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Model of Missouri Mathematics Project for Problem Solving Skills Problems in Flat Mathematics in Deaf Students

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ABSTRACT

This research is motivated by the problems of deaf students in the field of mathematics, especially in the ability to solve problems in mathematical flat problems. The purpose of this study is to prove the influence of the Missouri Mathematics Project learning model in solving mathematical problems in everyday life. This research used quantitative approach with pre experimental kind and one group pre-test – post-test design. This research result indicated that there was influence of learning model of Missouri Mathematics Project toward troubleshooting ability of story exercise of mathematics two-dimensional figure to hearing impairment students. It could be concluded that there was significant influence toward troubleshooting ability of story exercise of mathematics two-dimensional figure to hearing impairment students.

Keywords: *Missouri Mathematics Project, Problem Solving Skills, Deaf students*

1. INTRODUCTION

The development of science and technology which is increasingly modern requires all people to adapt and adapt to new conditions such as mathematics which underlies the development of modern science and technology. Mathematics has an important role in advancing humans and various sciences.

Students' mindset towards mathematics begins to form when they are taught mathematics learning from kindergarten to college. This is a form of mathematics learning objectives, namely to shape students' mindset towards mathematics in daily life skills and changes in circumstances caused by globalization, adaptation to life and realities in everyday life. The teaching of mathematics is expected to train students in thinking, communicating and solving mathematical problems that are applied in everyday life.

The purpose of teaching mathematics is so that students have guidelines for the application of mathematical reasoning in their daily lives in carrying out their daily life [1]. Hearing impairment in deaf children has an impact on the language skills of deaf children [2]. The use of learning models, approaches and methods by teachers that do not match the characteristics of deaf children also causes the ability to understand children's reading content difficult to develop, because learning activities are less relevant to the characteristics of children [3].

Problem solving aims to help students learn how to solve problems through hands-on learning experiences [4]. And can be interpreted as learning based on everyday problems, daily activities and problem situations (real problems that are often encountered in concrete terms) which are simulated as the context of learning mathematics [5]. Thus students can learn about solving problems to problems related to mathematical flat-build problems found in everyday life. Illustrations of mathematical problems in everyday life that are presented in story problems can be understood by children because in doing so the children practice and know directly in a concrete way how the process of solving problems in mathematical flat-up story problems.

Learning by solving problems does not use mathematics to solve problems, but learning mathematics through problem solving so that students acquire new

knowledge [6]. Students have an active role to learn, seek, and find information to be processed into concepts, principles, or conclusions if the opportunity for the problem-solving process is given to students and carried out by students. All students can have problem solving skills if the teacher teaches how to solve problems effectively and efficiently. That way, the form of the story problem can be taken from the experiences of students with series or sentences containing mathematical concepts. Missouri mathematics project learning model is designed by combining independent work and collaborative work among students [7].

Problem solving has four steps, namely understanding the problem, compiling a plan, implementing the plan, and looking back [8]. Missouri mathematics project learning model aims to develop mathematical concepts [9].

Four steps of the Missouri Mathematics Project learning model is: (1) daily reviews (2) development (3) seatwork (4) homework (5) special reviews [10].

In the application of the Missouri Mathematics Project learning model students are made as active subjects in group assignments, independent assignments or homework assignments. This aims to hone communication between students so that misunderstandings occur, so students do not get bored or bored when learning activities. Because students can join or create small groups and carry out real group assignments so that they do not only use students' abstraction power in solving problems.

Learning activities facilitate students to understand various mathematical problems that are solved individually and in groups. There are stages in learning mathematics for problem solving, that is, Polya (in Luetke-Stahlman and Luckner: 1991) proposing 4 stages of problem solving for children: (1) understanding the problem, (2) designing a plan, (3) implementing a plan, (4) review and examine solutions. So that students and teachers can be compact and active together to create comfortable and enjoyable learning.

Students will be taught the basic concepts of mathematics contained in the story problems given. Learning becomes fun and active because it is not only teacher-centered. It is recommended that procedures in problem solving: (1) begin to teach basic level problems, (2) start with images and manipulatives to solve problems, (3) focus on problem solving, (4) keeping the language of mathematics simple and gradual, (5) making problems containing foreign information, (6) gradually by drawing manipulative materials [11].

Problem solving will involve carefully guided discussion, interaction with students and examination of working strategies. Research also reported by Suydama and Weaver (in Luetke-stahlman and Luckner: 1991) shows that time spent discussing and reconsidering the ways in which to solve problems may be a strategy in helping students to become better problem solvers. There are many different ways that students can open up vast opportunities for problem solving activities.

