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Motion Graphic Animation Videos to Improve the Learning Outcomes of Elementary School Students

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Abstract: The purpose of this study was to investigate the effectiveness of the development of motion graphic animation video media in Natural Sciences subjects in Elementary Schools. This study uses a type of Research and Development research with quantitative tests. This study employed the experimental research method involving 27 students in the control group and 27 students in the experimental group. This research was conducted on 5th-grade students in elementary school in 2 different schools. Data collection uses interview methods for preliminary studies, observations and tests to test the effectiveness of animated video media motion graphics. The results of the study showed that there were significant differences between the results of the learning achievement of the experimental group and the control group. As well as motion graphic animation video media, its effectiveness has been tested in improving student achievement, especially the experimental group. Hence, the interactive motion graphic media is effective to be used to improve the students' knowledge in the science subject of the fifth graders.

Keywords: *Motion graphic, animation video, learning outcomes, elementary school.*

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Introduction

Modern technology that is developing at this time began to affect aspects of human life extensively. Today, technology and social networking are a big part of human life from an early age to very old age (Kayimbasioglu, Oktekin, & Haci, 2016). Progress in the field of technology and information has encouraged people to improve their efficiency and effectiveness in everyday activities. The development of information sources that can be accessed anytime, anywhere, and anyone makes it easier for humans to obtain information. So, it can be estimated that in the future, technology will become an important part of human life. Not only is it a tertiary item, but it is one of the primary human goods in helping and increasing the effectiveness and efficiency of human activities. All aspects of life will use technology, including education.

Modern information and communication technology (ICT) is beginning to spread in all areas of human activities, including education, to improve the effectiveness and quality of teacher work (Hlasna, Klimova, & Poulova, 2017). The education system plays an important role in achieving the development of a nation, and the impact of early education is that it can empower knowledge acquisition (Kayimbasioglu et al., 2016). Education aims to provide people with the knowledge and skills needed in the time they are living (Gurbuzturk, 2018). With education, the community will gain knowledge and skills, so that it is expected to improve the welfare of individuals and communities.

Along with the changing paradigm of learning, the success of teaching and learning activities in elementary schools is not only determined by the teacher (teacher factor) but is strongly influenced by the use of instructional media and student activity. Technological advances in the 21st century require that children naturally grow in the arena of higher levels of information access (Huda et al., 2017). From an optimistic point of view, ICT has the potential to improve learning and teaching methods (Gellerstedt, Babaheidari, & Svensson, 2018; Eckhaus, & Davidovitch, 2019). Currently, in education, there is a transition to more interactive, interesting, and experiential learning methods in many countries (Anikina & Yakimenko, 2015). Teachers are required to be able to use the media available at the school. ICT must be

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adopted in a good pedagogical manner (Gellerstedt et al., 2018). The learning process begins to be changed from the teacher as the main material giver to become a teacher as a facilitator of classroom learning.

In the learning paradigm, students are positioned as subjects. Knowledge is not something ready, but a process that must be cultivated, thought about, and constructed by students, cannot be transferred to those who only accept passively. A teacher must maintain students' interest in learning, teach students to learn and develop their desire to learn, to find satisfaction in learning from the first lesson in their school life (Yakovleva & Goltsova, 2016). The activity of these students needs to be stimulated with interesting and meaningful learning (Cetinavci, 2019). The contents of the basic education program reflect life. Therefore, it must be based on real-life (Ucus, 2015).

Nowadays, teaching is in rapid technology and innovation development, but teachers do not explore to use ICT in their teaching activity (Shaban & Egbert, 2018). Teachers often use conventional learning media, namely lectures from both elementary (elementary) and even upper class (high school). As an example from the results of a preliminary study in one of the 5th grade elementary schools in Central Java, it was found that the learning material was delivered by making theoretical examples and sticking to the language of textbooks and using teaching aids drawn by the teacher on the board, still have not optimized student learning outcomes (Asrowi, Hadaya, & Hanif, 2019). Many students generally experience misinterpretations. Students fantasize and try to understand the theory of the teacher according to their understanding. If not anticipated, this will cause problems, where students will remember material that students interpret without knowing whether it is true or not.

