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# The Influence of Animation Media In Understanding Fractions In Mathematics

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**Abstract.** This research aims to determine the effect of animated video media in understanding fractions in mathematics subjects to improve elementary school students' learning outcomes. The type of research used was Quasi Experiment with Nonequivalent Control Group Design, namely research conducted in two classes, namely the experimental class and the control class. This research was conducted in class IV of the Pesantren Elementary School. The data collection techniques used were tests and observations. Data validation through content validity, instrument testing, reliability testing. Data analysis uses inferential statistical techniques through normality tests, homogeneity tests, and T tests. Based on the research results, the average learning outcomes test score before being given treatment (pretest) in the experimental class is 39.54, while the average learning outcomes test score after being given treatment (posttest) was 81.93. And the results of the hypothesis test show a sig (2-tailed) result of 0.000, where 0.000 < 0.05, so Ho is rejected, and Ha is accepted. This means that there is a difference in the use of animated video media in understanding fraction material in mathematics learning in class IV of the Semarang City Pesantren Elementary School between before being given treatment (pretest) and after being given treatment (posttest). So, there is an influence of animated video media in understanding fraction material in mathematics subjects to improve the learning outcomes of fourth grade elementary school students at the Semarang City Pesantren State Elementary School for the 2023/2024 academic year.

**Keywords:** animation media; interest in learning; learning results

## INTRODUCTION

Education plays an important role in forming a future generation that is superior, qualified and ready to face the challenges of the times. Educators must realize that each student has different learning abilities (Wahyuningsari et al., 2022) . Some students prefer learning while playing, while others are more interested in using interesting learning media (Ichsan et al., 2021; Setiyadi et al., 2022; Wulandari, 2020) . In the era of 21st century education, the use of technology in learning is important to improve the quality of education in line with current developments. As stated by Illahi, (2020) that teachers have an obligation to convey their knowledge and educate students well so that they become smarter. The skills needed by educators today include the ability to use information and communication technology (ICT) as a tool in the teaching and learning process.

Mathematics learning plays an important role in developing logical, critical and analytical thinking skills (Sa'adilla et al., 2022) . One material that is considered difficult by elementary school students is the concept of fractions. Fractions are part of the mathematics curriculum that teaches students about parts of a whole, basic operations with fractions, and the application of fractions in everyday life. This concept requires in-depth understanding and good visualization to be understood correctly by students.

According to the constructivist theory put forward by Piaget, students learn by building their own knowledge based on their experiences and interactions with the environment (Agustyaningrum et al., 2022; Suryana et al., 2022) . In the context of learning fractions, the use of interactive and interesting learning media can help students connect abstract concepts with their concrete experiences. Animation media is a tool that can be used to create meaningful learning experiences and help students understand the concept of fractions better (Listiyoningrum et al., 2024) . Animation is a series of images displayed sequentially to create the illusion of movement, and is often accompanied by audio to enhance the learning experience (Setiawan et al., 2023) . The use of animation media in learning has been proven to be effective in attracting students' attention, increasing learning motivation, and helping them understand complex material (Tarigan et al, 2024) .

The advantage of animation media in learning lies in its ability to present information in a more dynamic and interactive way (Melati et al., 2023) . Through animation, concepts that are difficult to understand can be visualized clearly, making it easier for students to understand and remember the material. Apart from that, animation can also

present situations or phenomena that cannot be observed directly, such as abstract mathematical processes or complicated scientific experiments (Tanjung & Sitepu, 2023) .

Even though many studies have discussed the benefits of using animation media in learning, there is still a gap in the application of this media to mathematics learning, especially fraction material in elementary schools. At the Semarang Pesantren Elementary School, the results of observations and interviews showed that many students had difficulty understanding fraction material. Conventional and less interesting teaching methods cause students to quickly feel bored and lose focus during the lesson. Apart from that, teachers also face challenges in using innovative and effective learning media to explain the concept of fractions.

It is important to carry out this research to fill this gap and find solutions that can improve students' understanding of fraction material. It is hoped that the use of animation media can make learning more interesting and interactive, so that students are more motivated and can understand the concept of fractions better. Therefore, this research aims to analyze the influence of animation media in understanding fractions in mathematics subjects in elementary schools. So, it can help teachers develop their skills in using technology and innovative learning media.