Missouri Mathematics Project is a learning model obtained from research conducted by Thomas L. Good and Douglas A. Grouws in 1979 with the research title "The Missouri Mathematics Effectiveness Project: An experimental study in fourth-grade classrooms". The use of the Missouri Mathematics Projects learning model in mathematics learning for solving math problem solving problems in deaf children can make children learn to solve problems independently and in groups and find solutions for problem solving.

Daily review, development, individual work and homework are syntax in Missouri Mathematics Project learning model [12]. Missouri Mathematics Project learning model provides opportunities for students to work in groups, controlled exercises, and apply their own understanding by working independently in seatwork [13].

2. METHOD

2.1. Type of Research Design

This research uses a one-group pretest-posttest design. This type of research used in this research is experimental research.

$$O_1 X O_2$$

Figure 1 Pre-test and post-test design

Information:

(1) O1: The pre-test value before being given treatment to measure the ability to understand problem solving mathematical flat-wake story problems students. A pre-test is given to deaf students amounted to 8 (eight) without any treatment

(2) X : The treatment given to the subject through Missouri Mathematics learning model Project as many as 6 (six) meetings

X1: State the types of shapes Mathematics

X2: Identify the types of shapes Mathematics in everyday life

X3: Find the formula for area and perimeter of the shape

X4: Find the formula for area and perimeter of the shape Mathematics in everyday life

X5: Doing problem solving of story problem get up flat Math with exercises

X6: Doing problem solving story problems Mathematical shapes in life everyday with practice

(3) O2: Post-test value after being given treatment for measuring students' ability to solve mathematical problem solving process after being given treatment. The test posts were given to 8 (eight) deaf students. The results of the pre-test and post-test were analyzed using the non-parametric statistical sign test formula of the Wilcoxon Match Pairs Test.

2.2. Research Subjects

The subjects in this study were deaf students of low grade 5 elementary levels, totaling 8 students.

2.3. Data Analysis Techniques

In this research used non parametric statistics using Wilcoxon Match Pair Test because the subjects used in the study were less than 30 people, namely 8 subjects. Therefore it can be assumed that the data is abnormal and not homogeneous. Then the research data were analyzed in a non-parametric way using the Wilcoxon Match Pairs Test formula

$$Z = \frac{T - \mu_T}{\sigma_T}$$

Information:
Z: The value of the Wilcoxon match pairs test

T: Small number of ranks

X: The direct observation results are the number of signs (+)

μT: Mean (average value)

oT: Standard deviation

P : The probability of obtaining a sign (+) or (-) = 0.5

n : Number of samples [14].

3. RESULT AND DISCUSSION

Based on the results of data analysis, it shows a success rate of 95% and a failure rate of 5%, which means that this shows a significant effect on the use of the Missouri Mathematics Project learning model on the problem-solving ability of mathematical flat-wake story problems in deaf students.

The pre-test was given to students 1 time on May 6, 2019, with a duration of 60 minutes. Researchers provide written test questions to answer mathematical flat shape story questions, problem solving formulas for flat shape math problems and concrete shapes in everyday life. The pre-test was carried out before being given intervention or treatment using the Missouri Mathematics Project learning model. During work, researchers do not help students answer questions.

The intervention was carried out in 6 meetings within 10 days. Each meeting is held for 60 minutes. Students are given treatment or intervention by being given independent practice sheets, independent practice sheets and also group worksheets where the teacher positions himself as a facilitator and mediator who will help and assist students in the problem solving process so that misunderstandings do not occur when students solve problems on problems math flat wake story.

The post-test was given to students 1 time on May 22, 2019, carried out after being given treatment or intervention and carried out for 60 minutes. Like during the pre-test, in the continuation of the post-test activities, the researcher gave written tests to students. During work, researchers do not help students answer questions.

Table 1. Result of Pre-Test and Post-Test

No	Name	Pre-Test (O1)	Post-Test (O2)
1	CE	20	80
2	DA	30	70
3	DW	40	90
4	AT	50	70
5	GR	60	90
6	AF	40	90
7	AA	20	70
8	SL	30	80
Avarage		36,3	81,3

Processing the results of the test post and pre test results found the average value (μ_T = 18) and standard deviation (σ) T = 7.35) processed by entering into the Wilcoxon Match Pair Test formula and obtained the calculated Z value (Z_t) = 2.52

From the results of data analysis, it is obtained that the value of Z table with a critical value of 5% (for two-sided testing) = 1.96%, obtained Z count (2.52)> Z table (1.6) so that the working hypothesis (Ha) is accepted and the hypothesis zero (Ho) is rejected. If Ha is accepted, it means that there is a significant influence on the use of the Missouri Mathematics Project learning model on the problem-solving ability of the Mathematical flat figure problem in deaf students

Each student is experiencing development and improvement in how to solve the problem of a flat mathematical build-up story. In fact, the results of 4 students experienced a maximal improvement. This can be obtained from the time of the value of CE, the value obtained at the pre-test is 20. The value obtained in GR at pre-test is 60. The CE value at the time of the test post is 80 and the GR value is 90.The comparison of pre and post values obtained by CE and GR is very much. CE is seen experiencing a very good development-banding GR. And also based on the results of the same pre-test of both subjects namely DW and AF with a pre-test value of 40. It then experienced an increase in the same test post value with the result of 90. And also the third value with the same subject with the result of the test post 90 with a pre-test value of 60.

