

THE EFFECT OF THE IMPLEMENTATION OF ANIMATED LEARNING MEDIA CLICKABLE HOTSPOTS ON THE LEARNING OUTCOMES OF GRADE IV ELEMENTARY SCHOOL STUDENTS

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ABSTRACT

This study was motivated by students' learning outcomes that were not yet optimal and the use of learning media that tended to be conventional and less interactive. This study aimed to determine students' learning outcomes before and after the implementation of Clickable Hotspots animation learning media and to determine the effect of implementing the media on students' learning outcomes in IPAS on the material Forces Around Us. This study used a quantitative approach with a quasi-experimental method and a Two Group Pretest-Posttest Design. The sample consisted of 50 students, with 25 students of class IV A as the experimental group and 25 students of class IV B as the control group. The sampling technique used was saturated sampling. Data were collected through pretest and posttest questions and student learning activity observation sheets. Data analysis used descriptive statistics, normality test, homogeneity test, Independent Samples t-Test, and N-Gain analysis. The results showed that the mean pretest score of the experimental group was 61.20, while the control group was 59.20. After the treatment, the mean posttest score of the experimental group increased to 77.80, while the control group increased to 74.20. The Independent Samples t-Test obtained a Sig. (2-tailed) value of 0.192 > 0.05, so H_0 was accepted and H_1 was rejected. The N-Gain analysis showed a mean score of 0.400 for the experimental group and 0.375 for the control group, both categorized as moderate. Therefore, the implementation of Clickable Hotspots animation learning media showed a descriptive increase in learning outcomes, but did not have a statistically significant effect on the learning outcomes of fourth-grade elementary school students.

Article Information

Kata Kunci:

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ABSTRACT

Penelitian ini dilatar belakangi oleh hasil belajar peserta didik yang belum optimal serta penggunaan media pembelajaran yang masih cenderung konvensional dan kurang interaktif. Penelitian ini bertujuan untuk mengetahui hasil belajar peserta didik sebelum dan sesudah implementasi media pembelajaran animasi Clickable Hotspots serta mengetahui pengaruh implementasi media tersebut terhadap hasil belajar peserta didik pada mata pelajaran IPAS materi Gaya di Sekitar Kita. Penelitian ini menggunakan pendekatan kuantitatif dengan metode quasi experiment dan desain Two Group Pretest-Posttest Design. Sampel penelitian berjumlah 50 peserta didik, terdiri atas 25 peserta didik kelas IV A sebagai kelompok eksperimen dan 25 peserta didik kelas IV B sebagai kelompok kontrol. Teknik pengambilan sampel menggunakan sampling jenuh. Pengumpulan data dilakukan melalui tes pretest dan posttest serta lembar observasi aktivitas belajar peserta didik. Analisis data menggunakan statistik deskriptif, uji normalitas, uji homogenitas, Independent Samples t-Test, dan N-Gain. Hasil penelitian menunjukkan rata-rata nilai pretest kelompok eksperimen sebesar 61,20 dan kelompok kontrol sebesar 59,20. Setelah perlakuan, rata-rata nilai posttest kelompok eksperimen meningkat menjadi 77,80, sedangkan kelompok kontrol menjadi 74,20. Hasil Independent Samples t-Test memperoleh nilai Sig. (2-tailed) sebesar 0,192 > 0,05, sehingga H_0 diterima dan H_1 ditolak. Hasil analisis N-Gain menunjukkan rata-rata kelompok eksperimen sebesar 0,400 dan kelompok kontrol sebesar 0,375, keduanya termasuk kategori sedang. Dengan demikian, implementasi media pembelajaran animasi Clickable Hotspots menunjukkan peningkatan hasil belajar secara deskriptif, tetapi tidak memberikan pengaruh yang signifikan secara statistik terhadap hasil belajar peserta didik kelas IV SD.

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1. Introduction

Basic education plays a crucial role in building the foundation of students' knowledge, attitudes, and skills. According to Iswara, Ahmadi, & Da Ary (2022), elementary school education plays a crucial role in developing the foundation of knowledge and skills that will serve as the foundation for further academic development. At the elementary school level, particularly in grade IV, the learning process is expected to be oriented not only toward achieving learning outcomes but also foster student interest and active participation in learning activities. However, in reality, classroom learning is often dominated by conventional, teacher-centered methods, resulting in students being passive and less engaged. This condition results in low learning outcomes. Learning outcomes are the abilities students possess after participating in the learning process, encompassing cognitive, affective, and psychomotor aspects. According to Yandi et al. (2023), learning outcomes reflect students' level of understanding and mastery of the material after participating in a learning process. According to Haryadi & Kansaa (2021), learning outcomes are also defined as changes in students, both behavioral and other aspects, that arise as a result of the learning process, encompassing the cognitive, affective, and psychomotor domains. In the context of this research, learning outcomes are focused on the cognitive aspect, namely students' ability to understand learning materials, as measured by learning outcome tests. Learning outcomes are an important indicator of the success of a learning process and the effectiveness of the media used by teachers. According to Arsyad (2017), learning media is anything that can be used to convey messages and stimulate the learning process in students. Meanwhile, according to Sadiman et al. (2014), media is anything that can be used to convey messages so that it can stimulate students' attention, interest, thoughts, and feelings during learning activities.

Meanwhile, animation according to Setiawan et al (2022), Ramadianti (2021) animated video is one of the computer-based learning media that aims to maximize sound effects and provide continuous interaction, so that children's understanding will increase. According to Amal & Nindiasari (2024) in the Journal of Media and Educational Technology, animated video is an audio-visual learning media that combines moving animated images with sound/audio designed to convey learning material in an interesting and effective way, thereby facilitating students' understanding of the content. Animation is an image created using certain techniques so that the image appears to move. Clickable Hotspots are interactive features in digital media in the form of certain points or areas that can be clicked to display additional information, questions, or learning activities. This feature is designed to create direct interaction between students and learning media, so that the learning process is not only passive, but also involves active student participation. In the context of learning, Clickable Hotspots allow students to explore the material according to their individual needs and learning pace. According to Mayer (2020), Clickable Hotspots provide interactive points or areas on videos or digital media that can attract students' attention and direct learning focus to certain parts of the material.