And this is what will stick and become the learning outcomes of these students. Besides, teacher awareness of more modern learning media is underutilized in learning, making teachers feel comfortable in using learning methods that have been maintained. Although the existing infrastructure facilities at the elementary school are capable and suitable for supporting learning media. In fact, for technology to be integrated effectively, a professional development facilitator can answer the needs of teachers to understand why technological innovation can help them (Shaban & Egbert, 2018).

Based on the above problems, this study examines how to overcome the problems faced by teachers as a result of the impact of conventional learning or teacher-centered. The researcher began to develop a learning media product in the form of an interactive CD package containing animated videos that explained the subject matter. The reason is, the majority of students like to watch cartoons and animations, so the development of this learning video is directed at making animation. Animation video in the utilization now has various video formats that can be played by various electronic devices, such as a VCD player, computer, or and smartphone. It improved possibilities for further sharing and flexibility of the video media (van der Meij, 2017). Motion graphic is chosen since it has proven to attract the viewers by moving pictures. In short, motion graphic means moving picture because in the process of making the animation manipulated images sequentially, so it looks like moving. Motion Graphic is a medium operated using technology of animation to create the illusion of motion and usually combined with audio for use in multimedia projects for various purposes, such as a medium of learning (Wiana, Barliana & Riyanto, 2018).

In addition, animated videos also prevent students from getting bored, because animated videos are able to present a pleasant, humorous and relaxed atmosphere, but do not override material elements that are the main aspects (Naylor & Keogh, 2010). The above statement is strengthened by the results of research conducted by Akamca, Ellez, and Hamurcu (2009). The research contains the influence of learning in the Science class about the material "Classification of Living Beings" on how students understand the material and student learning outcomes. The researcher stated that using cartoon concepts in learning is one way to improve student learning outcomes and improve students' misconceptions about scientific phenomena. The concept of cartoons also triggers students to interact in the classroom. The results of the study indicate that using cartoon media has a positive effect on students 'scientific learning achievement and improves students' misunderstanding of learning material by encouraging students to interact socially.

In addition, the results of research on cartoon-based learning were put forward by Khalid, Meerah and Halim (2010). The study examined the views of physics teachers in Malaysia regarding the cartoon effects used in physics learning. The results of these studies indicate that more than 70% of teacher respondents have a positive view of the impact of cartoons in teaching and learning. The teacher sees that learning to use cartoon media can create a positive environment for students and can stimulate the imagination and creativity of students. Naylor and Keogh (2013) also stated that the use of cartoons in the teaching and learning process could be carried out in various situations, including creating a discussion environment and active participation of students. Students can construct their own knowledge of the material being taught. So that the student-centered learning class will be created. Based on some of the results of the above research, it is confirmed that the selection of cartoons is an alternative in solving learning problems found in the initial preliminary studies that have been carried out. So this study formulates a hypothesis, they are:

H_0: the group of students whose learning uses motion graphic animation video media is as effective as the student group without using motion video animation media.

H_1: the group of students whose learning uses motion graphic animation video media is more effective than the group of students without using animated video media motion graphics.

Methodology

Research Goal

This study uses a Research and Developmental (R & D) design. Research and Developmental design was chosen to explore and understand the development and use of motion graphic animation video media in elementary school learning. Three research questions, namely guide this research are:

Q1: What is the current learning process carried out by the teacher?

Q2: How was the process of composing learning animation videos developed?

Q3: Is motion graphic animation effective for learning in elementary school?

The main objective of this study is to determine the effectiveness of using motion graphic animation media to improve learning outcomes of elementary school students. Questions are carried out using quantitative analysis. It was done to determine the effectiveness of the use of motion graphic animation media.

Sample and Data Collection

The population of this study involved two schools in Sukoharjo, Central Java. The class taken in this population is 5th-grade elementary school. The class is taken because there are learning problems, especially learning Science subject that gets poor grades. The class is the final class where students at the next level will face the National Examination as a test for graduating from the Elementary School to the Middle School level. In this class, students are required to be able to master complex material and use more foreign terms in Science subjects. The sample consisted of two classes from two separate schools with a total of 54 students divided into 27 experimental groups and 27 control groups. Purposive sampling is used to select samples.

