

The Effectiveness of the Learning Video Assisted Discovery Learning on Science Learning Outcomes and Independent Characters of Students

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Abstract

Science is one of the most important subjects at every level of education. Based on initial observations at SD N Kandang Panjang 02 Pekalongan through interviews with science teachers, information was obtained that learning has not yet led to fostering student independence. This study aims to determine the effectiveness of learning video-assisted discovery learning on learning outcomes and student independence. This study uses a true experimental design research model in the form of pretest - posttest control group design. The Effectiveness of the Learning Video Assisted Discovery Learning Model on Science Learning Outcomes and Independent Characters of Grade V Elementary School Students. The research sample was a fifth-grade student, consisting of an experimental class and a control class with a total of 28 students in each class. The research hypotheses were tested using two-tailed t-test analysis. The results showed that the control class only got an average score of 30,93 while the experimental class only got an average score of 30,68. This means that the pretest scores of the control class and the experimental class have not yet reached the minimum completeness criteria. After teaching and learning activities were conducted using the discovery learning model assisted by learning video, the control class has obtained an average score of 76,46 and the experimental class has obtained an average score of 85,04. The student learning outcomes enhancement is shown by the normalized N-gain score of the experimental class students of 0,913 and the control class students of 0,838 that included in the high criteria. The percentage of discovery learning models assisted by Interactive Learning Videos, directing students to be more active and fun so they can build their knowledge. This research concludes that learning with discovery learning models assisted by interactive learning videos is effective in improving learning outcomes and student independence.

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INTRODUCTION

Natural science is a science that deals with how to find out the answers to the questions of what, why, and how natural phenomena are related to the composition, structure and properties, changes, and dynamics of nature (Widiadnyana et al., 2014). Science is one of the most important subjects at every level of education. Science learning in elementary school does not pay too much attention to the process because it pays more attention to the products produced (Putrayasa et al., 2014).

The results of the initial study at SDN Kandang Panjang 02 Pekalongan City showed that there were several science problems faced by students, including low independence and student learning outcomes because teachers did not train students to think critically at high levels. Teachers usually use some teaching models which lack innovation. The low motivation of students to learn because the learning model applied is less varied. Students are asked to work in groups occasionally, they still often rely on clever friends. Learning time is dominated by teacher activities, so students rarely ask questions and are less enthusiastic. It was found that the fifth-grade elementary school teacher had problems with science learning outcomes which had a low average, caused by each teacher using the lecture method and being less innovative in learning. It is shown that there are still many students who get scores below the Minimum Completeness Criteria (KKM). Of the 72 students there are still 42 students or 53.84% of the total students who have not been able to understand science subjects, the remaining 30 students or 43.58% of students have understood and the score has reached the KKM. This is also due to a less innovative learning model.

According to the researcher, the innovative learning model that is appropriate to use is the discovery learning model. The Discovery learning model is a discovery-focused learning model that is closely related to the science process skills of students learning critical thinking and finding skills to acquire knowledge. In addition to using the discovery learning

model, researchers also use audiovisual-based learning media. The learning media in question is a learning video that supports learning materials. Learning Science Physics with the help of interactive learning video can increase student interest and learning outcomes (Widiyatmoko, 2012).

This study aims to determine the effectiveness of the discovery learning model in improving learning outcomes and student independence in science learning. The benefit of the research is that it provides useful scientific contributions in the world of education regarding the effectiveness of the video-assisted discovery learning model on learning outcomes and students' independent character in science subjects. The discovery learning model can increase students' knowledge of the Water Cycle material through discussions with group friends and increase students' independence and enthusiasm in the science learning process.

METHODS

This research is a quantitative research with experimental method. (Sugiyono, 2004) mentions that the research design using quantitative research methods based on the philosophy of positivism, is used to examine certain populations or samples, data collection uses research instruments, data analysis is quantitative/statistical, intending to test predetermined hypotheses. This research used a true experimental design with a shape pretest-posttest control group design..

The research activity was carried out from March 19, 2020, to April 15, 2020, with research subjects for class VA and VC, at SDN Kandang Panjang 02 Kota Pekalongan. The type of research used is experimental research.

This research method is experimental. The experimental research sample has two groups selected randomly. The first group was given treatment (X) and the other group was not. In the actual study, the effect of treatment was analyzed by different tests, using a statistical t-test.