Based on interviews with fourth-grade elementary school teachers, particularly in the Natural and Social Sciences (IPAS) subject, low student learning outcomes were still found. According to Susanti et al. (2024), this low achievement is thought to be caused by the use of learning methods that are less varied and tend to be monotonous, so that students are less motivated to be actively involved in the learning process. Monotonous learning conditions cause students' attention, activeness, and motivation to learn to decrease and have an impact on low learning evaluation results. On the other hand, children at this age have a short attention span and are more open to approaches that involve visual interaction and multimedia. Therefore, the use of media that can meet these needs, such as animated videos, is a very promising alternative. Therefore, teachers see the need to use innovative and interactive learning media, such as Clickable Hotspots animated videos, which allow students to be actively involved in learning so as to improve conceptual understanding and learning outcomes. Based on these findings, several problems can be identified, namely: The learning outcomes of fourth-grade elementary school students are still not optimal, The learning process is still dominated by conventional methods centered on the teacher, The use of interactive learning media in learning activities is still limited, Students are less active and less focused during the learning process, The learning media used has not fully accommodated the differences in students' learning styles, The use of Clickable Hotspots animated videos in learning has not been optimally implemented to improve student learning outcomes. Based on these problems, the use of learning media in the form of Clickable Hotspots animated videos is seen as one of the relevant alternative solutions to be implemented in learning in fourth-grade elementary school. The use of Clickable Hotspots animated videos as innovative learning media is one effort to improve the quality of learning and student learning outcomes in elementary school. However, the effectiveness of the implementation of these learning media needs to be proven empirically through systematic research. Therefore, this study was conducted with a quantitative approach to determine the Effect of the Implementation of Clickable Hotspots Animated Learning Media on the Learning Outcomes of Fourth-grade Elementary School Students. The results of this study are expected to contribute to the development of learning media and become a consideration for teachers in improving the quality of learning in elementary schools.

In today's rapidly evolving digital era, the world of education is experiencing significant changes in the methods of delivering material to students. The use of information technology has had a significant impact, not only in terms of accelerating access to various sources of knowledge, but also in enriching the way learning materials are presented in the classroom and online. Teachers and educational institutions are now required to be more creative in presenting learning processes that are interesting, relevant, and in line with the characteristics of the digital generation. According to Sa'dijah et al. (2023), the use of technology in education, known as educational technology, has grown rapidly in recent decades and is now an integral part of the education system in many countries. Along with the development of

information and communication technology, the world of education is required to be able to utilize innovative and interactive learning media. One form of innovation that is increasingly popular in supporting the modern learning process is the use of animation-based video media. This media is able to combine visual, audio, and motion elements harmoniously, thereby helping students understand difficult concepts in a more enjoyable, interactive, and easy-to-understand way. According to Pratiwi et al. (2024), learning media also plays an important role in conveying material from educators to students effectively and efficiently. According to Adiati, Firdaus, & Nurwahidin (2023), animated videos are an effective alternative solution to address learning challenges in the digital era, particularly in conveying complex, abstract material that requires dynamic visualization. Furthermore, the development of animated videos equipped with the Clickable Hotspots feature allows students to interact directly with the learning material. Clickable Hotspots provide students with the opportunity to explore specific information through interactive points available in the video. Thus, students are not only passive recipients of information but also play an active role in the learning process. This interactivity is believed to improve conceptual understanding and have a positive impact on student learning outcomes.

Based on the description above, the use of interactive animated videos has the potential to positively impact student learning outcomes. Therefore, this study was conducted to more specifically examine the effect of using Clickable Hotspots animated videos on the learning outcomes of fourth-grade elementary school students, as a form of development of previous studies.

2. Method

This study used a quantitative approach with a quasi-experimental method and a Two Group Pretest-Posttest Design. The study was conducted in the even semester of the 2025/2026 Academic Year in fourth grade students of SD Negeri 1 Trusmi Wetan for approximately six months, from December to May. The study design involved an experimental group and a control group. Both groups were given a pretest to determine initial abilities, then the experimental group received learning using Clickable Hotspots animated videos, while the control group used conventional learning media. After the treatment, both groups were given a posttest to determine changes in learning outcomes. The study population was all fourth grade students of SD Negeri 1 Trusmi Wetan. The sample consisted of two classes, namely one class as the experimental group and one class as the control group. Sampling used saturated sampling (total sampling) because the population was relatively limited, so all members of the population were used as research samples. The dependent variable of the study was student learning outcomes, which focused on the cognitive domain, including the ability to understand material, remember information, and answer questions. The treatment variable was the use of Clickable Hotspots animated videos, which are technology-based learning

media that combine animation with interactive points or areas that can be clicked to display additional information.

The research instruments included interview guidelines, observation sheets, and learning outcome tests. Interviews were used to obtain initial information regarding the learning process and learning outcome issues, while observations were used to observe the implementation of learning, activities, and student responses. Pretests and posttests were used as the primary instruments to measure learning outcomes before and after treatment. Instrument testing was conducted through validity and reliability tests. The validity of the tests and observation sheets used content validity through the suitability of the instruments to the indicators, learning objectives, and materials, as well as through expert judgment. The reliability of the learning outcome tests was tested using Cronbach's Alpha, with the instrument declared reliable if the reliability coefficient ≥ 0.70 . Research data were collected through interviews, observations, and tests. Learning outcome data were then analyzed using descriptive statistics in the form of mean, maximum value, minimum value, and standard deviation. Before hypothesis testing, normality tests were conducted using Kolmogorov-Smirnov or Shapiro-Wilk and homogeneity tests using Levene. Hypothesis testing used Independent Samples t-Test with a significance level of 0.05. In addition, the improvement in learning outcomes was analyzed using N-Gain, with high (≥ 0.70), medium (0.30–0.69), and low (< 0.30) categories.