Before giving a treatment, the researcher divided the class that got the experimental group and the class that got the control group. The experimental group will get treatment in the form of using motion graphic animation video media in learning Natural Sciences. The control group does not get learning using motion graphic video animation media but uses 2D image media.

Instrument of Data Collecting

Data collection techniques used in the qualitative stage of the study are using interviews, field observations, and documentation. The researcher interviewed four teachers from and observed those two classes for two meetings. The researcher used unstructured open questions to get the information related to the need of learning media. The interviews are conducted with the teacher concerned to get information in the form of constraints faced by the teacher in carrying out learning practices in groups, student behavior in following learning in groups and solutions offered by the teacher in overcoming obstacles that arise in carrying out learning practices in groups.

Whereas observation is done by observing the practice of learning carried out by the teacher. This observation collects research data in the form of learning methods and media used by teachers as well as student interactions in learning. Next is documentation, which is useful for collecting information data about the facilities and infrastructure available in the School, as well as the results of student learning achievements obtained in participating in learning in groups.

5-scale Likert (poor, less, sufficient, good, and excellent criteria) questionnaire is also used in the developmental stages for gaining the content material and media experts validation on product developed. The questionnaire is to assess the quality of the product in form of qualitative conclusion based on the criteria given. The questionnaire result will be analyzed by converting quantitative scores to qualitative criteria. The researcher developed the 25 items in material validation in language, presentation and facilitation and video display aspects and 30 items in total for media expert validation on the aspect of media objectives, content quality, video display and linguistic, and the ease of video aspects. Thus, for the experimental stage, the data is gained by a test after the treatment of learning using motion graphic animation. The instruments used 30 multiple-choice questions. Furthermore, to test reliability the results are 0.662. While the r table is 0.3550 with a significance of 0.05. If r count> r table, then the conclusion is a reliable instrument

Analyzing of Data

The experimental data are analyzed by using SPSS 2.0 on the t-test and covariance. Before analyzing the data aggregated, to find out whether the data of the two groups have normal or abnormal distribution data, a normality test is required. Normality test using Shapiro-Wilk with criteria if the value of Sig. (2-tailed)> 0.05, then the data is declared to be normally distributed.

Table 1. Data Normality Test Result

Item	Group	p sig	Analysis
Pretest	Experiment	0,523	
	Control	0,473	Sig. (2-tailed) > 0,05
Posttest	Experiment	0,248	**Normal**
	Control	0,387	

Based on the results of the normality test in the table above, the value of Sig (2-tailed) pretest of the experimental group obtained a value of 0.523 in the control group scored 0.473. These results indicate that the experimental group had normal data distribution (p Sig> 0.05). In the experimental group, the results of the study achievement posttest got a value of 0.248, while the control group got a value of 0.387. In conclusion, both groups, both the experimental group and the control group, had normal student learning achievement data distribution.

In addition to testing the normal distribution of samples, it is also necessary to test similarities in the uniformity of the variance of samples taken from the same population. The homogeneity test aims to determine whether a variance of data from two groups, namely the experimental group and the control group is homogeneous (same). If the two group data variances are homogeneous, then the calculation of the Independent Sample T-Test will produce accurate data.

Table 2. Homogeneity Test Results

Item	Group	Based on Mean	Analysis
Pretest	Experiment Control	0,268	Based on Mean>0,05
Posttest	Experiment Control	0,902	**Homogenous**

Based on Table 2, in the pretest homogeneity test of the two groups, namely the experimental and control groups, the value Based on Mean was 0.07. Then, the pretest data of the two groups are homogeneous (based on Mean> 0.05). The same is shown in the homogeneity test results in the posttest of the two groups. In the posttest results, both groups showed the value of Based on Mean was 0.902. So, in the posttest results, the two groups are also homogeneous (based on Mean> 0.05).