In this study, the population was all grade IV students of SDN Kandang Panjang 02 Pekalongan as many as 81 students in the 2019/2020 school year. The sample was determined by using a probability sampling technique of simple random sampling type, it is the taking of sample members from the population was carried out randomly without regard to the existing strata in the population. Because the research design requires the same conditions during the experimental process, randomization or randomization is carried out by taking into account the following considerations: (1) elementary schools that have large parallel classes, (2) almost the same number of students, (3) the same environmental conditions, (4) The learning facilities are relatively the same, (5) learning outcomes ability and the KKM is relatively the same. The samples in this study are: (1) The experiment class uses VA class with 28 students, (2) The control class uses VB with 28 students.

Student analysis was conducted to determine the characteristics and environment of students. For this purpose, the researchers conducted a pre-survey by directly asking several students in the class that was the test class for the learning model. While the characteristics of students related to academic abilities and activities in the classroom, the researchers asked the classroom teachers and observed the learning directly in one meeting. The results of the pre-survey obtained information that: (1) students are used to just waiting for the teacher's explanation, so that student activity in learning is still low, especially related to the character of student independence; (2) students are less enthusiastic and less attentive during the learning process; (3) students are not used to constructing their own knowledge.

The independent variable in this study is the learning model, namely the discovery learning model. The dependent variable is the variable that is influenced or that is the result of the independent variable. The dependent variable in this study is the student's learning outcomes and independent character.

This study will use several data collection techniques used to obtain data from the field. The techniques used are tests, interviews, observations, and questionnaires. The test has been given twice, namely the pretest and the posttest. The pretest questions were given before the treatment and the posttest questions were given after the treatment. The interviews are a data collection technique while the researcher wants to conduct a preliminary study to find problems that must be investigated, and also if researchers want to know things from respondents who are more in-depth and if the number of respondents is small.

The questionnaires are a data collection technique that is conducted by giving some questions or written questions to be answered by respondents. This study used the questionnaires to find out the students learning independently. In this study, the researcher used the Likert Scale to measure the student's ability. By using the Likert Scale, the measured variable is spelled out to the aspect, the aspect is spelled out to indicators, and the indicators are spelled out as a starting point to make the question for the research instrument item (Sundayana, 2014).

There are two kinds of research instruments, namely learning implementation instruments and data collection instruments. The learning implementation instrument is the instrument that is used during the learning process in the form of a learning device. The data collection instrument is the instrument used to obtain the posttest final result data. The instruments for implementing this learning are the syllabus, lesson plans, teaching materials, and student worksheets (LKPD). The learning implementation instrument in this study has been validated by experts in the field to obtain data on the feasibility of the instrument before being applied to the control class and experimental class. Prior to the trial, the instrument was validated by experts. The data collection instruments in this study consisted of non-test instruments and test instruments. In this research, the non-test instrument in this study was the student's independent character observation sheet during the learning process

using the discovery learning model assisted by the learning video.

This non-test instrument was validated first and validated by experts. After being validated by the instrument of the student's independent character observation sheet, it was then used in the implementation of learning in the experimental class by using the discovery learning model assisted by the learning video. The test instrument in this study is a matter of evaluation which is used to measure students' cognitive learning outcomes. The test is given once, namely the posttest. A post-test was given to the experimental group and the control group after receiving treatment in the implementation of the research, the results of which will be analyzed to answer research problems.

Learning with the learning video-assisted discovery learning model of interactive learning is said to be effective if student learning outcomes after learning with the learning video-assisted interactive learning discovery model are better than before the treatment (Sugiyono, 2010). The difference test in the average increase in learning outcomes aims to determine whether the experimental group's student learning outcomes are better than the control group's learning outcomes. Analysis of learning outcomes using the normalized test (N-gain). The increase that occurs before and after learning is calculated by the g factor formula (N-gain).

RESULTS AND DISCUSSION

Based on the results of initial observations carried out at SD Negeri Kandang Panjang 02, the researchers concluded several problems faced by students, namely: (1) low independence and student learning outcomes because teachers did not train students to think critically at high levels. This kind of learning results in less optimal students using high-level critical thinking skills in solving the problems they face; (2) teachers still lack to use innovative models in teaching. The low learning motivation of students because the learning model applied is less varied; (3) in working on assignments in

groups, students still often rely on smarter friends; (4) Lack of innovative learning media to support and teachers are less than optimal in the use of teaching aids.

The results of the pre-survey of students obtained information that: (1) students are used to just waiting for the teacher's explanation, so that student activity in learning is still low, especially related to the character of students' independence; (2) students are less enthusiastic and less attentive during the learning process; (3) students are not used to constructing their knowledge.

