The Impact of Creative Problem-Solving Learning Model Based Android Towards Learning Outcomes of Elementary School Students

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Abstract. This study aims to know the impact of the Creative Problem Solving learning model based on android on the learning outcomes of elementary school students. The numbers population was all students of SD Tunas Bangsa. The technique of determining the sample used simple random sampling. This research used pre-experimental with One Group Pretest-Posttest Design. Data collection techniques used learning outcomes tests to measure the student’s learning outcomes both before and after being given treatment, documentation, and observations about student learning activities and teacher observations regarding the implementation of the model during the learning process. Descriptive statistical analysis data described the students' mathematics learning outcomes. Inferential statistical analysis to test the hypothesis using the dependent t-test or Paired-Sample T-Test with SPSS 21.0 version. The results of the research showed that there was an impact of the Creative Problem Solving learning model based on android towards learning outcomes. This is evidenced by the results of the pretest in the less category experienced an increase in posttest learning outcomes in the good category. It can be concluded that there is an impact of Creative Problem Solving learning model based on android towards learning outcomes of elementary school students.

Keywords: Learning Outcomes, Creative Problem Solving, Android

1. Introduction

Education is a conscious and planned effort in realizing learning conditions and the learning process so that the students actively develop themselves to have religious-spiritual strength, noble character, self-control, intelligent personality, and skills needed for themselves, society, nation, and state. The goal of national education, schools are expected to be able to maximize all the components that can make this happen. In addition to learning activities that are expected to be able to prepare students to become individuals competent, other components are also expected to contribute. One component that has a significant influence in shaping the character of students is learning activities, especially learning mathematics. Education is every effort, influence, protection, and assistance given to children aimed at the maturation of the child, or more accurately helping the child to be sufficiently capable of carrying out his own life tasks.

During this Covid-19 pandemic, our education system must be ready to leap to transform online learning for all students and teachers. We are entering a new era to hone students’ skills, build creativity, and improve self-quality by changing systems, perspectives, and patterns of our interaction with technology. The main problem felt by the world of education during the Covid-19 pandemic is how to make students even at home, but have to study. Because learning is the main means for students to grow and develop optimally.

The online learning process is a learning process that is expected to continue to be comfortable and enjoyable for all school members, especially for teachers and students. So the learning process must be
assisted by online learning such as Android-based on Creative Problem Solving learning. This change in learning requires teachers to change the way of teaching from direct teaching to indirect teaching [1].

Mathematics is one of the subjects in school that is considered difficult so that it gets the largest portion of attention from both educators, parents, and children causing mental disturbance of students and can also lead to negative attitudes of students towards learning mathematics.

Students become lazy to take math lessons, are afraid of math teachers, and can even hate math lessons. Learning mathematics at SD Tunas Bangsa of Makassar also feels difficulty and boredom in the learning process so that mathematics learning is less active, marked by low student learning outcomes that are not as expected [2].

The problems to be studied are: Is there an influence of the Android-Based Creative Problem Solving learning model on the Mathematics learning outcomes of SD Tunas Bangsa students?

The purpose of this study is to determine the effect of the Android-based Creative Problem Solving learning model on the learning outcomes of elementary school students.

2. Method
This type of research is quantitative with Pre Experimental Design research methods. The type of research design was One Group Pretest-Posttest. Because it only involved one class as an experimental class that is carried out without a group [3]. The population was all students of SD Tunas Bangsa Makassar. The sampling technique used simple random sampling. The sample of this study was the fifth-grade students of SD Tunas Bangsa with a total of 30 students.

The variables in this study consisted of two variables, namely, the independent variable and the dependent variable [4]. As explained below: 1. Android-Based Creative Problem Solving Learning Model which is the causal variable or independent variable (X) 2. Mathematics learning outcomes is variable caused by the independent variable or dependent variable (Y). The research design of the relationship between the independent variable and the dependent variable is described as follows:

\[
O_1 \quad X \quad O_2
\]

The figure of the relationship between the independent variable and the dependent variable

Information:
\(O_1\): Pretest, before being given treatment
\(X\): Treatment
\(O_2\): Posttest, after being given treatment

Model. This experiment went through three steps, namely: 1) Giving a pretest to measure the dependent variable (learning outcomes) before the treatment was carried out using the Android-Based Creative Problem Solving model. 2) Giving treatment to the class of research subjects by using the Android-Based Creative Problem Solving model. 3) Provide a posttest to measure the dependent variable after the treatment is carried out using the Android-Based Creative Problem Solving model [5].
Data collection technique

The data collection techniques used learning outcomes tests and observations which are the most important steps in a study, because the main purpose of research is to obtain data. Data collection techniques used by researchers in this study are:

1. Test
The test is a set of stimuli given to students with the intention of getting answers that can be used as the basis for determining numerical scores.

2. Observation Technique
The implementation of the Android-Based Creative Problem Solving model was carried out by making observations based on the data observation sheet about student activities and teacher activity data taken during Mathematics learning by using the Android-Based Creative Problem-Solving model at SD Tunas Bangsa [6].