3. Results and Discussion

This research was conducted on fourth grade students of SDN 1 Trusmi Wetan in the even semester of the 2025/2026 Academic Year. The research subjects consisted of two classes, namely class IV A as an experimental group of 25 students and class IV B as a control group of 25 students. The sampling technique used was saturated sampling (total sampling), that is, all members of the population were used as research samples. Thus, the total number of samples in this study was 50 students. This study aims to determine the effect of the implementation of Clickable Hotspots animation learning media on the learning outcomes of fourth grade elementary school students in the science subject of the material "Forces Around Us". The approach used was a quantitative approach with a quasi-experimental method and a Two Group Pretest-Posttest Design. The study involved an experimental group that was given treatment in the form of learning using Clickable Hotspots animation media and a control group that was given learning using conventional learning media. Both groups were given a pretest before treatment and a posttest after treatment to determine differences in learning outcomes and the effect of using Clickable Hotspots animation learning media. The first stage of the research was conducted by administering a pretest to students in grade IV A as the experimental group and grade IV B as the control group to measure the initial learning outcomes of students in the science subject "Forces Around Us". The test was in the form

of 5 essay questions arranged based on learning outcome indicators and adjusted to the learning objectives. A pretest was given to both groups before the treatment was implemented to determine the initial abilities of students. The second stage was the provision of treatment to the experimental group in the form of science learning using Clickable Hotspots animated video media on the material "Forces Around Us". This media combines visual elements, audio, animation, text, and the Clickable Hotspots feature that allows students to interact with certain parts of the video to obtain additional information or responses related to the material. Meanwhile, the control group was given learning using conventional learning media in accordance with the learning that is usually used. The treatment was carried out with the aim of determining the effect of using Clickable Hotspots animated video on student learning outcomes. The third stage was the implementation of a final test (posttest) after all

treatment was completed. Posttest was given to the experimental group and the control group. using questions that have the same indicators and structure as the pretest. The posttest aims to determine changes and improvements in student learning outcomes after participating in the learning process. The pretest and posttest results from both groups were then compared and analyzed statistically to determine differences in learning outcomes and the effect of using Clickable Hotspots animated video media on the learning outcomes of fourth-grade students. In addition to the written test, this study used an observation sheet of student learning activities as a supporting instrument. The observation sheet was used to observe student activity and involvement during the science learning process on the topic "Forces Around Us", both in the experimental and control groups. Observations were conducted to obtain an overview of student attention, activeness, concentration, response, and involvement during the learning process, especially when the experimental group used Clickable Hotspots animated video media. The research data were then processed and analyzed using descriptive and inferential statistical techniques. Descriptive statistical analysis was used to determine an overview of student learning outcomes based on pretest and posttest scores in the experimental and control groups. Furthermore, prerequisite analysis tests were conducted in the form of normality tests and homogeneity tests. After the data met the analysis requirements, a hypothesis test was conducted using an independent sample t-test to determine whether there was a significant difference in learning outcomes between the experimental group using Clickable Hotspots animated video media and the control group using conventional media. Furthermore, an N-Gain calculation was performed to determine the improvement in student learning outcomes based on a comparison of pretest and posttest scores in each group.

1. Test Results Validity of Test Instruments

a. Class Experiment

The validity test of the test instrument was conducted to determine the level of accuracy of each question item in measuring student learning outcomes. The test instrument used in this study consisted of 5 essay questions arranged based on learning indicators in the material "Forces Around

Us". The validity test was conducted on the questions used in the pretest and posttest of the experimental class. The validity test was carried out by comparing the calculated r value with the table r at a significance level of 5%. With a total of 25 students, the table r value was obtained at 0.396. The question item is declared valid if the calculated r value is greater than the table r. The results of the validity test of the test instrument in the experimental class are presented in the following table.

Table 1 Results of the Validity Test of the Experimental Class Test Instrument

No	Question Items	r count (pretest)	r count (posttest)	r table	Information
1	Question 1	0.612	0.645	0.396	Valid
2	Question 2	0.684	0.702	0.396	Valid
3	Question 3	0.573	0.618	0.396	Valid
4	Question 4	0.721	0.735	0.396	Valid
5	Question 5	0.648	0.671	0.396	Valid

Based on the table above, the results of the reliability test of the test instrument in the experimental class show that the Cronbach's Alpha value in the pretest was 0.781, while in the posttest it was 0.806. Both values are greater than 0.70. Thus, the pretest and posttest test instruments in the experimental class are declared reliable and have a good level of consistency in measuring student learning outcomes. Thus, the test instrument consisting of five essay questions can be used as a tool for collecting learning outcome data in research.

b. Class Control

Reliability testing in the control class was conducted to determine the consistency of the test instrument in measuring student learning outcomes. Reliability testing was conducted using Cronbach's Alpha on five essay questions used in the pretest and posttest. The instrument was considered reliable if the Cronbach's Alpha coefficient value was ≥ 0.70 . This testing was conducted to ensure that the instrument had adequate consistency in measuring student abilities.

Table 4 Results of the Reliability Test of the Control Class Test Instrument

No.	Instrument	Number of Questions	Cronbach's Alpha	Reliability Limits	Information
1	Pretest	5	0.764	0.70	Reliable

2	Posttest	5	0.793	0.70	Reliable
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Based on the table above, the results of the test instrument reliability test in the control class show that the Cronbach's Alpha value for the pretest was 0.764, while for the posttest it was 0.793. These values are greater than 0.70, so the pretest and posttest instruments in the control class are declared reliable. This indicates that the instrument has good consistency in measuring student learning outcomes. Based on the results of the reliability test, all the questions used in the test instrument were declared to have an adequate level of consistency and could be used in research in the control class.

3. Interview Results

Interviews were conducted with fourth-grade teachers to obtain information regarding the implementation of science learning, the use of learning media, obstacles encountered, student engagement, and learning outcomes. The results of the interviews with teachers are presented in the following table.

Table 5 Interview Results

N o.	Aspect What is observed	Interview Questions	Interview Results
1.	Learning Process	How has the implementation of science learning in grade IV been so far?	Science lessons are going quite well. Teachers usually explain the material, provide examples, and then students complete assignments or exercises.
2.	Instructional Media	What media are usually used in science learning?	The media used are usually textbooks, pictures, and simple media available in the classroom. The use of digital media is still relatively rare.
3.	Learning	What	A common

N o.	Aspect What is observed	Interview Questions	Interview Results
	Obstacles	obstacles are often encountered in delivering science and natural sciences material?	obstacle is that some students still have difficulty understanding material when it's only explained verbally. Furthermore, students' attention can easily wane when lessons go on for a long time.
4.	Student Activity	What is the level of student activity and attention during learning?	Student engagement varied considerably. Some were active in asking and answering questions, but others lacked focus and tended to be passive during the lesson.
5.	Learning outcomes	What are the learning outcomes of grade IV students?	Student learning outcomes varied widely. Some achieved their learning objectives, but some still achieved results below expectations.
6.	Interactive Media	Have you ever used	Interactive media

N o.	Aspect What is observed	Interview Questions	Interview Results
		interactive learning media? What were the results?	has been used in simple ways. Students appear more engaged and engaged when learning uses media that directly engages them.
7.	Video	What do you think about the video?	I find videos quite engaging for use in learning. This medium can help students understand the material through images, sound, and clickable sections.