The material analysis aims to identify the main materials that will be studied by students. The material of the water cycle includes evaporation, condensation, and respiration on the water cycle on earth and the impact of the water cycle on events that occur on earth. The learning carried out seeks to make students able to have an overview of the water cycle and make the material into something fun. Especially for elementary school students, where independence is one of the most valuable provisions for students in facing global competition in the future. Based on the needs analysis, there is a need for research on the learning process using a discovery learning model assisted by learning video.

Preliminary research results indicate that it is necessary to develop a learning model that is following existing needs. According to the researcher, the innovative learning model that is appropriate to use is the discovery learning model. The discovery learning model is a discovery-focused learning model that is closely related to the science process skills of students learning critical thinking and finding skills to acquire knowledge. The discovery learning model is a learning model where students themselves find and investigate the concept of a material so that the results obtained will be long-lasting in memory and not easily forgotten by students (Suryosubroto, 2009).

The limited-scale trial in this study was carried out to obtain some information about student responses from observers regarding the learning process using discovery learning models

assisted by learning learning video. The limited-scale trial also aims to gain some better learning tools before being applied to large-scale trials. This simulation class looks at the readability of the device which was calculated using a questionnaire given to students.

In a limited-scale trial, the data were collected in the form of student learning outcomes after they have done for the learning process using the discovery learning model assisted by learning video. Students' cognitive learning outcomes are presented in Table 1.

Table 1. Data of Pretest and Posttest Values for Limited Trial Group

Source Variance	Pretest Score	Posttest score
Average	24.92	78,80
The highest score	32	90
Lowest Value	18	68
variance	10.43	21.38
Standard		
Deviation	3.23	4.62
Completeness	0%	88%
N-Gain	-	0.878
Criteria	-	tall

The pretest scores shown in Table 1 show that the initial ability of students in the limited trial class has not yet reached the criteria for maximum completeness with an average value of only 24.92. Then teaching and learning activities were carried out using the discovery learning model with the help of learning video to find out how much the increase in student learning outcomes on the material of the water cycle in life. The value of learning outcomes after the discovery learning model-assisted learning video activities is 78.80. From the results of the pretest and posttest, the N-Gain value of 0.878 was obtained which was included in the high criteria. The results of learning mastery in the limited trial class are 88%, so it can be concluded that the limited trial class has achieved learning mastery.

The independence questionnaire and student responses were also tested for reliability using the r11 formula (Cronbach Alpha). In the

independence questionnaire, the value of r11 (Cronbach Alpha) is 1.092, while the rtable value is at = 5% with n = 24, which is 0.404. Because $r_{11} > r_{table}$, it can be concluded that the independence questionnaire is reliable.

In the student response questionnaire, the value of r11 (Cronbach Alpha) is 1.092, while the rtable value is at = 5% with n = 24, which is 0.404. Because $r_{11} > r_{table}$, it can be concluded that the independence questionnaire is reliable.

Multiple-choice tests are used to measure student learning outcomes after participating in learning. Interpretation of test results with multiple-choice learning is based on the number of items that can be answered correctly by students. Before being used to collect data, the instrument for understanding the concept was tested on students who had studied the material, namely in class VI, totaling 72 students. Based on these results, it was obtained input for the validity of the questions, the level of difficulty, the power of difference, and the reliability of the questions which were then taken into consideration by the researchers to make revisions to the questions.

After calculating the validity of each item on the multiple-choice test, it is calculated using the biserial point correlation formula and then consulted with t-table with $dk = k-2 = 70$, = 5% obtained t-table = 1.6669. Based on the analysis of the results of the test items on the multiple-choice test, 33 valid questions were obtained, namely numbers 2, 3, 4, 6, 8, 9, 11, 12, 13, 14, 17, 18, 20, 21, 23, 25, 27, 28, 29, 31, 32, 34, 36, 37, 39, 40, 41, 43, 44, 45, 47, 49, 50. The complete calculation is in appendix 14. Further revisions are made to the question, Then a test was conducted to measure the content aspect through a written test in the form of multiple-choice questions, only 30 questions both before and after learning activities.

Learning using the discovery learning model in this study using the help of interactive learning video is a learning tool that combines and synergizes all media consisting of text, images, animations, graphics, narration, and interactivity programmed based on learning theory, thereby further increasing absorption and

students' interest in the subject matter. Learning using the discovery learning model in this study using the help of interactive learning video is a learning tool that combines and synergizes all media consisting of text, images, animations, graphics, narration, and interactivity programmed based on learning theory, thereby further increasing absorption and students' interest in the subject matter (Suh, 2011). Learning interactive learning video contain somatic, visual, audio, intellectual elements through pictures, learning videos, audio, games, learning instructions, and commands to carry out activities that support learning (Rahmawati, 2016). Tutorial-based interactive learning video media are created and used to help students understand the learning process in class and outside the classroom (Ys & Nelmira, 2019). The learning media in e-modules are presented by text, images, games, and animations, precisely and clearly, so that students can easily learn and understand computer system material classroom (Putra et al., 2017).

