The Effect of Use Interactive Learning Media Environment-based and Learning Motivation on Science Learning Outcomes

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ABSTRACT
The study aims to determine the effect of the use of interactive learning media environment-based and learning motivation on science learning outcomes. This research was conducted on grade V students of SDN Wijaya Kusuma 07 Jakarta Barat from September to November 2019. The method used was an experiment with a research design using two-way ANAVA (treatment by level 2x2). It was obtained using a multi-stage random sampling. Based on data analysis, it was obtained: First, the science learning outcomes of students who learn to use interactive learning media environment-based are higher than the science learning outcomes of students who learn to use non-interactive learning media. As evidenced by F_{count}(6.63) > F_{table}(4.17), second, there was an effect of learning media interaction and learning motivation on the science learning outcomes. This can be seen from the acquisition price of F_{count}(59.68) > F_{table}(4.17); third, in groups of students who have high learning motivation, the science learning outcomes of students who learn to use interactive learning media environment-based are lower than the science learning outcomes of students who learn to use non-interactive learning media. With the Tukey-test Q_{count} Test (10.30) > Q_{table} (4.04); fourth, in groups of students who have low learning motivation, the science learning outcomes of students who learn to use interactive learning media environment-based are lower than the science learning outcomes of students who learn to use non-interactive learning media. With the Tukey-test Q_{count} Test (5.15) < Q_{table} (4.04).

In accordance with current developments, one of the learning media that can be used by students in the 4.0 era is a technology-based media one of which is interactive learning media. Interactive learning media is a combination of images, animation, video, and sound in the software that allows users to interact directly (Novitasari, 2016). In addition, interactive learning media have functioned as a link in the learning process. social interaction, increasing sensitivity, and can be designed for individual learning (Naismith, et al.; 2006). There is also the function of interactive learning media can be known from various types of learning media. for example, web-based has a function to share data. audiotapes function to get information obtained from the source of the messenger in the audiotapes. videotapes have almost the same function as audiotapes, only in the form of videos. and many other functions are tailored to the needs and types of media presented (Lee and Owens, 2004).

The function of the interactive learning media is also...
adapted to the needs of students who are inseparable from technology, especially students learning subject is the age of multiskilling millennial generation so that if linked in teaching and learning activities will greatly support the independence of students in solving problems presented in learning. especially those that are so the teacher can be helped (Lati. et al., 2012). This is very much in accordance with science learning which requires a process of learning to solve various problems that are scientific.

Science learning provides space for students to think scientifically and always related to the environment in the teaching and learning process. It will be very interesting if it is associated with technology, for example, teaching and learning activities will be simplified in the use of technology. In addition, another positive thing that can be taken is the use of technology, so it is expected to be one of the solutions to overcome problems related to the environment due to the negative impact of the development of the technology itself (Purwanto. 2012). With this, the teacher can utilize existing environment-based interactive learning media. So that learning is more interesting.

Some of the ease in the learning process by using interactive learning media. there are other things that are a challenge for teachers. for example, with the use of these media, students are required to be more independent, in other words, there is a need for student motivation. Motivation is not something inherent in a person but an effort that can be obtained by anyone who wishes to involve themselves in doing what he considers interesting to do (Sternberg dalam Galishnikova. 2014). Learning motivation is always associated with students’ interest in learning so as to be able to grow in the form of facilities or interesting learning media. Good learning media can attract students' attention and be able to stimulate student motivation and learning interest (Rachmadullah. Zulela. & Sumantri. 2019).

The use of interactive learning media that emphasizes how to learn independently will make students easily achieve appropriate learning outcomes because learning independently prioritizes the self-control of each student. It is related to the achievement of learning outcomes after the learning process. Learning outcomes are the acquisition of values in the form of letters or numbers obtained by students at the end of learning (Reich. 2015). Learning outcomes are also related to learning achievement because to see whether or not learning objectives are achieved. it can be seen from the learning outcomes obtained by students as benchmarks so that in the future it will be an evaluation material to develop teaching skills.