		Indicators			
1	Attention of students	3	22.33	89.33%	Very good
2	Learning activity	3	21.00	84.00%	Very good
3	Interaction with media	3	22.00	88.00%	Very good
4	Enthusiasm for learning	3	22.67	90.67%	Very good
5	Understanding the material	3	21.00	84.00%	Very good
6	Focus on studying	2	21.50	86.00%	Very good
7	Student responses to media	3	22.67	90.67%	Very good
Total Amount/Average		20	21.90	87.60%	Very good

Based on the table above, the observation results in the experimental class show that student engagement during learning using Clickable Hotspots animation media is in the very good criteria, with an overall percentage of 87.60%. The aspects with the highest percentages are enthusiasm for learning and student responses to the media, which are 90.67% each. This shows that students show interest and positive responses during learning using Clickable Hotspots animation media. Furthermore, the aspect of student attention obtained a percentage of 89.33%, while interaction with the media obtained a percentage of 88.00%. The aspect of learning focus obtained a percentage of 86.00%, while learning activity and understanding of the material each obtained a percentage of 84.00%. Overall, these results indicate that the use of Clickable Hotspots animation media can support student engagement in the learning process, especially in increasing student attention, enthusiasm, interaction, focus, and response during learning.

4. ResultsObservation

a. ClassExperiment

Observations were conducted to obtain supporting data regarding student engagement during the learning process in the experimental class. Observations were conducted on class IV A students who received learning using the Clickable Hotspots animated learning media. Aspects observed included student attention, learning activity, interaction with the media, learning enthusiasm, material understanding, learning focus, and student responses to the media. The observation instrument consisted of 20 indicators that were assessed based on the implementation of the indicators during the learning process.

Based on the observation results, an overview of student activity and engagement was obtained during learning using the Clickable Hotspots animation media. The results of the observations in the experimental class can be seen in the following table.

Table 6 Results of Experimental Class Observations

N o.	Aspect	Number of	Average	Presentation	Criteria
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b. ClassControl

In addition to conducting observations in the experimental class, researchers also conducted observations in the control class to determine student activity and involvement during the learning process using conventional learning media in the form of textbooks and teacher explanations. Observations in the control class were conducted using an instrument consisting of 20 indicators covering student attention, learning activity, learning participation, learning enthusiasm, material understanding, learning focus, and learning responses. The results of these observations were used as supporting data to provide an overview of the condition of student activity during learning in the control class. The results of observations of students in the control class can be seen in the following table.

Table 7. Control Class Observation Results

N o.	Aspect	Experiment	Control	Difference
1	Attention of students	89.33%	73.33%	16.00%

N o.	Aspect	Experiment	Control	Difference
2	Learning activity	84.00%	68.00%	16.00%
3	Learning Interaction/Participation	88.00%	70.67%	17.33%
4	Enthusiasm for learning	90.67%	72.00%	18.67%
5	Understanding the material	84.00%	68.00%	16.00%
6	Focus on studying	86.00%	66.67%	19.33%
7	Learning/Media Response	90.67%	70.00%	20.67%
Total Amount/Average		87.60%	69.80%	17.80%

Based on the table above, it can be seen that the percentage of student activity and involvement in the experimental class was higher compared to the control class in all observed aspects. Overall, the experimental class obtained a percentage of 87.60%, while the control class obtained a percentage of 69.80%, so there was a difference of 17.80%. The highest difference was in the aspect of student response to learning/media, which was 20.67%, then followed by the aspect of learning focus at 19.33% and learning enthusiasm at 18.67%. Meanwhile, the difference in aspects of attention, activeness, and understanding of the material was 16.00% each. The results of these observations provide an illustration that students who participated in learning with Clickable Hotspots animation media showed higher activity and involvement compared to students who participated in learning using textbooks and teacher explanations. However, these observation results are supporting data, while testing the effect of learning media on student learning outcomes was carried out based on pretest and posttest data and statistical analysis that had been determined in the study.

5. Pretest ResultsLearners Before Using Clickable Hotspots Animation Learning Media

Before implementationIn the learning process with different treatments for each group, the researcher first gave a pretest to students in class IV A as the experimental group and class IV B as the control group. The purpose of giving the pretest was to determine the initial abilities of students on the material "Forces Around Us" before the learning process was carried out. The results of the pretest were also used as a basis for observing the initial abilities of both groups so that changes in learning outcomes after being given the treatment could be known more objectively. The pretest was given to 25 students each using the same test instrument, namely five essay questions that measured students' cognitive abilities on the material "Forces Around Us". The questions given covered students' understanding of the material on forces and their application in everyday life. Students worked on the questions independently according to their abilities before receiving learning with each group's treatment. The pretest results from both groups were then used to describe the initial abilities of students before the

learning process took place. The data were then presented separately to determine the highest score, lowest score, and average score obtained by each group. Thus, the pretest results can provide an overview of the initial conditions of student learning outcomes in the experimental group and the control group before being given treatment.

a. Class pretest resultsExperiment

Before being given treatment using the Clickable Hotspots animated learning media, grade IV A students were given a pretest to determine their initial abilities in the material "Forces Around Us." The pretest results from 25 students are presented in the following table.

Table 9 Pretest Results of Experimental Class

Based on the table, the pretest score for the experimental class averaged 61.20. The highest score was 75, while the lowest was 50. These results indicate that students' initial abilities before being given treatment were still relatively low, and some students had not yet achieved the expected learning outcomes.

b. Class pretest resultsControl

A pretest was also administered to students in grade IV B as a control group. The pretest was administered under the same conditions as the experimental class to determine the students' initial abilities before engaging in learning with conventional learning media. The pretest results are shown in the following table.