This learning video is interactive and innovative media, so it can be used by students for independent study or by teachers in delivering subject matter in class so that there is an influence between the use of interactive learning media and student learning outcomes (Sahronih et al., 2019). Interactive learning video-based learning media is suitable for use in learning (Nurdiana et al., 2018). Active involvement of students in training can increase retention, make learning run smoothly, and enable students to apply concepts or skills to new situations (Trianto, 2007). The use of appropriate learning media is one of the efforts so that students get a concrete picture of the concepts that must be understood (Hayumuti, 2016).

This research was conducted using two samples, the experimental class with discovery learning model learning on learning video-assisted interactive learning and the control class with discussion model learning. Student learning outcomes are obtained from test scores in accordance with the indicators of learning activities and have gone through a validity test.

Student learning outcomes after the research can be seen in Table 2.

Table 2. Study Results of Research Samples

Source	Experimental Group I		Experimental Group II	
	<i>Pretes</i> <i>t</i>	<i>Posttes</i> <i>t</i>	<i>Pretes</i> <i>t</i>	<i>Posttes</i> <i>t</i>
Average	30.93	76.46	30.68	85.04
The highest score	40	87	42	93
Lowest Value	20	67	20	73
variance	39.77	22.11	34.97	22.99
Standard Deviation	6.31	4.70	5.91	4.79
Completeness	0%	93%	0%	100%
N-Gain		0.838		0.913
N-Gain Criteria		High		High

From Table 2, the pretest value for the control class only obtained an average value of 30.93 while the experimental class only obtained an average value of 30.68. This shows that the pretest scores of the control class and the experimental class have not yet reached the minimum completeness criteria (KKM). After teaching and learning activities were carried out using the discovery learning model assisted by learning video, the control class obtained an average score of 76.46 and the experimental class obtained an average score of 85.04. The use of media that supports children's learning will further help stimulate understanding in children (Rahmawati, 2016). Interactive learning video can be said to be very effective in learning when used in conjunction with discovery learning models. The application of learning using discovery learning models can improve critical thinking skills and student learning outcomes (Rahayu et al., 2019). Research result Fitriyah (2017) also stated that there was an effect of the use of discovery learning models on mathematics learning outcomes on the subject of the Matrix (Fitriyah et al., 2017).

Improved learning outcomes in the control class and experimental class were obtained from the analysis results using a normalized gain score. The results of the N-gain analysis in the control class resulted in an average achievement of 0.838 with high improvement criteria. The results of the N-gain analysis in the experimental class resulted in an average achievement of 0.913 with high improvement criteria. This shows that there is an increase in students' critical thinking skills that are high after the discovery learning model-assisted learning video learning is implemented. The percentage of classical learning completeness for the control class is 93% and the experimental class is 100%. So it can be concluded that control class and experimental class with the discovery learning model assisted by learning video have been able to achieve classical learning completeness (Sahronih et al., 2019). Student activities during learning with the discovery learning model can be said to be very well with average student learning outcomes included in the very good category (Siti Hajar & In'am, 2017). The results of the same study were also stated by Susanti (2016) which states that there is an influence from the discovery learning model on scientific abilities and student learning outcomes (Susanti & Jamhari, 2016).

Student learning outcomes from the control class and the experimental class were used to conduct a t-test to determine the difference in the value of student learning outcomes from the control class and the experimental class. From the results of the t-test, it was obtained t-count of 9.59 with t-table of 2.00 so it can be concluded that the student learning outcomes of the experimental class are better than the control class. The magnitude of the influence of the learning model used to improve students' critical thinking skills on student learning outcomes was determined through the Product Moment test. In the experimental class, the learning model of discovery learning assisted by interactive learning video has an effect of 70.69% on student learning outcomes and the remaining 29.31% is influenced by other factors. From

these results, it can be concluded that the effect of the use of discovery learning models assisted by interactive learning video affects student learning outcomes. Interactive learning with all its advantages can increase interest and motivation which is high and has a big impact (Aripin, 2017). The interactive learning video usage can increase the active role and learning outcomes of students (Wahyuni & Kristianingrum, 2008).