2. MATERIALS AND METHODS

This research was conducted in September to November 2019 in grade V elementary school in the odd semester of the 2019/2020 school year.

2.1 Research Sample

The sample is part of the number and characteristics possessed by a population, while the population is an area of generalization consisting of objects or subjects that have certain qualities and characteristics determined by the researcher (Sugiyono. 2015). The population in this study were students of Class V SDN Wijaya Kusuma 07 West Jakarta in Grogol Petamburan District. West Jakarta City. The sampling technique uses multi-stage random sampling. namely by drawing stages two classes V with parallel classes (VA and VB) a total of 61 students in SD Wijaya Kusuma 07 West Jakarta for classes that will be determined as control and experiment classes. The learning experimental class uses interactive learning media based on the environment and the learning control class uses non-interactive learning media.

Collecting learning motivation data using a questionnaire with a Likert Scale. while the science learning outcomes data uses a learning outcome test that has been validated and tested.

2.2 Statistical Data Analysis

Test requirements analysis is done by testing the normality and homogeneity. The normality test is done by using the Lillifors test. Data analysis is performed using two-way Variant Analysis (ANAVA) through the F-test to test the main effect hypothesis. Then also testing the hypothesis of interaction effect and a simple effect.

3. RESULTS AND DISCUSSIONS

3.1 Data Description

The data obtained in this study are the results of the rest of the natural science learning that uses interactive learning media based on environment (A1) and students who learn to use non-interactive learning media (A2) by considering students’ learning motivation, those who have high and low learning motivation. Description of student learning outcomes science data can be seen in the following table.

| Statistic      | A1        | A2        |
|---------------|-----------|-----------|
| Sample        | 16        | 16        |
| Max           | 96        | 80        |
| Min           | 48        | 52        |
| Mean          | 70.25     | 65.75     |
| Standar Deviation | 18.98     | 6.36      |
| Varians       | 360.46    | 40.46     |
Based on Table 1, the science learning outcomes of students who learn using interactive learning media consisting of 16 samples, obtaining the highest value of 96, the lowest value of 48, an average of 70.25, a standard deviation of 18.98, and a variance of 360.46. While the science learning outcomes of students who learn using non-interactive learning media, the highest value is 80, the lowest value is 52, the average is 65.75, the standard deviation is 6.36, and the variance is 40.46.

The frequency distribution of science learning outcomes of students in groups of students who learn to use interactive learning media based on the environment (A₁) can be seen in the following table.

| No. | Interval | Frequency | Cumulative Frequency | Percentage (%) |
|-----|----------|-----------|----------------------|----------------|
| 1   | 48-57    | 7         | 7                    | 43.75          |
| 2   | 58-67    | 1         | 8                    | 6.25           |
| 3   | 68-77    | 1         | 9                    | 6.25           |
| 4   | 78-87    | 1         | 10                   | 6.25           |
| 5   | 88-97    | 6         | 16                   | 37.50          |
| Total |          | 16       |                      | 100.00         |

Based on Table 2, the frequency distribution consisting of 5 classes with a class length of 10, the highest frequency is in the range of 48-57 as many as 7 students. It can be seen that there are 6.25% of students who are above average.

Whereas for students who learn to use non-interactive learning media values are obtained as shown in the following table.

| No. | Interval | Frequency | Cumulative Frequency | Percentage (%) |
|-----|----------|-----------|----------------------|----------------|
| 1   | 52-57    | 1         | 1                    | 6.25           |
| 2   | 58-63    | 3         | 4                    | 18.75          |
| 3   | 64-69    | 9         | 13                   | 56.25          |
| 4   | 70-75    | 2         | 15                   | 12.50          |
| 5   | 76-81    | 1         | 16                   | 6.25           |
| Total |          | 16       |                      | 100.00         |

Based on Table 3 which has a class length of 6 and consists of 5 classes, it is found that there are 18.75% of students who are above the average value. Students who are below the average of 4 is equal to 25%, and the rest are students who obtain learning outcomes at an average of 56.25%.