While the AA with the results pre-test 20, then the test post results 70 experienced a significant improvement about the problem solving ability Ceruta build flat mathematics. DA, DW and SE experienced improvements from pre-test and test post with an increased yield of over 50.

This is in accordance with the opinions of Van de Wall and Thompson (in Luetke-Stahlman and Luckner: 1991) indicating that the time spent discussing and reconsidering the way – the way in which to show a better problem. There are many different ways that can open up a wide range of opportunities for students in problem-solving activities. This was demonstrated by pre-test results and a test post with the study using the Missouri Mathematics Project modelling model for problem-solving capabilities about the mathematical flat wake story that has undergone a significant improvement.

Research conducted on the modelling model of the Missouri Mathematics Project by Good, Grouws and Ebmie re (in Slavin, 2007) states that, the Missouri Mathematics Project is a program designed to help teacher effectively use practices that had been domainkeys identified from earlier correctional research to be characteristic of teachers whose students make outstanding gainsin achievement [15]. This is evidenced by the study of the influence of the Missouri Mathematics Project learning model on the problem solving ability of ceriuta to build a flat of mathematics at the 5-grade deaf school in the SLB-B Pertiwi Kota Mojokerto with the results of pre-test and test post improvement.

The research was also supported by the theory proposed by Edgar Dale who was diagnosed with the clone of experience. Edgar Dale's theory states that a percentage of student's information acquisition ability or memory of learning by 10% of what is read, 20% of what is heard, 30% of what is seen, 50% what is heard and seen, 70% of what is said written, 90% of the experience [16]. In this study using the Missouri Mathematics Project learning model which, in addition to the steps applied in research in accordance with the Missouri Mathematics Project learning model, Edgar Dale's theory began using images as a medium in learning, for example, for examples of a flat, concrete math in everyday life where students get information by reading, listening and viewing. Then in the practice of measuring and discovering the surrounding and extensive formula the student gets the information by listening to and seeing in real the form of a flat wake up math in daily life – , then in the stage of language learning and verifying the perception of students reading the story of a flat build mathematics and explanation. And the last student commented on the material by working on the group's task about the flat math story building by finding the problem and the problem solving process directly.

This study was carried out in 6 times the treatment given the repetition of the material 3 times so that it gained a significant result of the ability to solve the problem of the mathematics flat build story by using the Missouri Mathematics Project learning model. In the activity of the repetition of material in this study supported by Thorndike (Law of exercise) theory, to produce a suitable and satisfying action to respond to a stimulus, there must be repeated experiments and exercises – repeat, exercise bustan or repetition of suitable behavior that has been found in learning which is a form of existence and behavior that is suitable and increasingly strong (law of use) In a technique to transfer and that has been obtained from short time memory to long time memory then it takes repetition with hope will not be accomplished.

The use of the Missouri Mathematics Project Children's learning model will be easier to find problems and understand each process in problem solving and is also supported by the opinions of Polya (in Luetke-Stahlman and Luckner: 1991) proposes 4 stages of troubleshooting for a Child: (1) Understanding the problem, (2) Designing a plan, (3) Implementing a plan, (4) Looking back and examining the solution. So that students and teachers can be both compact and active together – creating comfortable and enjoyable learning. That includes all the steps in the Missouri Maathematics Project learning model where students will be taught the basic mathematical concepts found in the story given. Learning becomes fun and active because it is not only centered on the teacher. (Rosmala and Isrok'atun: 2018) namely, the Missouri Mathematics Project learning model, giving students opportunities to work in groups, controlled exercises, and applying their own understanding by working independently in Seatwork.

4. CONCLUSION

Conclusion Based on the research results, H zero (Ho) is rejected and the working hypothesis (Ha) is accepted, Z count (Zh) = 2.52 is greater than Z table (Zt) = 1,96 with $\alpha = 5\%$.

This research result indicated that there was influence of learning model of Missouri Mathematics Project toward troubleshooting ability of story exercise of mathematics two-dimensional figure to hearing impairment students. It could be concluded that there was significant influence toward troubleshooting ability of story exercise of mathematics two-dimensional figure to deaf students.

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