## METHODS

This research is quantitative research with a Quasi Experiment design (Sugiyono, 2013) . This design was used to evaluate the effect of using animation media in understanding the concept of fractions in mathematics subjects at the Semarang City Pesantren Elementary School. This research used an experimental group that was given treatment in the form of using animation media and a control group that used conventional learning methods.

This research will be carried out at the Pesantren Elementary School for one month in the odd semester of the 2023/2024 academic year. The population in this study were all fourth-grade students at the Pesantren State Elementary School. The research sample was taken using a purposive sampling technique, namely by selecting two class IV students who had relatively homogeneous characteristics and academic abilities. One class will be used as an experimental group which will be given learning using animation media, while the other class will be used as a control group which will be given learning using conventional methods with a total sample of 25 students.

The data collection techniques used in this research are as follows: Tests are used to measure students' understanding of the concept of fractions before and after treatment. This test consists of multiple choice questions and descriptions that have been validated by material experts (Arikunto, 2019) . Observation: Used to observe the learning process and student participation during learning using animation media. Data Validation through Content Validity: Test questions and questionnaires will be validated by material experts and educational evaluation experts to ensure that the instruments used really measure what they are supposed to measure. Instrument Trial: The instrument will be trialled on students who are not included in the research sample to measure its validity and reliability. Reliability Testing: Test instruments and questionnaires will be tested for reliability using Cronbach's Alpha formula. The instrument is considered reliable if the alpha value is more than 0.70.

Data obtained from test results before and after treatment will be analyzed using inferential statistical techniques (Sutisna, 2020) . The data analysis steps are as follows: Normality Test: Carried out to determine whether the data is normally distributed or not using the Kolmogorov-Smirnov test. Homogeneity Test: Carried out to determine whether the variance between groups is homogeneous or not using Levene's test. Test: Used to compare the average student learning outcomes between the experimental group and the control group. This t-test was carried out to see whether there were significant differences between the two groups after being given treatment. The results of data analysis will be used to draw conclusions regarding the influence of using animation media in understanding the concept of fractions in mathematics subjects at the Semarang City Pesantren Elementary School.

## RESULTS AND DISCUSSION

The results showed that the experimental group that used animation media had a significant increase in understanding of fractions compared to the control group. The average comprehension score of the experimental group increased significantly after using animation media, while the average comprehension score of the control group did not increase significantly.

In the research entitled "The Influence of Animation Media in Understanding Fraction

Material in Mathematics Subjects at Pesantren Elementary Schools", the use of animation media, student learning outcomes, and the influence of the use of animation media on student learning outcomes in Mathematics subjects will be explained. Data from the research results will be analyzed using descriptive statistics to describe the research results, and inferential statistics to test the hypothesis using the independent sample t test. Student Pretest Data in Understanding Fraction Material in the Experimental Class. Data on student pretest results in the experimental class can be seen in the following table:

**Table 1.** Qualifications and Pretest Interval for Experimental Class

| Descriptive statistics | Statistical Value |
|---|---|
| Number of Samples | 13 |
| Lowest Value | 25 |
| The highest score | 70 |
| Average (Mean) | 45.38 |
| Range | 45 |
| Standard Deviation | 13.301 |
| Variance | 176.923 |

Based on Table 1, there were 13 samples taken in this research. The average value (mean) before using animation media in the experimental class was 45.38. This value shows that the average learning outcomes of experimental class students before using animation media were in the medium category. The lowest score obtained by students was 25, while the highest score obtained by students was 70. The range or difference between the lowest and highest scores was 45. The standard deviation, which is a measure of the distribution of data, was 13.301, while the variance was 176.923. The greater the data distribution value, the more varied the data. Data on the frequency distribution of student learning outcomes in the experimental class pretest can be seen in the following table.