Findings

Current learning process

The research location used in this preliminary study was at two schools in Sukoharjo city, they are State Elementary School of Mulur 03 and State Elementary School of Sugihan 01. The target of this study was students in fifth grade of Elementary Schools. Preliminary studies are conducted to obtain preliminary data regarding conditions in the field relating to the selection of products to be developed. The preliminary study collected data on the learning activities carried out, constraints faced, the use of facilities and infrastructure available in schools, and the results achieved by students in participating in the learning.

Based on the results of interviews, the teacher is still "comfortable" in his zone. The teachers are still happy to use the teacher-centered learning method only. The most important thing is that learning can work as usual. The facilities available at the school are quite adequate to apply learning media in groups, namely the availability of LCD projectors and school laptops. However, it seems that teachers have not been passionate and have not been enthusiastic in creating innovative learning processes that are different from usual.

The results of the preliminary study on learning activities in one of the Elementary Schools in Sukoharjo in science subjects are (a) The teacher still prioritizes conventional lecture methods and is assisted with teaching aids written by the teacher on the board. It is an obstacle to learning because it was found that many students were still misinterpreting and lacking understanding of Latin terms in the properties of light. In addition, when the teacher drew on the writing board, the students even cooled themselves behind, some played, joked with their friends, and even ran around in groups.

It is because when the teacher draws, no one pays attention to and conditions the students. The lag time when the teacher draws quite a lot, so students become bored and more interested in doing activities outside of learning; (b) Learning carried out by teachers is still not meaningful. It can be in line with the results of the methods of learning carried out by the teacher in the group, where students are only given makeshift theories and props in understanding theories that are generally dominated by foreign terms. At least the connection of subject matter with real-life makes students confused, bored and not even interested in the lesson. In this case, the student will try to connect the material itself with the understanding that he has gotten before. As a result, learning becomes passive, and students tend to be quiet in groups; (c) Teacher-centered. Because the learning method used is lecture and picture props, the information is

fully available to the teacher. Students only listen and understand what the teacher conveyed in the group. This causes learning to be teacher-centered.

The result of the preliminary study is assumed as the major factor of several problems, such as (a) Students become less motivated. The use of the lecture method, if collaborated with learning media that is interesting for students will make students become interested and feel motivated to learn more deeply. However, if most of the lecture methods are used and use teaching aids drawn by the teacher at the same time, the students become bored and feel uninterested in the lessons delivered; (b) Not concentrated on the lesson. This activity is seen during the lesson. When the teacher explains in front of the group, students become cool themselves with their friends, when the teacher draws illustrations of the characteristics of light in front of the group of students choose to do activities outside of learning activities, such as crowded in groups, playing and even running around in groups. (c) Less understanding of the teacher's explanation. Many foreign terms and theories that must be memorized make students confused. All of those problems are drawn from the result of the weekly report of students' score which mostly is under the passing grade. Coupled with the absence of concrete illustrations and media offerings that can attract students, making students more comfortable doing activities outside of learning and the impact is not concentrating on lessons that make students less aware of the lessons being taught.

In terms of facilities and infrastructure in schools, it is enough to support the use of learning media. The presence of LCD projectors, laptops and internet access provides a broad alternative in finding and utilizing learning media. However, the lack of competence in mastering information technology, especially for senior teachers, is a major obstacle in the use of learning media. Moreover, the senior teacher's mindset is more comfortable and relaxed in using the lecture method than learning to master information technology. Finally, in formative and summative tests, teachers begin to be confused with student learning outcomes that are under passing grade. From the results of the documentary review, in the material science subjects the nature of light, 30 students reached the minimum score, while the remaining still did not meet the established passing grade. It is an important concern in the teaching and learning process in groups.

The process of developing learning animation videos

The results of the preliminary study became the basic capital in the preparation of this product. After the results of the preliminary study are obtained, then the researcher collected the materials used for the preparation of the product. Materials for compiling products is in the form of learning materials, learning plans by teachers and syllabus that aim to produce products that are following the plans and learning objectives to be achieved by students, as well as images, music background and supporting animations used to compile animated learning media motion graphic. The motion graphic video is created by using Adobe After Effect software. That product preparation will produce an initial product called the product draft.