The effectiveness of the use of interactive learning video is indicated by a significant difference in the learning outcomes of students who use interactive learning video with students who do not use interactive learning video (Romadhoni et al., 2017). Learning video have proven to be very helpful in discovery learning because they make learning more practical and effective (Maulana, 2017). Interactive learning video are very effective in improving student learning outcomes (Ambarwati, 2013). Overall the effectiveness assessment of the Interactive learning video has a very good level of effectiveness to use (Wijaya & Tanjung, 2017).

Mastery learning was measured using a pretest given at the beginning of the study, and a posttest given at the end of the study. According to (Mulyasa, 2004) the success of the class can be seen from at least 85% of the number of students in the class who have achieved individual mastery. From the calculation of the classical learning mastery test, the results obtained where the learning mastery in the experimental group II and experiment I was 100% and 92.9%, respectively. From these results, it can be said that the experimental group and the control group have achieved mastery learning because the results are more than 85%. Learning outcomes have increased after the teacher uses audio-visual media. The increase in learning outcomes is also followed by an increase in the absorption of students in receiving lessons and an increase in the percentage of Minimum Completeness Criteria (KKM) (Purwono, 2018). Interesting learning materials and media preparation for students can improve student learning mastery. Discovery learning models assisted by interactive learning

video usage can increase the student interest in learning so that student learning outcomes also increased (Dwi Ariani et al., 2014). Discovery learning model and learning interest affect students' science learning outcomes (Putrayasa et al., 2014). The significant influence between learning outcomes and critical thinking skills of students who carry out learning with the discovery learning model (Prasetyo & Kristin, 2020). Learning using the thematic learning model based on discovery learning can help students be active, build the courage to do an experiment/experiment, and build the ability and confidence to evaluate their knowledge (Estiwi et al., 2015).

The t-test was used to test the average student learning outcomes and interpreted that the discovery learning model assisted by interactive learning video that has been applied was effective and successful in improving student learning outcomes. Many factors affect learning outcomes. One of them is the learning strategy applied in the presentation of the teaching and learning process. The percentage of discovery learning models assisted by interactive learning video directs students to be more active and fun so they can build their knowledge. Groups of students with discovery learning models have better learning outcomes than groups of students with learning in general (Ramdhani et al., 2017). The use of discovery learning models is more effectively used in grade 3 SD Gugus Mawar Suruh compared to the use of problem-based learning models in grade 3 SD Gugus Mawar Suruh (Astari et al., 2018).

Learning with discovery learning models assisted by interactive learning video is also expected to improve the character of students' independence. Based on the research data, it was obtained that students had a good or positive attitude of independence after learning with an average independence's positive attitude of 80%. Its shows that learning with the discovery learning model assisted by interactive learning video that has been done was able to increase students' high independence attitudes. According to them, after participating in this learning activity they better understand the

concepts of the water cycle in particular and can increase their self-confidence so they can do various things independently. The interactive video used in learning economics subjects has been proven to get a positive response by students and is effective in improving student learning outcomes (Kusmaryono, 2015). Nurrohmi's research in 2017 on students concluded that the use of discovery learning models was able to improve student's critical thinking skills so that students could carry out learning independently (Nurrohmi et al., 2017). The discovery learning model in biology practicum is proven to be better in improving scientific ability than conventional models (Bahtiar & Dukomalamo, 2019). Kandiawan who researched the interactive video usage in French learning also stated that the impact of using this interactive multimedia was able to improve students' language skills (Kandiawan, 2017).

Students stated that after participating in this learning activity they better understand the concepts of the water cycle in particular and can increase their self-confidence so they can do various things independently. Its shows that student's responses to the use of interactive learning video-based learning media get a great response (Suprpta et al., 2018). Technology usage such as electronic learning in the experimental class can significantly improve students' independent learning abilities compared to the control class (Akgündüz & Akinoglu, 2017). Learning using interactive learning video makes students very active so that their learning outcomes will increase (Romadhoni et al., 2017). The development of interactive learning video-based teaching materials has proven to improve learning outcomes and student activity during the teaching and learning process (Warkintin & Mulyadi, 2019). Interactive learningvideo used in learning have proven to be very practical and effective in improving student learning outcomes (Annisa, 2013).

CONCLUSION

Learning with discovery learning models assisted by interactive learning video has been proven to improve student learning outcomes. It is evidenced by the N-Gain value in the experimental class of 0.913 with high improvement criteria. The experimental class learning mastery is also expected, namely being able to reach a percentage of 100% with an average value of 85.04. Discovery learning model learning assisted by interactive learning video has an effect of 70.69% to improve student learning outcomes and independence. The student's responses in learning discovery learning models assisted by interactive learning video are 85% giving a positive response to learning.

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