

THE INFLUENCE OF PROBLEM BASED LEARNING ASSISTED MONSTER MATH GAME IN SOLVING CALCULATING PROBLEMS

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Abstract

This study aims to determine the effect of the Problem Based Learning model assisted by the Monster Math Game in overcoming numeracy problems. The population in this study were fifth grade students at SDN Jatilawang 01, SDN Jatilawang 02, SDN Kertaharja 01, MI NU 01 Kemantran for the 2022/2023 Academic Year with a total of 171 students. Sampling using simple random sampling technique. The design in the study used the posttest only control design. Data collection techniques using interviews, tests, and documentation. The data analysis technique uses a simple linear regression test, with normality and homogeneity tested beforehand. The results showed that there was an influence of the Problem Based Learning model assisted by the Monster Math Game in solving math problems by 28.4%.

Keywords: Problem Based Learning Learning Model, Monster Math Game, Numeracy Ability

1 INTRODUCTION

Education is an effort made by humans to be able to develop their potential through the learning process. Education has the task of producing quality human resources for the development of the nation and state. In addition, education also has the goal of being able to educate the life of the nation, develop human life and increase the progress of a country [1]. Educational goals can be achieved with the implementation of learning.

Learning is a process of interaction carried out by educators and students, with learning materials, learning methods, learning strategies, and learning resources in a learning environment. Then success in the learning process can be seen through the level of success in achieving educational goals [2]. To be able to achieve educational goals in learning, it is necessary to apply innovative and constructive learning models.

Learning in the educational process in this modern era is not just conveying subject matter, but rather as a process of regulating the environment so that students learn. It can be said that in the learning process students must be the center of the activity [3]. In addition to using innovative and constructive learning models, learning media are also needed in the teaching and learning process. Because learning media can help students be active in learning, understand the subject matter, and can stimulate students to focus on learning.

As technology develops, it has a huge influence on various aspects, especially in the field of education. Good use of technology can improve the quality of learning. An example is used as a learning medium. One of the technology-based learning media is educational games. Educational games are games specifically designed as learning media for developing concepts and understanding, guiding and training students' abilities as well as a medium for motivating students in order to support learning activities [4].

Mathematics is the basic knowledge that must be owned by students to achieve a successful learning [5]. In essence, learning mathematics is a process of training the brain to be able to think logically, orderly, continuously and state strong evidence in every statement uttered [6]. The assumption that mathematics is a difficult subject can be a factor that reduces students' understanding of mathematics [7]. This assumption can have an impact on students' numeracy skills. The ability to count is the ability to operate real numbers in the form of numbers, especially regarding addition, subtraction, multiplication and division [8].

Based on the results of interviews with fifth grade teachers at SDN Jatilawang 01, SDN Jatilawang 02, SDN Kertaharja 01, MI NU 01 Kemantran. Researchers got information that there are still many teachers who use the Direct Instruction learning model because they think that mathematical material is difficult to present using a model that is in accordance with the 2013 curriculum. When using the Direct Instruction learning model with the lecture method it causes students to become passive in the learning

process because learning is only teacher-centered and students just listen. Researchers obtained information from the results of interviews with teachers, that students' numeracy skills were said to be low because students experienced problems with counting in addition, subtraction, multiplication, and division. Then in the learning process there are those who do not use learning media and some who use learning media. One of the learning media used is rote cards, when using rote cards there are still many students who have not memorized the cards and students lack speed in counting when applied in learning.

From the problems above, innovation in learning mathematics is needed by using learning models and learning media. Learning models that can be centered on students in the learning process. The Problem Based Learning learning model is a learning model that is able to encourage students to have problem solving skills in everyday life and can generate communication skills in discussions.

Learning media that is fun and helps in the teaching and learning process, especially mathematics. So with this the researcher uses the learning media, namely the monster math game. Monster Math Game is a game that will be applied to elementary school students in solving math problems. When using the game students play with numbers, these numbers are related to the arithmetic operations of addition, subtraction, multiplication and division of positive and negative integers. This game is a game that can attract and challenge students, because there are certain times in solving questions at each level. So that it is hoped that players will be motivated to work on the questions as quickly as possible with the correct answers.

Based on the background of the problem, the researcher will test the effect of the Problem Based Learning learning model assisted by the Monster Math Game learning media with the current situation in overcoming students' math arithmetic problems.