**Table 2.** Frequency Distribution of Pretest Scores for Experimental Class

| Score (%) | Category | Frequency | % |
|---|---|---|---|
| 81-100 | Very high | 0 | 0 |
| 61-80 | Tall | 2 | 15.4 |
| 41-60 | Currently | 4 | 30.8 |
| 21-40 | Low | 7 | 53.8 |
| 0-20 | Very low | 0 | 0 |
| Amount | | 13 | 100 |

Based on frequency distribution table 2, there were 2 students who scored in the high category, with a percentage of 15.4%. There were also 4 students who scored in the medium category, with a percentage of 30.8%. Meanwhile, there were 7 students who got scores in the low category, with a percentage of 53.8%. Descriptive statistical analysis shows that the experimental class pretest is in the medium category. This can be seen from the average value of student learning outcomes in the experimental class pretest before using animation media, namely 45.38.

**Student Pretest Data regarding Student Understanding of Control Class Fractions.**

**Table 3.** Qualifications and Pretest Interval for Control Class

| Descriptive statistics | Statistical Value |
|---|---|
| Number of Samples | 12 |
| Lowest Value | 20 |
| The highest score | 75 |
| Average (Mean) | 43.75 |
| Range | 55 |
| Standard Deviation | 14.001 |
| Variance | 196.023 |

Based on Table 3, there were 12 samples taken in the research in the control class. The average value (mean) of student learning outcomes in the control class is 43.75. This shows that the average pretest learning outcomes of control class students are in the medium category. The lowest score obtained by students is 20, while the highest score obtained by students is 75. The range or difference between the lowest and highest scores is 55. The standard deviation, which is a measure of the distribution of data, is 14.001. The greater the spread of data, the more varied the data. The variance is 196.023. Data on the frequency distribution of student learning outcomes in the control class pretest can be seen in the following table.

**Table 4.** Frequency Distribution of Control Class Pretest Scores

| Score (%) | Category | Frequency | % |
|---|---|---|---|
| 81-100 | Very high | 0 | 0 |
| 61-80 | Tall | 1 | 8.3 |
| 41-60 | Currently | 5 | 41.7 |
| 21-40 | Low | 5 | 41.7 |
| 0-20 | Very low | 1 | 8.3 |
| Amount | | 12 | 100 |

Based on frequency distribution table 4.4, there was 1 student who got a score in the high category, with a percentage of 8.3%. There were also 5 students who scored in the medium category, with a percentage of 41.7%. Apart from that, there were 5 students who got scores in the low category, with

a percentage of 41.7%. There was also 1 student who got a score in the very low category, with a percentage of 8.3%. Descriptive statistical analysis shows that the control class pretest results are in the medium category. This can be seen from the overall average pretest score for the control class, namely 43.75.

**Student Posttest Data in Understanding Experimental Class Mathematics Material**

Data on students' posttest results in the experimental class can be seen in the following table:

**Table 5.** Experimental Class Posttest Qualifications and Intervals

| Descriptive statistics | Statistical Value |
|---|---|
| Number of Samples | 13 |
| Lowest Value | 25 |
| The highest score | 70 |
| Average (Mean) | 45.38 |
| Range | 45 |
| Standard Deviation | 13.301 |
| Variance | 176.923 |

Based on table 5, the average (mean) student learning outcomes after using animation media (posttest) in the experimental class is 81.54. This shows that the average student score after using animation media is in the very high category. The lowest score obtained by students is 60, while the highest score obtained by students is 100. The range or difference between the lowest and highest scores is 40. The standard deviation (standard deviation) which is a measure of data distribution is 10.875, while the variance obtained is 118.269. To see in more detail the frequency distribution of student learning outcomes in the experimental class posttest, you can see the table provided.

**Table 6.** Frequency Distribution of Posttest Scores for Experimental Class

| Score (%) | Category | Frequency | % |
|---|---|---|---|
| 81-100 | Very high | 6 | 46.2 |
| 61-80 | Tall | 6 | 46.2 |
| 41-60 | Currently | 1 | 7.7 |
| 21-40 | Low | 0 | 0 |
| 0-20 | Very low | 0 | 0 |
| Amount | | 13 | 100 |

Based on frequency distribution table 6, there were 6 students who obtained scores in the very high category, with a percentage of 46.2%. Apart from that, there were also 6 students who got scores in the high category, with the same percentage, namely 46.2%. The number of students who scored in the medium category was only 1 person, with a percentage of 7.7%. Based on descriptive statistical analysis, it can be concluded that student learning outcomes in the experimental class are in the very high category. This can be seen from the average value (mean) of overall learning outcomes, namely 81.54.