Data Analysis Techniques The data that has been collected that processed by statistical descriptive analysis techniques and inferential statistical analysis.

2.1. Descriptive analysis
The data analysis used descriptive statistics to describe the data from the research variables, namely Android-Based Creative Problem Solving and mathematics learning outcomes [7].

2.2. Inferential analysis
2.2.1 Prerequisite test
Statistical prerequisites include normality test, homogeneity test, and linearity test. a. Normality test

Normally distributed data can be seen from the significance value or probability value. Decision-making guidelines are if the significant value <0.05 the data is not normal and vice versa if the significance value> 0.05 the data is said to be normal [7]. The normality test of the data distribution used was the Kolmogorov Smirnov test using SPSS.

Homogeneity Test The homogeneity test of the data aims to see the level of homogeneity with the assumption that the data is homogeneous by looking at Levene's Test for Equality of Variance on SPSS software with the test criteria used is sig > with a level of = 0.05.

2.2.2 Hypothesis test
To answer the research hypothesis that has been proposed, the researcher used the t-test while the provisions are the significance rate = 0.05 or 5% and the criteria used in the t-test are $H_0$ accepted if sig 0.05, rejected $H_1$ if sig 0.05 (using SPSS 22.0).

Information:

$H_0 = \text{There is no effect of the Android-Based Creative Problem-Solving model on mathematics learning outcomes in fifth-grade students of SD Tunas Bangsa.}$

$H_1 = \text{There is an effect of the Android-Based Creative Problem-Solving model on mathematics learning outcomes in fifth-grade students of SD Tunas Bangsa.}$
3. Results and discussion

3.1. Descriptive Statistical Analysis.

3.1.1 The activity of the teacher’s ability in implementing the use of the Android-Based Creative Problem Solving model on learning outcomes.

The test results of learning outcomes of the ability to use the Android-Based Creative Problem Solving model were analyzed using descriptive statistics, namely the average score [1]. In observing mathematics learning outcomes for students, they are as shown in the table as follows:

| Teacher Activities | Score | Category   |
|--------------------|-------|------------|
| Meeting 1          | 70.1  | Enough     |
| Meeting 2          | 85.3  | Good       |
| Meeting 3          | 90.1  | Very good  |
| Average            | 81.9  | Good       |

Source: Teacher activity assessment

Based on the results of observations of teacher activities in the table above at the score of the first meeting was 70.1, the score of the second meeting was 85.3, at the score of the third meeting was 90.1. So that the average of teacher activity in using the Android-Based Creative Problem Solving model was a good category. So the teacher's activity in utilizing the Android-Based Creative Problem Solving model can be said to be achieved because it was a good category [8].

3.1.2. Student activities

Student activities in the learning process were as subjects of learning activities. For students to act as actors in learning activities, teachers should plan an effective learning process, namely learning that provides opportunities for self-study and doing activities on their own. Data from the test results of the implementation of the Android-Based Creative Problem Solving model on learning outcomes were analyzed using descriptive statistics, namely the average score [9].

The student activities were observed by researchers related to learning using the Android-Based Creative Problem Solving model are as follows:

| Student Activities | Score | Category   |
|--------------------|-------|------------|
| Meeting 1          | 70    | Enough     |
| Meeting 2          | 84    | Good       |
| Meeting 3          | 92    | Very good  |
| Average            | 82    | Good       |

Source: Student activity assessment

Based on the results of observations of student activities in the table above at the score of the first meeting was 70, the score of the second meeting was 84, and the score of the third meeting was 92. So the average student activity in utilizing the Android-Based Creative Problem Solving model was a good category. So students' activities in utilizing Android-Based Creative Problem Solving can be said to be achieved because they were good category [10].
3.1.3. Learning outcomes

Data on learning test results were analyzed using descriptive statistics, namely the average score. The categorization criteria are used to describe the Android-Based Creative Problem Solving model in Mathematics [11]. The research data was obtained through pretest data and posttest data for Mathematics learning outcomes for Class V through the use of the Android-Based Creative Problem Solving model in class V SD Tunas Bangsa.

| Score       | Pretest Frequency | Posttest Frequency | Category |
|-------------|-------------------|--------------------|----------|
| 90 – 100    | 0                 | 10                 | Very good|
| 80 – 89     | 9                 | 11                 | Good     |
| 70 – 79     | 7                 | 1                  | Enough   |
| 60 – 69     | 5                 | 0                  | Less     |
| 60          | 1                 | 0                  | Poor     |
| Total       | 22                | 22                 |          |

*Source: Learning outcome assessment*

Based on the results of learning Mathematics in class V SD Tunas Bangsa who obtained a pretest score of 90-100, none of them had achieved and 80-89 consisted of 9 respondents and those who scored 70-79 consisted of 7 respondents and obtained a score of 60-69 consisted of 5 respondents, and who got score 60 consists of 1 respondent. So the posttest score of 90-100 consists of 10 students who got a score of 80-89 consist of 11 respondents and got 70-79 consists of 1 respondent and the students got a score of 60-69, there were no students who achieved who got a score ≤ 60 nothing reaches.