Table 10 Pretest Results of Control Class

N o.	Student Name	Pretest Score
1	ADEVA NURMALIKA	55
2	AHMAD HAQIQI	60
3	AISYAH OUTRI FEBRIYANI	50
4	AKBAR MAULANA	65
5	ANJANI	60
6	ATHAYA NABHAN ZAHIRULHAQ	55
7	CEMPAKA AYU NENGSIH	70
8	DITO BASTIYAN	60
9	DWI NATA PRATISTA	55
10	FANI ALFARIA	65
11	FAREL SYAPUTRA	50
12	FENISHA	60
13	NUR KANIA	55
14	FINA FORTUNA	70
15	JION MEYMAR	65
16	MUFAIDA	60
17	MUHAMAD RIZAL	55
18	MUHAMMAD AL FURKHON	65
19	MUHAMMAD LUTFI MAULANA	60
20	NADIRA AZAHRA	50
21	NAJUAN ALFARIZI	55
22	NAZHAR AL ATHAS	60
23	REZKI FEBIANSAH	65
24	RINI WULAN FROM	55
25	SAELAN	60
Average		59.20

Based on the table, the average pretest score of the control class was 59.20 with the highest score of 70 and the lowest score of 50. These results indicate that the initial abilities of students in the control class were relatively the same as those of the experimental class before being given treatment.

c. Comparison of Pretest Results

In general, the two classes had relatively close initial abilities. The experimental class obtained an average of 61.20, while the control class obtained an average of 59.20. This small difference in averages indicates that the initial conditions of the two groups were relatively balanced before the treatment was administered. This is consistent with the Two Group Pretest-Posttest design in your study, which uses a pretest to determine the initial abilities of both groups.

Table 11 Comparison of Pretest Results of Experimental & Control Classes

Class	Number of Students	Lowest Value	The highest score	Average
Experiment	25	50	75	61.20
Control	25	50	70	59.20

Based on the pretest data comparison table above, it is known that the average score for the experimental class was 61.20, while the control class was 59.20. The minimum score for both classes was 50, while the maximum score for the experimental class was 75 and the control class was 70. These results indicate that the initial abilities of students in both classes were relatively similar. Thus, both classes had fairly balanced initial conditions before being given the treatment in the study.

6. Posttest Results Student Learning After Using Clickable Hotspots Animation Learning Media

After the entire series of learning and treatments were implemented, the researcher then administered a final test (posttest) to students in class IV A as the experimental group and class IV B as the control group. The purpose of administering the posttest was to determine students' learning outcomes after participating in the learning process and to determine changes in learning outcomes compared to the initial abilities obtained through the pretest. In this study, the experimental group received learning using learning media with the Clickable Hotspots animation feature, while the control group received learning using conventional learning media. The use of different treatments for the two groups was carried out in accordance with the established research design. Through the posttest, the researcher was able to obtain data regarding the achievement of student learning outcomes after participating in the learning process in each group. The posttest was given to both groups using the same test instrument, namely five essay questions that measure students' cognitive abilities on the material "Forces Around Us". The posttest questions were given after the learning process was completed so that students could demonstrate the abilities acquired after participating in the learning. The results of the students' work were then examined and given

No.	Student Name	Pretest Score
1	ABRIZAN AL GHIFARI	60
2	ACHMAD MAHESYA ASIKIN	55
3	AFIFAH AULIA MAARIF	65
4	AINUN YUSHALLUUNA	50
5	ALIV RAMADI	70
6	ANGGI MOZA REZA	60
7	AYU Azzahra	55
8	CITRA NUR KIRANA	65
9	DHEA NOVKA RIZKY	60
10	FAIREL HABIBIE	75
11	FIRLIYA ENJELITA PUTRI	55
12	GISHELA ANANDA PUTRI ZEVANNYA	70
13	HERI KRISTOFAN	60
14	IZZI ROFIQOH	65
15	MAHESWARA HAFIDZ PRADIPTA	50
16	MAULANA ISHAK	60
17	MUHAMMAD AKBAR	55
18	MUKHAMMAD NAFFAL AR RAKHIM	70
19	NADIRA MIKAELA ZIANI	65
20	NAJWA TRIWILYA	60
21	RAKA TARAT AFARAT	55
22	RESTY FAIRUZ	65
23	SYAFA SALSABILLAH	60
24	TITIN SUPRIATIN	70
25	YULIANTI ZAHRO	55
Average		61.20

scores according to the predetermined scoring guidelines. Next, the posttest results for each group were presented to determine the highest score, the lowest score, and the average score obtained by students. The posttest data was then compared with the pretest results to determine any changes in learning outcomes in each group. Furthermore, the posttest results served as a basis for further analysis to determine differences in learning outcomes between the experimental and control groups.

a. Class Posttest Results Experiment

After the entire learning series was completed, the researcher administered a final test (posttest) to students in class IV A as the experimental class and class IV B as the control class. The posttest was given to determine students' learning outcomes after participating in the learning process. The instrument used was five essay questions that measured students' cognitive abilities on the topic "Forces Around Us." The posttest results for each class are presented in the following table.

Table 12 Posttest Results of Experimental Class

N o.	Student Name	Posttest Score
1	ABRIZAN AL GHIFARI	60
2	ACHMAD MAHESYA ASIKIN	65
3	AFIFAH AULIA MAARIF	60
4	AINUN YUSHALLUUNA	90
5	ALIV RAMADI	80
6	ANGGI MOZA REZA	80
7	AYU Azzahra	85
8	CITRA NUR KIRANA	80
9	DHEA NOVKA RIZKY	70
10	FAIREL HABIBIE	55
11	FIRLIYA ENJELITA PUTRI	95
12	GISHELA ANANDA PUTRI ZEVANNYA	95
13	HERI KRISTOFAN	60
14	IZZI ROFIQOH	80
15	MAHESWARA HAFIDZ PRADIPTA	90
16	MAULANA ISHAK	75
17	MUHAMMAD AKBAR	65
18	MUKHAMMAD NAFFAL AR RAKHIM	85
19	NADIRA MIKAELA ZIANI	80
20	NAJWA TRIWILYA	80
21	RAKA TARAT AFARAT	100
22	RESTY FAIRUZ	75
23	SYAFA SALSABILLAH	70
24	TITIN SUPRIATIN	90
25	YULIANTI ZAHRO	80
Average		77.80