The initial product produced cannot be directly tested in the experimental group. The draft product should be first proposed to be validated, both media validation and material validation. From the results of the validation, the initial product will experience improvements in terms of the media and the learning material based on the assessment and advice from the validators who are teachers, external media, and material experts. Later, the initial product that has been revised according to the advice of the validator will be ready to be tested to assess whether the product developed is feasible to be tested for its effectiveness.

After going through the trial phase, new motion graphic video media can be used in learning. The trial phase includes 1) expert trials; 2) one-on-one trials; 3) small group trials; 4) limited trials. In the feasibility test by both experts, both media experts and material experts.

It was found that the results of the assessment of media experts obtained an average score of 4.5. These results indicate that the media developed in the category of decent and good in terms of media. The result of validation on the aspect of media objectives, content quality, video display and linguistic and the ease of video aspects, on average, the validators give a score of 4.5 or categorized as excellent. This score is also included in the feasible category and the initial media product is well developed and ready to use. In the material aspect, the two experts gave an average score of 4,7 in the aspect of language, presentation, and facilitation, video display aspects. After knowing the summary of values in each expert field, then combined and get a score of 4.6. The score shows the conclusion that the initial motion graphic video media product that has gone through the media feasibility test phase gets a good and feasible category to proceed to the next product trial.

Furthermore, the results of the assessment of one-on-one trials that have been carried out involving 3 samples of students obtain an average score of 84.25. The value is in the category of good and feasible. This one-on-one trial produces a record that can be improved for the implementation of learning using future motion graphic video media. The suggestion is the teacher's method should give a time lag for students to understand per part of the material presented in the video. Students who have difficulties in the material can ask questions and understand more deeply about the material that is considered difficult, assisted by the teacher's explanation in more depth.

The results of the assessment of the next trial were small group trials involving 9 samples of students obtaining an average score of 90.58. These results fall into the category of very good and feasible to continue. Like the previous trial, in this small group trial, there were suggestions for further improvement. These suggestions are by giving a problem to be discussed with students. It aims to see student feedback in understanding the material presented in the media. In addition, optimizing the problem training menu on the media by inviting students to discuss working on the questions given.

The results of the last product trial were field trials. This trial is the same as the previous trial. But the difference is that the number of samples is greater than the previous test. The samples needed in the trial in this study were 15 students. The results of the field trials obtained an average score of 83.09. These results fall into the category of good and decent. So, it can be concluded that from the three final product trials, the initial product of the media is feasible to be tested for its effectiveness. Originally called the initial media product, it has now become a final product that is ready to be implemented and tested for effectiveness in science learning in the fifth grade of elementary school on material of the properties of light. The samples' looks of the initial product are captured in Figure 1, Figure 2, and Figure 3 as below.

Figure 1. Main Menu

Figure 2. Description About Light

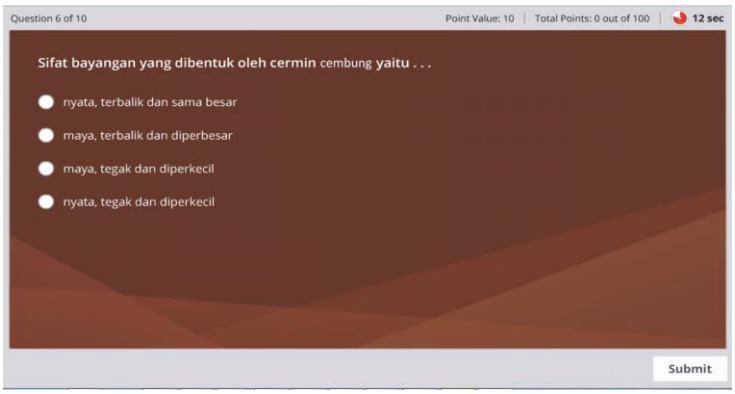

Figure 3. Practice Test

Motion graphic animation effectiveness for learning in elementary school

The learning of the experimental group using motion graphic video animation was carried out during 2 meetings. Each meeting takes 45 minutes per meeting every day. So that the total use of motion graphics video media as much as 90 minutes. The duration of the video displayed is 18 minutes per video. The teacher gives a problem related to learning material for discussion by students in groups. After that, students will be allowed to present the results of the discussion in front of the class. The use of motion graphics animation video media in this experimental group is expected to be able to attract students' interest and learning motivation. So the value of student learning outcomes will increase or better than the control group.