![Figure 1. Graph of learning outcomes of pretest score.](image)

Based on the graph above, the researchers can find out the number of students who got grades, it can be concluded that the learning outcomes in Mathematics at the Pretest stage using an instrument test, namely the 90-100 category, there were no students who had achieved it, the 80-89 category with 9 students, the 70-100 category. 79 with 7 students and 60-69 categories with 5 students, 60 category consists of 1 student.
Figure 2. Graph of learning outcomes in posttest

Based on the graph above, The researchers can find out the number of students who got grades, it can be concluded that the learning outcomes in Mathematics at the Posttest stage used instruments test was 90-100 category with 10 students, 80-89 category with 11 students, 70-79 category with the number of students was 1, and category of 60-69, there were no students who achieved, category \( \leq 60 \), and no student reached out of 22 students.

| Variable | Pretest | Posttest |
|----------|---------|----------|
| N        | 22      | 22       |
| mean     | 73.18   | 89.55    |
| median   | 75.00   | 85.00    |
| Mode     | 80      | 85       |
| Std Deviation | 8.803 | 8.296 |
| Range    | 30      | 30       |
| Min      | 55      | 70       |
| Max      | 85      | 100      |
| Sum      | 1610    | 1970     |

Source: value of data

Based on the table above, the pretest data for learning outcomes in mathematics using the Android-based Creative Problem Solving model in class V SD Tunas Bangsa. From 22 samples obtained an average of 73.18 with standard deviation results.8.803for the range value of 30, it is obtained from the difference data between the minimum value of 55 and the maximum value of 85, and in the final test (Posttest) the learning outcomes in Mathematics using the Android-Based Creative Problem Solving model in class V SD Tunas Bangsa. Based on 22 samples obtained an average of 89.55, with a standard deviation of 8,296, for a range value of 30, obtained from the difference data between the minimum value of 70 and the maximum value of 100.
4. Inferential statistical analysis
Inferential statistical analysis was to test the hypothesis in the study, before testing the hypothesis first, data of prerequisite test can be carried out. data of normality test, data of homogeneity test, and data of linearity test were carried out while hypothesis testing was carried out (T-test) [3].

4.1. Prerequisite test
4.1.1. Data of normality test
The normality test was carried out on mathematics learning outcomes to know whether the data of the population was normally distributed or not. Normality test was carried out using computer assistance with SPSS version 22 program using Kolmogorov-Smirnov.

\[ H_0 = \text{Not normally distributed} < 0.05 \]
\[ H_1 = \text{Normal distribution} > 0.05 \]

Table 5. Pretest and posttest normality test results

| Statistics | df | Sig  |
|------------|----|------|
| Pretest    | .190 | 22   | .062 |
| Posttest   | .254 | 22   | .058 |

*Source: normality test results*

Based on the table above, the results of data analysis using the Kolmogorov-Smirnov test, the significance or p-Value of Pretest = 0.062 of 22 students. the p-Value of Posttest = 0.058 > (significance rate 0.05) means that the data comes from a normally distributed population.

4.1.2. Homogeneity test
After doing the normality test, then carried out a homogeneity test with a computer using SPSS version 22 in the homogeneity of variance test with relevance. The homogeneity test was useful to find out whether the data to be analyzed meets the variance constant (homogeneity).

\[ H_0 = \text{Not homogeneous} < 0.05 \]
\[ H_1 = \text{Homogeneous} > 0.05 \]

Table 6. Homogeneity test results science learning outcomes

| Levence statistics | Df1 | Df2 | Sig  | Note: |
|--------------------|-----|-----|------|-------|
|                    | 2,124 | 3   | 17   | .135  | Homogeneous |

*Source: homogeneity test results*

Based on the test of homogeneity of variance with "Levene's test" obtained a significant value or P-value > ie 0.135 > 0.05 So the homogeneity test was fulfilled.

4.2. Hypothesis testing
After the prerequisite test for data analysis was carried out, hypothesis testing was carried out using a T-test aimed at knowing the average value of the Mathematics learning test.
Hypothesis testing was tested using the T-test in this study.

| Learning outcomes | df | Sig. (2 tails) |
|-------------------|----|---------------|
| 0.00              | 22 | .000          |

Based on the results of the independent analysis of the sig test sample (2-tailed). Obtained a value of 0.00 which was smaller than the significance rate of 0.05, which means that there was an effect of learning outcomes in Mathematics, thus H1 was accepted. By utilizing the Android-Based Creative Problem Solving model on mathematics learning outcomes in fifth-grade students of SD Tunas Bangsa.

5. Conclusion
Based on the results of data analysis research obtained both descriptively and inferentially that generally, the use of the Android-Based Creative Problem Solving model in learning on Mathematics learning outcomes in Class V SD Tunas Bangsa students has an effect with a significant value of 0.00 < 0.05, which means that H0 is rejected and H1 is accepted by using the Android-Based Creative Problem-Solving model on mathematics learning outcomes for fifth-grade students of SD Tunas Bangsa.

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