2 METHODOLOGY

The type of research used in this research is experimental research, because this research is looking for the influence of the treatment in the form of a Problem Based Learning learning model assisted by the Monster Math Game on test results in solving arithmetic problems. There are two sample groups/classes in this design, namely the experimental class and the control class. Determination of the experimental class was carried out using simple random sampling technique. The type of experimental research used was a post-test only control design.

The population in this study were all fifth grade students at SDN Jatilawang 01, SDN Jatilawang 02, SDN Kertaharja 01, and MI NU 01 Kemantran for the 2022/2023 Academic Year, totaling 171 students.

Determination of the sample in this study was carried out using a simple random sampling technique, namely the sampling technique from the population was carried out randomly without regard to the existing strata in the population. So that two classes were randomly selected to determine the experimental class and the control class. Class VA SDN Jatilawang 02 as the experimental class and class VB SDN Jatilawang 02 as the control class.

The independent variable in this study is the activity of students using the Problem Based Learning model assisted by the Monster Math Game. The dependent variable in this study is the test results of students in solving numeracy problems.

Table 1. Research Design.

Group	Treatment	Post-test
Experiment	X ₁	O ₁
Control	X ₂	O ₂

Information:

X₁ = Learning mathematics with the Problem Based Learning learning model assisted by the Monster Math Game

X₂ = Learning mathematics with the Direct Instruction learning model

O₁ = Giving a final test (post-test) in the experimental class

O₂ = Provision of the final test (post-test) in the experimental class

The research design above consisted of two groups, each of which was selected by simple random sampling. Furthermore, the experimental class was taught with the Problem Based Learning learning model assisted by the Monster Math Game and the control class was taught with the Direct Instruction learning model. At the last meeting, each class was given a final test to find out the test results in solving arithmetic problems.

This study has an instrument, namely the observation sheet. Observation sheets are used to obtain data about student activities in the learning process. The observation sheet aims to see the achievement of action plans that describe student activities during the learning process by using the Problem Based Learning model assisted by the Monster Math Game. The observation sheet was made by the researcher with reference to the lesson plan. Observations were made by looking at the guidelines on the observation sheet that had been prepared. Researchers set 23 activity indicators to measure student activity. Researchers give numbers in the column, the score consists of 1, 2, 3, 4 according to the activities of students in learning. The observation sheet was used at each meeting in three meetings.

In this study, to determine the effect of the Problem Based Learning model assisted by the Monster Math Game in overcoming numeracy problems, a research instrument was used in the form of a written test in the form of a description for the final test on single data presentation material compiled by the researcher.

3 RESULTS

This research was conducted to determine the effect of the Problem Based Learning model assisted by the Monster Math Game in overcoming numeracy problems.

3.1 Descriptive Analysis

3.1.1 The results of observing the implementation of learning with the Problem Based Learning model assisted by the Monster Math Game

The implementation of learning activities in class is observed by observers. The process of analyzing student learning activity data is carried out using the Problem Based Learning model assisted by the Monster Math Game. The description about is indicated by the percentage of student activity during the learning process. The data is obtained through the implementation of student activities. Based on the results of the observations above, it was found that the level of the teacher's ability to carry out learning with the Problem Based Learning model assisted by the Monster Math Game showed unfavorable results. This can be seen from the increase in the percentage of each meeting. Implementation of learning at the first meeting reached 66%, the second meeting reached 64% and the third meeting reached <100%.

The results of the recapitulation of student activities in the implementation of learning mathematics using the Problem Based Learning model assisted by the Monster Math Game on single data presentation material carried out for 3 meetings experienced an increase in the percentage of each meeting. Student activity at the first meeting reached 66%, the second meeting reached 64%, and the third meeting reached 68%.

3.1.2 Mathematics learning outcomes of fifth grade students at SDN Jatilawang 02

The distribution of posttest scores is the distribution of scores obtained by students who are treated in the form of a Problem Based Learning model assisted by the Monster Math Game. The posttest data distribution results of the numeracy skills of students in the experimental class taught using the Problem Based Learning model assisted by the Monster Math Game, and the control class taught using the Direct Instruction learning model, can be seen in the following table:

Table 2. Distribution of Experimental Class and Control Class Data.