The data in this study were obtained from the initial data before the pretest treatment of the experimental group and the control group and the final data after the treatment (posttest) of the experimental group and the control group.

Experimental Group Pretest Data

The experimental group is a group that is treated (treatment) using animated video media motion graphic. Before the researcher gave treatment (treatment), the experimental group was given a pretest. The sample used to follow the pretest was 27 students who are given amount to thirty multiple-choice questions.

Table 3. Description of the Pretest Experiment Group Value

Mean	Median	Modus	Std. Deviation
50,59	50,00	40,00	9,951

Based on the table above, the mean value in the experimental group pretest results is 50.59, while the median is 50.00, the mode is 40.00, and the standard deviation is 9,951. It shows that the average experimental class does not meet the criteria for graduation. Treatment needs to be given so that the average score of the experimental group students increases and exceeds the specified graduation standard. The description of the results of the pretest scores of the experimental group is shown in the table below:

Table 4. Description of the Pretest Experiment Group Value

No	Interval	Absolute Frequency	Cumulative Frequency	Relative Frequency (%)
1	60 - 67	6	27	22,2
2	52 - 59	7	21	25,9
3	44 - 51	5	14	18,5
4	36 - 43	7	9	25,9
5	28 - 35	2	2	7,4
Total		27		100

The table above shows that the highest score obtained by students is 67, while the lowest value is 30. The most frequently occurring values are in the interval group 60-67, while the value of frequency of occurrence is rare in the interval group 28-35. The table above can be illustrated in the form of bar charts as follows. It is also necessary to test similarities in the uniformity of the variance of samples taken from the same population. The homogeneity test aims to determine whether a variance of data from two groups, namely the experimental group and the control group is homogeneous (same). If the two group data variances are homogeneous, then the calculation of the Independent Sample T-Test will produce accurate data.

Control Group Pretest Data

The control group is a group that is not treated (treatment) using animated video media motion graphics. In other words, learning uses conventional methods. The control group was also given a pretest before treatment. The sample used to follow the pretest was 27 students. While the questions given totaled thirty multiple-choice questions.

Table 6. Description of the Pretest Control Group Value

Mean	Median	Modus	Std. Deviation
48,28	47,00	40,00	8,071

Based on the table above, the mean value in the control group pretest results is 48.28, while the median is 47.00, the mode is 40.00, and the standard deviation is 8.017. It shows that the average control class does not meet the criteria for graduation criteria, such as the experimental group. The description of the results of the pretest scores of the experimental group is shown in the table below:

Table 7. Description of the Value of the Pretest Control Group

No	Interval	Absolute Frequency	Cumulative Frequency	Relative Frequency (%)
1	60 - 67	3	27	11,1
2	52 - 59	6	24	22,2
3	44 - 51	8	18	29,6
4	36 - 43	8	10	29,6
5	28 - 35	2	2	7,4
Total		27		100

Table 7 above shows that the highest score obtained by students is 63, while the lowest value is 33. The most frequently occurring values are in the interval groups 44 - 51 and 36 - 43, while the value of frequency of occurrence is rare in the interval group 28-35.

Experimental Group Post Data

After being given the treatment of learning by using motion graphic animation video media, the experimental group then made a post-test. Post-test results are the results of final student learning achievements. Questions given are a total of thirty multiple-choice questions.