3.2 Test Requirements Analysis

Before conducting a hypothesis test, a prerequisite test is carried out consisting of tests of normality and homogeneity.

1.1 Normality Test

The tested data is a single data, then the normality test of the data uses the Lilifors test on Microsoft Excel 2007. Data is stated as a normal distribution if $L_{count} < L_{table}$, in the data group with a level $\alpha = 0.05$ and is accepted as $H_0$.

| No. | Group | N    | $L_{count}$ | $L_{table}$ | Conclusion |
|-----|-------|------|-------------|-------------|------------|
| 1   | A1    | 16   | 0.203       | 0.222       | Normal     |
| 2   | A2    | 16   | 0.149       | 0.222       | Normal     |
| 3   | B1    | 16   | 0.132       | 0.222       | Normal     |
| 4   | B2    | 16   | 0.186       | 0.222       | Normal     |
| 5   | A1B1  | 8    | 0.311       | 0.313       | Normal     |
| 6   | A2B1  | 8    | 0.158       | 0.313       | Normal     |
| 7   | A1B2  | 8    | 0.287       | 0.313       | Normal     |
| 9   | A2B2  | 8    | 0.200       | 0.313       | Normal     |
Based on table 4, it can be explained that the L_{table} of the 8 data groups is less than L_table at $\alpha = 0.05$. Thus it can be concluded that the sample of the eight data groups came from populations that were normally distributed.

2.1 Homogeneity test

Homogeneity test in the two groups of data was used Fisher's test and in the data group that was more than 2 groups used the Bartlett test. The data group is declared homogeneous if the $f_{hitung} < f_{table}$ at the 0.05 error level is expressed by accepting $H_0$. The following is a summary table of the results of the homogeneity test.

| No. | Group | Df | $1/df$ | $\sigma_1^2$ | $\sigma_2^2$ | $\log_1^2$ | $\log_2^2$ | $db \log_1^2$ | $db \sigma^2$ |
|-----|-------|----|--------|-------------|-------------|------------|------------|--------------|--------------|
| 1   | A1B1  | 7  | 0.14   | 0.14        | 36.57       | 1.563      | 10.942     | 8.63         | 4.17         |
| 2   | A1B2  | 7  | 0.14   | 0.14        | 15.71       | 1.196      | 8.374      | 8.63         | 4.17         |
| 3   | A2B1  | 7  | 0.14   | 0.14        | 22.86       | 1.359      | 9.513      | 8.63         | 4.17         |
| 4   | A2B2  | 7  | 0.14   | 0.14        | 22.57       | 1.354      | 9.475      | 8.63         | 4.17         |
| Total|       | 28 |        |             | 38.304      |            | 684.000    |              |              |

With the acceptance of $H_0$, it can be concluded that all four data groups have the same or homogeneous variants.

3.3 Hypothesis Testing

In connection with the prerequisite test results stating that the data from each data group is normally distributed and homogeneous, then testing the hypothesis through two-way ANOVA is used to test the main effect and interaction effect.

The main effect consists of: 1) the hypothesis of differences in students' science learning outcomes between groups of students who learn to use interactive and non-interactive learning media; 2) hypothesis about the effect of learning motivation on students' science learning outcomes.

The results of the calculation are in accordance with the steps of the two-way ANOVA test listed in the following table.

| Variant                        | $df$ | $JK$ | $RJK$ | $F_{hitung}$ | $F_{table}$ |
|--------------------------------|------|------|-------|--------------|-------------|
| Learning Media (A)             | 1    | 162  | 162   | 6.63         | 4.17        |
| Motivation Learning (B)        | 1    | 3872 | 3872  | 158.50       | 4.17        |
| Interaction AxB                 | 1    | 1458 | 1458  | 59.68        | 4.17        |
| Mean of Square (RK_d)          | 28   | 684  | 24.42857 |              |             |
| Reduced Total                  | 31   | 6176 |        |              |             |

From the two lines of learning media (A), the ANOVA Dua Path summary table is obtained the value of $F_{hitung} > F_{table}$ (6.63 > 4.17) then $H_0$ is rejected. and it is concluded that there are significant differences between students learning to use interactive learning media with non-interactive learning media. This shows that there is a significant effect of learning media on student learning outcomes.