Based on the table above, the posttest results of the experimental class show that from 25 students, the total score was 1,945 with an average score of 77.80. The highest score obtained by students was 100, while the lowest score was 55. These results indicate that after being given treatment using Clickable Hotspots animation learning media, the learning outcomes of students in the experimental class increased compared to the initial abilities shown through the pretest results. The posttest average of 77.80 also shows that the learning outcomes of students in the experimental class were higher than the pretest average of 61.20. Thus, the use of Clickable Hotspots animation

learning media provides an illustration of an increase in student learning outcomes after participating in the learning process.

b. Class Posttest ResultsControl

After the learning process was completed in the control class, the researcher gave a posttest to students in class IV B. The posttest was given to determine the students' learning outcomes after participating in learning using conventional learning. The posttest instrument consisted of 5 descriptive questions related to the material "Forces Around Us". The posttest results obtained from 25 students in class IV B are presented in the following table.

Table 13 Posttest Results of Control Class

No .	Student Name	Posttest Score
1	ADEVA NURMALIKA	70
2	AHMAD HAQIQI	75
3	AISYAH OUTRI FEBRIYANI	65
4	AKBAR MAULANA	80
5	ANJANI	75
6	ATHAYA NABHAN ZAHIRULHAQ	70
7	CEMPAKA AYU NENGSIH	85
8	DITO BASTIYAN	75
9	DWI NATA PRATISTA	70
10	FANI ALFARIA	80
11	FAREL SYAPUTRA	65
12	FENISHA	75
13	NUR KANIA	70
14	FINA FORTUNA	85
15	JION MEYMAR	80
16	MUFAIDA	75
17	MUHAMAD RIZAL	70
18	MUHAMMAD AL FURKHON	80
19	MUHAMMAD LUTFI MAULANA	75
20	NADIRA AZAHRA	65
21	NAJUAN ALFARIZI	70
22	NAZHAR AL ATHAS	75
23	REZKI FEBIANSAH	80
24	RINI WULAN FROM	70
25	SAELAN	75
Average		74.20

Based on the table above, the posttest results for the control class show that the average score obtained by students was 74.20. The highest score obtained was 85, while the lowest score was 65. These results indicate that the learning outcomes of students in the control class increased after participating in learning with conventional learning media. However, the average posttest results for the control class were still lower than the average for the experimental class.

c. Comparison of Posttest Results

Posttest results for both classes showed a difference in scores between the experimental and control classes. The experimental class, which received learning using the Clickable Hotspots animated video, had a higher average score than the control class. A comparison of the posttest results for the experimental and control classes can be seen in the following table.

Table 14 Comparison of Posttest Results of Experimental & Control Classes

Class	Number of Students	Lowest Value	The highest score	Average
Experiment	25	55	100	77.80
Control	25	65	85	74.20

Based on the table above, the posttest results show that the average score for the experimental class was 77.80, while the control class obtained an average score of 74.20. Thus, there is a difference in average scores of 3.60 points, with the average for the experimental class being higher than the control class. This difference indicates a difference in descriptive learning outcomes between students who received learning using the Clickable Hotspots animated video and students who received learning in the control class.

7. The Influence of Clickable Hotspots Animation Learning Media on the Learning Outcomes of Fourth Grade Elementary School Students

a. Descriptive Statistical Analysis

Descriptive statistical analysis was used to provide an overview of student learning outcomes in the experimental and control classes. The data analyzed included the minimum, maximum, average (mean), and standard deviation values for the pretest and posttest. The results of the descriptive statistical analysis can be seen in the following table.

Class	N	Min	Max	Mean	Standard Deviation
Experiment	25	0.800	1,000	0.400	0.381
Control	25	0.300	0.500	0.375	0.056

Table 15. Descriptive Statistical Analysis

Group	Test	N	Minimum	Maximum	Mean	Standard Deviation
Experiment	Pretest	25	50	70	61.20	6.66
Experiment	Posttest	25	55	100	77.80	12.25
Control	Pretest	25	50	70	59.20	5.72
Control	Posttest	25	65	85	74.20	5.72

Based on the table above, the average pretest score for the experimental class was 61.20, while the control class's score was 59.20. After the learning process, the average posttest score for the experimental class increased to 77.80 and the control class to 74.20. Descriptively, the average posttest score for the experimental class was higher than the control

class's.

b. TestAnalysis Prerequisites

Prerequisite analysis tests were conducted before hypothesis testing to determine the characteristics of student learning outcome data in the experimental and control classes. Prerequisite tests in this study included normality and homogeneity tests for pretest and posttest data.

1) TestNormality

A normality test was conducted to determine whether the pretest and posttest data in the experimental and control classes were normally distributed. The test was conducted using the Shapiro-Wilk test with the help of SPSS. Data were declared normally distributed if the significance value (Sig.) > 0.05.

Table 16 Normality Test Results

Tests of Normality			
Shapiro-Wilk			
Data	Statistics	df	Sig.
PretestExperiment	0.941	25	0.153
PosttestExperiment	0.958	25	0.374
Pretest Control	0.924	25	0.063
Posttest Control	0.924	25	0.063

Based on the table above, all pretest and posttest data have a significance value greater than 0.05. Thus, the learning outcomes data for students in the experimental and control classes are normally distributed.

2) TestHomogeneity

The homogeneity test was conducted to determine whether the variance of the values between the experimental and control classes had the same distribution or not. The homogeneity test in this study was conducted on pretest and posttest data using Levene's Test. The basis for decision making is if the significance value (Sig.) > 0.05, then the data is declared homogeneous. Conversely, if the significance value (Sig.) < 0.05, then the data is declared non-homogeneous. The results of the homogeneity test of the pretest and posttest data for the experimental and control classes are presented in the following table.