Table 8. Description of the Pretest Experiment Group Value

Mean	Median	Modus	Std. Deviation
71,72	70,00	70,00	7,120

Based on the table above, the mean value in the control group pretest results is 71.72, while the median is 70.00, the mode is 70.00, and the standard deviation is 7.120. It shows that the average experimental class has met the criteria for graduation criteria. The description of the results of the pretest scores of the experimental group is shown in Table 9 below:

Table 9. Description of the Posttest Experiment Group Value

No	Interval	Absolute Frequency	Cumulative Frequency	Relative Frequency (%)
1	83 - 90	2	27	7,4
2	75 - 82	4	25	14,8
3	67 - 74	17	21	62,9
4	59 - 66	3	4	11,1
5	51 - 58	1	1	3,7
Total		27		100

The table above shows that the highest score obtained by students is 90, while the lowest value is 56. The most frequently occurring values are in the interval group 67- 74, while the value of frequency of occurrence is rare in the interval group 51-58.

Control Group Posttest Data

After being given the treatment of learning without using motion graphic animation video media or using conventional learning, the control group then performed post-test. Post-test results are the results of final student learning achievements. Questions given are total of thirty multiple-choice questions.

Table 10. Description of the Value of the Posttest Control Group

Mean	Median	Modus	Std. Deviation
65,67	63,00	60,00	6,703

Based on the table above, the mean value in the pretest results of the control group is 65.67, while the median is 63.00, the mode is 60.00, and the standard deviation is 6.703. It shows that the average control group has not met the graduation criteria standard.

Table 11. Description of the Value of the Posttest Control Group

No	Interval	Absolute Frequency	Cumulative Frequency	Relative Frequency (%)
1	74 - 81	2	27	11,1
2	66 - 73	11	25	40,7
3	58 - 65	12	21	44,4
4	50 - 57	2	4	11,1
Total		27		100

The table above shows that the highest score obtained by students is 80, while the lowest value is 50. The most frequently occurring value is in the interval group 58-65, while the value of frequency of occurrence is rare in the interval groups 50-57 and 74-81.

ANCOVA Test

ANCOVA Test is a combination of comparative and correlational tests. ANCOVA is used to compare dependent variables (Y), namely learning outcomes in terms of independent variables (X1), namely motion graphic animation video media while connecting dependent variables (Y) learning outcomes, with other independent variables (X2). Variable (X2) is used to predict the relationship between independent variables and dependent variables called covariance. By using ANCOVA, the role of independent variables with dependent variables, both through comparison and prediction, can be done simultaneously.

In this experimental study, the researchers tested the effectiveness of the treatment given. The treatment is said to be effective if there are differences in scores between pretest and posttest. The reference to covariance analysis is if the probability/significance value is < 0.05.

Table 12. Result Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	765.182[a]	2	382.591	8.817	.001	.257
Intercept	5301.298	1	5301.298	122.164	.000	.705
pretest	273.163	1	273.163	6.295	.015	.110
Group	393.464	1	393.464	9.067	.004	.151
Error	2213.133	51	43.395			
Total	257457.000	54				
Corrected Total	2978.315	53				

R Squared = .257 (Adjusted R Squared = .228)
Dependent Variable: posttest_result

Based on the ANCOVA test above, it can be seen that: corrected model shows a significance number of 0.001 <0.005. It indicates that the pretest and media motion graphics animation simultaneously have different effects on learning outcomes. Intercept shows a constant value with a significance of 0,000 <0,05 with the contribution of the treatment effect on learning outcomes by 70,5%. The pretest significance value indicates 0.015 <0.05, which means that the pretest has an impact on learning outcomes by contributing to the impact of pretest on learning outcomes by 11%. The control and experimental groups get a significance value of 0.004 <0.05, which means that both experimental and control groups have significant differences in learning outcomes.

Discussion and Conclusion

This research aimed to develop and prove empirically the influence of motion graphic animation video on students learning outcomes in science. This study also proves empirically the presence of the need for alternative media to help student in learning a specific subject. Based on the problems raised in the introduction above, is there a difference in learning outcomes between experimental classes using motion graphic animation media with control classes that use conventional methods, then the effectiveness of the use of motion graphic animation media in elementary schools is conducted. After hypothesis testing, the research shows that H_0 is rejected and H_1 is accepted, meaning that there are significant learning outcomes in the use of motion graphic video animation media in the experimental class.

