 | 0 1 1 0 1 1 0 0 0 1 | 60.00% |
| 7 | 1 1 1 1 1 1 1 1 0 1 | 86.67% |
| 8 | 1 1 1 0 0 1 1 0 1 1 | 66.67% |
| 9 | 1 1 1 0 1 1 1 0 0 1 | 80.00% |
| 10 | 0 1 1 1 1 0 1 1 0 0 | 60.00% |
| 11 | 0 1 1 0 0 1 0 1 1 1 | 66.67% |
| 12 | 1 1 1 1 0 0 1 1 0 1 | 66.67% |
| 13 | 0 1 1 0 0 1 1 0 1 1 | 66.67% |
| 14 | 1 1 1 0 0 0 1 1 0 1 | 66.67% |
| 15 | 0 1 1 0 0 0 1 1 1 1 | 60.00% |
| 16 | 0 1 1 0 0 1 1 0 0 1 | 60.00% |
| 17 | 0 1 1 0 0 1 1 1 0 1 | 60.00% |
| 18 | 0 1 1 1 1 1 0 0 0 0 | 66.67% |
| 19 | 0 1 1 0 0 1 1 0 0 0 | 53.33% |
| 20 | 0 1 1 1 0 0 1 1 1 0 | 66.67% |
| 21 | 1 1 1 1 0 0 1 1 1 1 | 73.33% |
| 22 | 1 1 1 0 0 1 1 1 0 1 | 60.00% |
| 23 | 0 1 1 0 0 0 1 1 1 0 | 80.00% |
| 24 | 1 1 1 1 1 0 0 1 1 1 | 60.00% |
| 25 | 0 1 1 0 0 0 1 1 0 0 | 60.00% |
| 26 | 0 1 1 0 0 1 1 1 0 1 | 73.33% |

Table 1. Cont.

With the recognition, the researchers and teachers design a learning model that will be applied to the implementation of model testing. In the early stages of the model, the research model is devoted to the topic of integer operations. The development of the research model of design result can be seen from the learning steps that use mathematics props, with the help of a power point program.
3.1.1. Initial activity:
- Fill out the class list, prepare the teaching materials.
- Motivate students to express opinions.
- Asked some previous material questions.

3.1.2. Core activities:
a. Exploration
- Students recall the operation of integers.
- The teacher explains integer operation with power point props model.

b. Elaboration
- Facilitate students through assignments, discussions and others to bring new ideas both orally and in writing.
- Gives students the opportunity to think, analyze the problem solved with the reduction.

c. Confirmation
- Teacher asks about things that students do not know yet.
- Teachers with students ask the answer to straighten out misunderstandings, provide reinforcement and inferences.

3.1.3. Final activity:
- Teacher asks questions about the material being taught.
- Students collect tasks according to the material being taught.
- Teachers give homework to students.

The learning models implemented above are developed based on the characteristics of learning models that emphasize the conceptual learning approach with the help of visual aids. In conceptual understanding, the learning process emphasizes that the students master the characteristics, properties and application of the concepts they have learned at the stage of conceptualization. In understanding the concept of the students need to get experience with various concepts, apply the concept, and the techniques of application of the concept. It is necessary to be able to use these concepts in solving related problems. Therefore, the number of learning model is chosen by using the power point application tool.

Here is a quick overview of the model props used:

![Figure 1. The model props used.](image-url)
4. Conclusion

Based on the results of tests and interviews, we have identified students who suspected of experienced Mathematics Learning Disability. Based on the previous findings, we have developed a model of mathematical learning about the understanding of addition and subtraction of integers by using power point application tools. It is necessary to develop a mathematics learning model for other materials besides the addition and subtraction of integers for children with MLD.

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