Table 17 Results of Homogeneity Test

Based on the table above, the homogeneity test results on the pretest data show a significance value of 0.475. This value is greater than 0.05 (0.475 > 0.05), so the variance of the pretest scores of the experimental and control classes is declared homogeneous. Meanwhile, the posttest data obtained a significance value of 0.006. This value is smaller than 0.05 (0.006 < 0.05), so the variance of the posttest scores of the experimental and control classes is declared not homogeneous. Thus, the pretest data meets the homogeneity assumption, while the posttest data does not meet the homogeneity assumption.

c. TestHypothesis

Hypothesis testing was conducted to determine the differences in student learning outcomes between the experimental class and the control class based on the pretest and posttest results. The testing was conducted using the Independent Samples t-Test because the study involved two different groups, namely the experimental class and the

control class. The decision-making criteria were if the Sig. (2-tailed) value < 0.05 then H_0 was rejected and H_1 was accepted, whereas if the Sig. (2-tailed) value ≥ 0.05 then H_0 was accepted and H_1 was rejected.

Data	<i>t</i>	<i>df</i>	Sig. (2-tailed)	information
Pretest	1,140	48	0.260	Not significant
Posttest	1,331	33,970	0.192	Not significant

Table 18. Hypothesis Test Results

Based on the table above, the results of the Independent Samples t-Test on the pretest data show a Sig. (2-tailed) value of $0.260 > 0.05$. Thus, H_0 is accepted and H_1 is rejected, so there is no significant difference between the pretest results of the experimental class and the control class. This shows that the initial abilities of the two groups are relatively the same before being given treatment. Furthermore, the test results on the posttest data show a Sig. (2-tailed) value of $0.192 > 0.05$. Thus, H_0 is accepted and H_1 is rejected, so there is no significant difference between the posttest results of the experimental class and the control class. Although the average posttest of the experimental class is 77.80 higher than the control class of 74.20, the difference has not shown statistically significant results. Thus, the use of Clickable Hotspots animation learning media shows an increase in learning outcomes descriptively, but based on the results of the Independent Samples t-Test, the increase has not shown a statistically significant effect at the 5% significance level.

d. Learning Outcome Improvement Analysis (N-Gain)

To determine the improvement in student learning outcomes after being given learning, an N-Gain analysis was conducted based on the pretest and posttest scores in the experimental and control classes. The N-Gain calculation was carried out by comparing the difference between the posttest and pretest scores with the maximum score that could be achieved after taking the pretest scores into account. The results of the N-Gain calculation in both classes were then analyzed descriptively to determine the minimum, maximum, average (mean), and standard deviation scores. The results of the N-Gain analysis for the experimental and control classes are presented in the following table.

Based on the table, the average N-Gain of the experimental class was 0.400 with a minimum value of -0.800 and a maximum of 1.000 and a standard deviation of 0.381. Meanwhile, the control class obtained an average N-Gain of 0.375 with a minimum value of 0.300 and a maximum of 0.500 and a standard deviation of 0.056. Based on the N-Gain interpretation criteria, the average N-Gain of the experimental class and the control class were in the medium category because they were in the range of 0.30–0.69. Descriptively, the average N-Gain of the experimental class was higher than the control class with a difference of 0.025. This shows that the increase in student learning outcomes in the experimental class was descriptively higher than the control class. However, based on the results of the

Independent Samples t-Test, the increase has not shown a statistically significant effect at the 5% significance level.

The research discussion is a section that explains and interprets the research results that have been obtained based on the data that has been analyzed. This study aims to determine the learning outcomes of students before and after using the Clickable Hotspots animation learning media, as well as to determine the effect of using the media on the learning outcomes of fourth-grade elementary school students on the science material "Forces Around Us". The study was conducted on fourth-grade students of SDN 1 Trusmi Wetan with a total of 50 students divided into class IV A as the experimental class and class IV B as the control class. Based on the results of the study, the average pretest score of the experimental class was 61.20, while the control class was 59.20. After the learning process was carried out, the average posttest score of the experimental class increased to 77.80, while the control class increased to 74.20. Thus, descriptively there was an increase in learning outcomes in both classes, with a higher average increase in the experimental class. However, based on the results of the Independent Samples t-Test, the increase did not show a significant effect.

1. ResultsLearners Before UsingClickable Hotspots Animated Media

Student learning outcomes before being given treatment can be determined through the pretest scores given to the experimental and control classes. Based on the analysis, the average pretest score for the experimental class was 61.20, while the average pretest score for the control class was 59.20. The difference between the two classes was 2.00 points. These results indicate that the initial abilities of students in both classes were relatively similar. This condition was also supported by the results of the independent sample t-test on the pretest scores, which obtained a significance value of 0.260. Because the significance value is greater than 0.05, there was no significant difference in initial abilities between the experimental and control classes. This relatively similar initial ability is important in experimental research because it can illustrate that both groups had relatively comparable initial conditions before being given treatment. Thus, changes in learning outcomes after learning can be compared based on the learning treatment provided. According to Yandi et al. (2023), learning outcomes are a reflection of students' level of understanding and mastery of the material after participating in a learning process. Furthermore, the relatively comparable initial conditions of the students indicate that the use of the Clickable Hotspots animation media in the experimental class was carried out on a group with relatively similar initial abilities as the control class. Thus, discussions regarding changes in learning outcomes after the treatment became more focused.

2. ResultsStudent Learning After Using Clickable Hotspots Animation Media

After being given learning treatment using Clickable Hotspots animation media, student learning outcomes improved. Based on the research results, the average posttest score of the experimental class reached 77.80, while