Student Posttest Data in Understanding Fraction Material in the Control Class

**Table 7.** Control Class Posttest Qualifications and Intervals

| Descriptive statistics | Statistical Value |
|---|---|
| Number of Samples | 12 |
| Lowest Value | 45 |
| The highest score | 100 |
| Average (Mean) | 70.42 |
| Range | 55 |
| Standard Deviation | 15.588 |
| Variance | 242.992 |

Based on table 7, the average (mean) student learning outcomes in the control class (posttest) is 70.42. This shows that students' scores without the use of animation media are in the high category. However, this value is still lower than the experimental class which used animation media. This shows that using animation media is more effective than not using animation media. The lowest score obtained by students was 45, while the highest score obtained by students was 100. The range or difference between the highest and lowest scores was 55. The standard deviation (standard deviation) which is a measure of data distribution was 15.588, while the variance obtained was 242.992. To see in more detail the frequency distribution of student learning outcomes in the control class posttest, you can see the table provided.

**Table 8.** Qualifications and Posttest Interval for Control Class

| Score (%) | Category | Frequency | % |
|---|---|---|---|
| 81-100 | Very high | 6 | 46.2 |
| 61-80 | Tall | 6 | 46.2 |
| 41-60 | Currently | 1 | 7.7 |
| 21-40 | Low | 0 | 0 |
| 0-20 | Very low | 0 | 0 |
| Amount | | 13 | 100 |

Based on frequency distribution table 8, there were 2 students who scored in the very high category, with a percentage of 16.7%. Apart from that, there were also 6 students who got scores in the high category, with a percentage of 50%. The number of students who scored in the medium

category was 4 people, with a percentage of 33.3%. Based on descriptive statistical analysis, it can be concluded that the control class posttest results are in the high category.

**Data Normality Test**

The data normality test was carried out with the help of SPSS. The output results from the pretest and posttest normality tests for the experimental class and control class can be seen in the output. Based on Normality Test Results of Student Learning Data can be concluded that the pretest and posttest data in the experimental class and control class have a normal distribution. This can be seen from the normality test results which show that the probability value is greater than 0.05. Thus, it can be concluded that the data is normally distributed.

**Homogeneity Test**

The homogeneity test aims to find out whether the data obtained is homogeneous or not. The homogeneity test in this study used a test with the help of SPSS.

Based on Data Homogeneity Test Results was found that the results of the pretest homogeneity test between the experimental class and the control class had a probability value of 0.972. Meanwhile, the results of the posttest homogeneity test between the experimental class and the control class have a probability value of 0.283. With a probability value greater than the specified value (0.05), it can be concluded that the data is homogeneous. Therefore, it can be continued by carrying out a parametric test or T-test, because the requirement for carrying out a T-test is that the two groups being tested must be homogeneous.

**Hypothesis testing**

The pretest hypothesis test for the experimental class and the control class was carried out to determine the differences in student learning outcomes before being given treatment in the form of the use of animation in the experimental class and the control class.

Based on the Independent Sample T-Test Pretest Results for Experimental Class and Control Class was found that the probability value in the experimental class was greater than 0.05. This shows that there is no significant difference in learning outcomes between the experimental class and the control class before the application of animation media (treatment). Furthermore, a comparison between the t count and t table values shows that the t count value (0.299) is smaller than t table (2.066) using an α value (significance level) of 5% and a degree of freedom (df) of 23. Therefore, it can be concluded that no there was statistically significant difference between the experimental class and the control class in terms of the pretest results obtained.

This analysis was carried out by testing the posttest results in the experimental class and control class. This analysis was carried out to find out whether there were differences in student learning outcomes after using animation media in the experimental class and the control class without treatment.