Based on this, interactive learning media has more influence on student learning outcomes in science compared to non-interactive learning media because the average value is greater (70.25 > 65.75).

Sourced from Table 6 in the AxB interaction row two-way ANOVA Summary Table obtained $F_{hitung} > F_{table}$ (59.68 > 4.17) then $H_0$ was rejected. and it can be concluded that the interaction of learning media and learning motivation has a very significant influence between learning media with learning motivation on student learning outcomes.

With the influence of these interactions, it can proceed to test the simple effect hypothesis using the Tukey Test with the results summarized in the following table.

| Group | Mean | RKD | $Q_{hitung}$ | $Q_{table}$ |
|-------|------|-----|--------------|-------------|
| A1B1  | 88   | 2.05| 10.30        | 4.04        |
| A2B1  | 70.75| 2.05|              |             |
| A1B2  | 52.50| 2.05| 5.15         | 4.04        |
| A2B2  | 55.50| 2.05|              |             |

Based on the data in the Table, it is known that $Q_1$ obtained a value of 7.53 and $Q_2$ of 2.67. Thus it can be said
that for Q1 the value is $Q_{hitung}$ (10.30) > $Q_{table}$ (4.04), it means significant. Whereas for Q2, it is obtained that $Q_{hitung}$ (5.15) < $Q_{table}$ (4.04), it means that it is significant.

In accordance with the table conclusions can also be drawn 1) there are differences in science learning outcomes of students who learn to use interactive learning media and non-interactive learning media at high motivation or $A_1B_1 > A_2B_2$; 2) there is no significant difference in science learning outcomes of students who learn to use interactive learning media and non-interactive learning media at low motivation or $A_1B_2 < A_2B_2$.

3.4 Discussion

The first hypothesis test results show that the learning outcomes of science students who learn to use interactive learning media based on the environment is higher than students who learn to use non-interactive learning media.

The conclusion of the first hypothesis test results shows that environment-based interactive learning media is more effectively used in learning science. That is because interactive learning media are considered relevant to their use today because students as subjects in learning are millennials who are already familiar with the use of technology and do not make students easily bored during the learning process.

The conclusion of the second hypothesis test results shows the interaction between learning media and learning motivation shows that the use of learning media will be more optimal if it is associated with learning motivation. It also shows that the selection of appropriate learning media will affect the cognitive development of students for example in the acquisition of science learning outcomes.

The third hypothesis test shows the average value of students who learn with interactive media-based learning media is higher than groups of students who learn to use non-interactive learning media on groups of students who have high learning motivation. That is because learning by using interactive media is able to stimulate the cognitive level of students in the process by going through several phases including the phase of attention, retention, reproduction, and also the motivation phase.

The fourth hypothesis shows that the average value of students who learn with interactive media-based learning media is lower than the group of students who learn to use non-interactive learning media on groups of students who have low learning motivation. The theoretical aspect that shows this is because the characteristics of students who have low motivation tend to wait for the intervention of others in a learning process. This is very suitable for learning activities that use non-interactive learning media with more supervision and direction from the teacher during the learning process. Whereas non-interactive learning media requires independence in learning so that learning motivation takes precedence over each individual.

4. CONCLUSION

Based on the results of data analysis, the results of hypothesis testing and the results of research discussions that have been obtained, it can be explained several conclusions including: 1) This study proves that the learning outcomes of science in class V students who learn to use interactive learning media environment-based are higher than the learning outcomes of students who learn to use non-interactive learning media; 2) there was an effect of learning media interaction and learning motivation on the science learning outcomes; 3) science learning outcomes for students who learn to use interactive learning media based on environments with high learning motivation is higher than science learning outcomes for students who learn to use non-interactive learning media with high learning motivation; and 4) science learning outcomes for students who learn to use interactive learning media based on environments with low motivation lower than science learning outcomes for students who learn to use non-interactive learning media with low learning motivation.

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