the control class obtained an average of 74.20. Thus, the average learning outcomes of the experimental class were 3.60 points higher than those of the control class. The increase in learning outcomes in the experimental class descriptively indicates that the use of Clickable Hotspots animation media can be one of the media that helps the learning process. This media combines animation elements with interactive features so that students not only see the presentation of the material, but can also interact with certain parts of the learning media. According to Arsyad (2019), learning media can help convey learning messages and stimulate students' thoughts, feelings, attention, and will so that the learning process can take place more effectively. Media that involve more than one sense can also help students understand the material presented. Furthermore, Munir (2020) explains that animated videos can present information dynamically so that abstract or difficult-to-understand material can be presented in a more concrete form. This is relevant to the science learning topic "Forces Around Us," because some concepts regarding forces can be more easily understood when presented through visualization of movement or animation. According to Sadiman et al. (2018), the use of animation accompanied by sound can attract students' attention and increase motivation in participating in learning. Interest in the learning display can make students more focused on the material being presented. In addition to animation elements, the media used in this study has a Clickable Hotspots feature. According to Mayer (2020), Clickable Hotspots are interactive points or areas in digital media that can be used to attract students' attention and direct focus to certain parts of the learning material. This interactive feature provides opportunities for students to be more actively involved during the learning process. Furthermore, according to Pribadi (2021), animated videos have the advantage of being able to be replayed according to students' needs. This condition allows students to repeat parts of the material that are not yet understood so that the learning process can be adjusted to each student's pace. Based on the description, the increase in the average learning outcomes of the experimental class from 61.20 in the pretest to 77.80 in the posttest can be descriptively attributed to the use of the Clickable Hotspots animated learning media. This media has visual, audio, and animation elements and interactivity that can help attract attention and provide a more varied learning experience.

3. The Effect of Using Clickable Hotspots Animation Media on the Learning Outcomes of Fourth Grade Elementary School Students

To determine the effect of using Clickable Hotspots animation media on student learning outcomes, this study used an independent sample t-test on the posttest scores of the experimental and control classes. The analysis results showed a significance value of 0.192. Because the significance value of 0.192 is greater than 0.05, it can be concluded that there is no statistically significant difference in learning outcomes between the experimental and control classes after being given learning. However, descriptively, the average learning outcomes of the experimental class were higher than those of the control class. The average posttest of the experimental class was 77.80, while the

control class was 74.20. The difference of 3.60 points indicates a tendency for better learning outcomes in the class that used Clickable Hotspots animation media. However, this increase was not statistically strong enough to be declared a significant effect. These results were further clarified through the N-Gain analysis. The average N-Gain of the experimental class was 0.400, while the control class was 0.375. Both values are in the moderate category. Thus, the improvement in learning outcomes in the experimental and control classes are both in the moderate category, although the average N-Gain value of the experimental class is slightly higher than the control class. According to Widiawati, Sujarwo, and Saptono (2025), N-Gain is used to determine the improvement in student learning outcomes based on a comparison of pre- and post-learning scores. An N-Gain value of 0.30–0.69 is included in the moderate category. Based on these criteria, an N-Gain value of 0.400 in the experimental class and 0.375 in the control class are included in the moderate category.

Theoretically, these results can be linked to Arsyad's (2019) opinion that learning media can help convey messages and increase student attention. The use of Clickable Hotspots animation media in this study provides a different form of material presentation than learning using conventional media. Furthermore, Munir (2020) stated that animated videos can help present concepts more concretely through dynamic visual displays. In science learning, the use of animation can help students see examples or processes related to the material "Forces Around Us". According to Mayer (2020), the Clickable Hotspots feature can be used as an interactive part of digital media to attract attention and direct students to specific information. This provides opportunities for students to interact with the learning material more actively. However, the results of statistical tests show that the use of Clickable Hotspots animation media in this study did not produce a statistically significant difference. This shows that the success of learning is not only determined by the use of learning media, but can also be influenced by various other factors, such as the initial abilities of students, student involvement during learning, learning time, classroom conditions, methods used by teachers, and individual factors of students. Thus, the results of this study provide an illustration that the use of Clickable Hotspots animation media has the potential to improve learning outcomes descriptively, which is seen from the average posttest and N-Gain of the experimental class which is slightly higher than the control class. However, based on the results of the independent sample t-test, the increase has not shown a statistically significant effect. Based on the overall results, it can be concluded that Clickable Hotspots animation media can be used as an alternative media for science learning to provide a more visual and interactive learning experience. However, its use needs to be supported by appropriate learning strategies and supportive learning conditions so that the benefits of the media can be more optimal.

4. Conclusion

Based on the results of research and discussion regarding the influence of the implementation of Clickable Hotspots animation learning media on the learning outcomes of

fourth grade students at SDN 1 Trusmi Wetan in the Natural Sciences subject with the material "Forces Around Us", the following conclusions can be drawn:

1. ResultsThe results of student learning before using the Clickable Hotspots animation media showed that the average pretest score of the experimental class was 61.20, while the average pretest score of the control class was 59.20. The average difference between the two classes was 2.00 points. Based on the results of the Independent Samples t-Test, the Sig. (2-tailed) value was obtained at $0.260 > 0.05$. Thus, H_0 was accepted and H_1 was rejected, so there was no significant difference between the pretest results of the experimental class and the control class. This shows that the initial abilities of students in both classes were relatively the same before being given treatment.

2. ResultsThe results of student learning after using the Clickable Hotspots animation media showed a descriptive increase. The average posttest score for the experimental class was 77.80, while the average posttest score for the control class was 74.20. Thus, there was an average difference of 3.60 points, with the average for the experimental class being higher than the control class. These results indicate that students who received learning using the Clickable Hotspots animation media obtained higher average learning outcomes than students who received learning using conventional learning media.

3. The effect of using Clickable Hotspots animation media on students' learning outcomes based on the results of the Independent Samples t-Test showed a Sig. (2-tailed) value of $0.192 > 0.05$. Thus, H_0 is accepted and H_1 is rejected, so there is no statistically significant difference in learning outcomes between the experimental class and the control class after being given learning. Although the average posttest of the experimental class is higher than the control class, the difference has not shown a statistically significant effect at the 5% significance level.

4. The improvement in learning outcomes based on the N-Gain analysis shows that the average N-Gain of the experimental class is 0.400, while the control class is 0.375. Both values are in the moderate category because they are in the range of 0.30–0.69. Descriptively, the average N-Gain of the experimental class is higher by 0.025 than the control class. This indicates that the improvement in student learning outcomes in the experimental class is slightly higher than the control class, but this increase has not shown a statistically significant effect.

Based on the overall research results, the Clickable Hotspots animated learning media has the potential to be used as an alternative learning media for science because it provides a more visual and interactive presentation of material. However, in this study, the use of Clickable Hotspots animated media has not shown a significant influence on student learning outcomes. Learning success is not only determined by the use of media, but can also be influenced by students' initial abilities, student involvement during learning, learning time, classroom conditions, methods used by teachers, and individual student factors.

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