Value	Experiment	Control
57 – 66	2	3
67 – 76	10	12
77 – 86	9	6
87 – 96	4	4
SUM	25	25

Data on the numeracy abilities of students in the experimental class who were taught using the Problem Based Learning model assisted by the Monster Math Game and the control class who were

taught using the Direct Instruction learning model were obtained from tests of the ability to count on single data presentation material carried out in class V. After the tests were carried out on experimental class using the PBL model assisted by Monster Math and the control class using the Direct Instruction model, the results obtained are descriptive statistics in the form of mean, median, mode, standard deviation, variance, minimum value, maximum value, range. Can be seen in the following table:

Table 3. Results of Descriptive Analysis of Experimental Class and Control Class.

Data	Experiment	Control
Max Value	92	90
Minimum Value	68	57
Range	28	33
Mean	77,96	74,88
Median	79	74
Modus	70	68
Variance	71,04	68,69
Standard Deviation	8,4285	8,2881

3.2 Inferential Analysis

3.2.1 Normality Test

The normality test is used to determine whether the research data is normally distributed or not. Statistical hypothesis used:

H_o : sample comes from a normally distributed population

H_a : samples come from populations that are not normally distributed.

The normality test can use the Lilifors test, so the data is said to be normally distributed if the $L_{count} < L_{table}$ value is at a significance level of 5%.

The conclusion from the normality test data for the experimental class and the control class is that the sample comes from a normally distributed population because $L_{count} < L_{table}$.

3.2.2 Homogeneity Test

The homogeneity test is used to determine whether the sample data comes from a population that has a homogeneous diversity or not. Statistical hypothesis used:

H_o : sample comes from a population that has a homogeneous diversity

H_a : the sample comes from a population that has an inhomogeneous diversity

Data in the homogeneity test were obtained using the Bartlett test and consulted with the chi-square table. If the calculation results are $\chi^2_{count} < \chi^2_{table}$, then the population has the same or homogeneous variance.

Based on the results of the calculation of the homogeneity test between the experimental class and the control class, $\chi^2_{count} = 0,0072$ with a significance level of 5% obtained $\chi^2_{table} = 3,84$. Because $\chi^2_{count} < \chi^2_{table}$ then H_o is accepted. It can be concluded that the experimental class and the control class have the same or homogeneous variance.

3.2.3 Uji Hipotesis

Testing the hypothesis using a simple linear regression test. This test is used to determine whether or not there is an effect of using the Problem Based Learning learning model assisted by the Monster Math Game in overcoming students' numeracy problems. The regression equation is $Y = a + bX$. If the results of the regression linearity test $F_{count} < F_{table}$ then H_o is accepted (linear regression) and if $F_{count} > F_{table}$ then H_o is rejected (non-linear regression). Furthermore, if the results of the regression significance test $F_{count} < F_{table}$ then H_o is accepted (regression is not significant) and if $F_{count} > F_{table}$ then H_o is rejected (significant regression). And finally, if the significance test of the regression equation coefficient uses the t-test, $t_a < t_{table}$ then H_o is accepted (the constant a is not significant) and if $t_b > t_{table}$ then H_o is rejected (positive effect). Next if $t_{count} > t_{table}$ then H_o is rejected (there is a significant relationship).

Based on the calculation results, it is obtained that the regression equation Y over X is $Y = 26,473 + 0,797X$, where $a = 26,473$ and $b = 0,797$. Regression linearity test Y over X is obtained $F_{count} < F_{table}$ that is $0,193 < 2,66$ H_0 is accepted then the linear regression, while the linear significance test Y over X is obtained $F_{count} > F_{table}$ that is $6,889 > 4,28$ H_0 is rejected, the regression is significant. The significance test of the regression equation coefficient using the t-test was obtained $t_a < t_{table}$ that is $0,656 < 2,069$ H_0 accepted so that the constant a is not significant, whereas $t_b > t_{table}$ that is $2,330 > 2,069$ H_0 is rejected so that there is a positive influence. Test the significance of the correlation coefficient X and Y obtained $t_{count} > t_{table}$ that is $3,021 > 2,069$ H_0 is rejected so that the correlation between X and Y is significant. The coefficient of determination is obtained $r^2 = 0,284$ This shows that there is an effect of using the Problem Based Learning learning model assisted by the Monster Math Game in overcoming students' numeracy problems by 28.4%

4 CONCLUSIONS

Based on the results and discussion in this study, it can be concluded that there is an influence of the Problem Based Learning model assisted by the Monster Math Game in overcoming the numeracy problems of class V students at SDN 2 Jatilawang by 28.4%.

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