Thus, the experimental group that used motion graphic animation video media in science learning group 5 elementary schools obtained better learning achievement results compared to the control group that did not use animated video motion graphic media on subjects in the 5 elementary school science group. The average score of the experimental group posttest is 71.72. The average posttest value of the control group was 65.67. The average difference between the two groups is 6.05. The increase in the value of the pretest results of the two groups before being treated until the

posttest results after being given treatment, the largest increase was obtained by the experimental group. The increase in the experimental group score was 21.11 and the increase in the control group was 17.40.

It indicates that the results of the increase in the score of the experimental group are greater than the increase in the control group score. Then it can be concluded that motion graphic video media is more effective than conventional learning. So the conclusion is the group of students who learn to use motion graphic animation video media is more effective than the student group without using motion graphic video media animation, The result supported the study of Wiana et al. (2018) which stated that selection of the right media will have an optimal impact on the use of the media used. The video used must match the characteristics of the students. Therefore, students become easier to understand the material presented using video media.

The existence of learning videos is intended to make the students easier to understand abstract materials. As revealed by Gellerstedt et al. (2018), animation media can make students understand the topics presented more easily. The animation media, as the alternative media for the students, provides a better experience for students. Especially if enriched with multimedia (picture, animation, music, sound), a video can motivate, attract and gather the students' attention (Yakovleva & Goltsova, 2016). It also in line with the study of Khalid et al. (2010) where the use of animation or cartoon made learning science, especially physics, more interesting and fun. The interactive display and exercise are features provided in animation. This feature has the purpose of drilling the depth of the students' knowledge of the material since the video can be replayed. In this study, physics as the one of science branch is effectively influenced by the use of video. The investigation of other branches of science such as biology and chemistry should be suggested.

The experimental stage results showed that the students who used the animation video obtained better learning outcomes than those who used textbooks. Compare to the 2D picture use in control group, the motion graphic is more effective. It was assumed from the feature of the video. An attractive package, containing animated videos and practice questions makes students learn while playing. As Naylor and Keogh (2013) stated that students would be more interested because the animation presented makes learning not monotonous. In addition, the material presented in the motion graphic animation video relates the material to the daily lives of students, so that students' thinking abilities will be adjusted to the material presented in the video

As the results of the meta-analysis carried out by Berney and Betrancourt (2016) revealed that animation is significantly more effective than static images in learning about factual and conceptual knowledge, and cognitive activities such as remembering, understanding and applying. So, based on the results of hypothesis testing carried out in this study, support the results of the research that has been stated above.

The use of Adobe After Effect is also interesting to be discussed. The use of other latest software in developing media in learning should be considered. In this study, the use of Adobe After Effect also has some challenges such as compatibility of video player, format, video size and length provided by the software system. The use of modern and up-to-date software or media such as online video animation developer can be used in further research (Anikina & Yakimenko, 2015).

Suggestions

This study examines the effectiveness of motion graphics animated video media in improving learning outcomes. The results of this study reveal that motion graphic video animation media has been shown to have a significant impact on students' achievement in the experimental group. The experimental group students became more active and concentrated in participating in learning. They also have increased understanding of the material by linking daily life so that students can easily understand and develop their knowledge optimally. The results of the increase in experimental student achievement have also experienced a significant increase compared to the control group. Teachers are supposed to develop active learning methods by combining motion graphic animation video or other media in their classroom activities.

Media of motion graphic video can be an alternative solution to the limitations of the textbook (printed) and other visualizations media. It is evidenced in the group using the interactive video had better learning outcomes compared to that using the 2D picture. Although the development of this motion graphic video has a positive impact, it should be remembered that to develop interactive teaching media must be based on the student learning needs. It needs to be executed so that the students can massively benefit from the use of video.

This study only measures the impact of motion graphic video in the knowledge aspect, while another aspect of learning outcomes such as skill, attitude and other standard achievements can be potential to be studied. The developed learning media is designed specifically in a limit sub competence so that, for further research, user satisfaction and other potential and challenges in the effectiveness of motion graphic video still can be deeply studied in other contexts and settings of participant.

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