From the Independent Sample T-Test Posttest Results for Experimental Class and Control Class can be concluded that the probability value is less than 0.05, indicating that there is a significant difference in learning outcomes between the experimental class and the control class after giving treatment using animation media. Furthermore, a comparison between the values of t count (2.083) and t table (2.069) shows that the value of t count is greater than t table. This shows that there is a statistically significant difference between the experimental class and the control class in terms of the posttest results obtained. Thus, it can be concluded that the use of animation media as treatment has a significant influence on student learning outcomes.

From research conducted in class IV of SD Negeri Pesantren, the use of animation media in two meetings was observed. The second meeting discussed fraction material, while the third meeting discussed fraction material using animation media. The use of animation media at the second meeting reached an implementation level of 75%, which can be categorized as effective. Meanwhile, the use of animation media at the third meeting reached an implementation level of 83%, which can be categorized as very effective. Thus, the data shows an increase in the implementation of the learning process. Melati et al., (2023) explained that the use of animation as a technology-based learning medium can increase learning motivation.

Next, to determine student learning outcomes, the data was analyzed using descriptive statistical techniques. Descriptive statistical processing is used to present the frequency distribution of respondents' scores before and after using (Prihatiningsih, 2022) animation media. Based on the data presented, it can be concluded that before giving treatment (pretest), student learning outcomes in the experimental class and control class were in the medium category. This shows

that student learning outcomes before using animation media still need to be improved.

However, after giving treatment using animation media (posttest), student learning outcomes in the experimental class increased to the very high category, while those in the control class increased to the high category. This shows that the use of animation media in the experimental class provides a more significant increase in student learning outcomes compared to the control class. This is in accordance with the opinion of Irham & Mahmud, (2019) that animation media influences learning outcomes and student learning motivation. The results of descriptive statistical calculations also show an increase in student learning outcomes after using animation media. This is in accordance with the opinion of Indriyani, (2019) who states that the use of learning media can generate motivation and stimulation of learning activities, as well as have a psychological influence on students (Ichsan et al., 2021) .

Based on descriptive statistical data and supporting theories, it can be concluded that the use of learning media, such as animation media, can improve student learning outcomes. In this research, inferential statistical analysis was carried out to test the effect of using animation media. Before carrying out a hypothesis test, an assumption test is first carried out, namely the normality test and homogeneity test.

The results of the normality test using the Kolmogorov Smirnov technique (Usmadi, 2020) show that the pretest and posttest data in the experimental class and control class have a normal distribution. This shows that the data meets the normality assumption. Next, a homogeneity test was carried out using Levene's test technique (Usmadi, 2020) showing that both classes (experimental class and control class) had homogeneous variances. This means that the difference in variance between the two classes is not significant. Thus, the results of the assumption test show that the research data meets the assumptions of normality and homogeneity. This is an important prerequisite before conducting hypothesis testing to test the effect of using animation media on student learning outcomes.

After testing the assumptions, the next step is testing the hypothesis. Hypothesis testing is carried out by comparing the t table value with the t count value, as well as comparing the significance probability values. Based on the t table value for N (23) = 2.069 and t count of 2.083, the t count value is greater than t table. This shows that there is a significant difference between student learning outcomes in the experimental class and the control class. Next, to see the significance probability value, an independent sample t-test statistical test was used using the SPSS Version 23 program. The test results showed that the significance value was 0.049. If formulated, this means that there is a significant difference between student learning outcomes in the experimental class and the control class, with a significance level of less than 0.05.

Based on the results of hypothesis testing, it can be concluded that the use of animation media has a significant influence on student learning outcomes. Based on these data it can be concluded that there is a significant difference between the posttest from the experimental class and the control class. This shows that the Ho hypothesis is rejected, and Ha is accepted, which means that animation media has a significant influence on student learning outcomes in Mathematics class IV at the Pesantren Elementary School.

## CONCLUSION

Based on the research results, it can be concluded that the use of animation media has a significant influence on student learning outcomes and there is a significant difference between the posttest from the experimental class and the control class. This shows that the Ho hypothesis is rejected, and Ha is accepted, which means that animation media has a significant influence on student learning outcomes in Mathematics class IV at the Pesantren Elementary School. The use of animation media can increase students' understanding of fraction concepts in an interesting and interactive way.

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