Berkala Ilmiah Pendidikan Fisika
ISSN : 2337-604X (print)
ISSN : 2549-2764 (online)

Vol 10 No 1 2022
https://ppjp.ulm.ac.id/journal/index.php/bipf
page 119-125

Students' Analytical Thinking Skills through Tutorial Video Assisted Inquiry Approach on Direct Current Electricity Grade XII Senior High School

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DOI:10.20527/bipf.v10i1.12404

Received: 20 December 2021 Accepted: 17 May 2022 Published: 22 May 2022

Students' analytical thinking skills are still lacking, causing students' understanding of physics lessons to be less than optimal. The research was conducted to examine the effectiveness of direct current electric video with an inquiry approach to students' analytical thinking skills and student responses to the video. The research method applied in this research is quasi-experimental with the research design of Nonequivalent Control Group Design. The sampling technique is purposive sampling data collection techniques using analytical thinking skills tests and questionnaires to video tutorials responses. The data analysis technique uses parametric quantitative analysis. The results of the analysis of hypothesis testing on the data of analytical thinking skills that had been carried out showed that the video tutorial learning media has not been effective in improving students' analytical thinking skills, while the results of student responses to direct current electric video tutorial learning media obtained a percentage of 70.67% and classified as good category. Students' analytical skills require more intensive practice and challenging routine assignments. Students' interest in the tutorials provided can only increase motivation to be involved in learning. The implications of this research can focus on innovative video tutorials on contextual physics experiments in life and more challenging experiments.

Keywords: Analytical Thinking Skills; Direct Current Electricity; Video Tutorial

How to cite: Amelia, N. V. S., Susilawati, S., & Poernomo, J. B. (2022). Students' analytical thinking skills through tutorial video assisted inquiry approach on direct current electricity grade xii senior high school. *Berkala Ilmiah Pendidikan Fisika*, 10(1), 119-125.

INTRODUCTION

Students' activeness in the learning process is expected to hone students talents and skills. An active learning process needs to be supported by various factors: the means/media to convey information to students (Kumala, Fihris & Poernomo, 2020). Learning media are various kinds of things that can transmit information to achieve effective and efficient learning (Bani & Masruddin, 2021; Sumarmi, Bachri, & Irawan, 2021). According to Miarso, learning media are all things that aim to transfer material that can stimulate the mindset, learning motivation, and feelings of students in participating in learning activities (Muheri, 2016). Learning media is related to everything that can be used to provide information and stimulate students' thinking, enthusiasm for learning, and feelings.

Physics is included in the family of natural sciences based on observations

of natural events. In learning physics, students need to observe an event to build concepts and practice their scientific skills (Lestari & Diana, 2018). The concepts and skills acquired by students can be a provision for students when they grow up. One of the skills students need to have is analytical thinking skills because these skills can help students understand learning materials (Winarti, 2015).

The pandemic period engulfing the world impacts all sectors, especially education. The implementation of learning during the pandemic is conducted online by utilizing various applications such as *Whatsapp, Zoom, Google Meet, Google Classroom,* etc (Anugrahana, 2021). The implementation of distance learning certainly has obstacles that can hinder the learning process, one of which is in learning physics. Physics learning that requires direct observation in the laboratory cannot be done, and this causes students' skills in analyzing not to be honed.

Difficulties in learning to use online media applications in the field include teachers' limited time and creativity in designing information technology-based media. In addition, students still experience limitations in operating media and incomplete infrastructure. If online learning, especially online practicum, is assisted by tutorials in the form of practicum videos, demonstrations can be represented with the help of practicum videos. Learning with video-assisted online media makes physics lessons easier.

The results of interviews conducted with one of the teachers at senior high school SMA Kotawaringin Barat Regency said that students were given material, sample questions, practice questions, and observations independently during the learning process. It becomes monotonous if done repeatedly; therefore, the teacher needs to prepare a fun and effective learning implementation plan for students. Unstructured interviews were also conducted with students at senior high school SMAN 1 Pangkalan Banteng using google form media. According to the interviews submitted to class XII nature science program 1 and nature science program 2, 70.71% of students stated that they did not understand and understand physics lessons; 61.01% of students stated that the atmosphere of learning physics tends to be boring. Students convey messages so that the implementation of physics learning is more innovative, active and communicative and explains the material in more detail. This is the same as the results of research which show difficulty in solving problems and low student learning activities (Bani & Masruddin, 2021).

The video tutorial media was chosen because it combines audio (sound) and visual (image) in one container (Yunita & Wijayanti, 2017). Another advantage of video tutorial media is that it can present events or events that cannot be observed directly (Kurniawan, 2016). Aplikasi learning packaged in inquiry learning can improve student learning experiences (Nyeneng, Agesta & Maulina, 2021).

The analytical thinking skills measured include five core indicators of analytical skills such as observation, hypothesizing, applying concepts, analyzing and concluding. Observation is the process of students observing the main points that become problems in an event. Hypothesizing is an activity to predict the outcome of a problem with a personal opinion based on the concept that has been conveyed—applying the concept as a student's process in solving a problem based on the physics concept obtained. Analyzing is a student's process of connecting the points obtained and making solutions from the relationship of these points. Concluding

as a student's process in explaining the relationship between the results obtained with the accepted theory, then formulating the experimental results briefly. In this study, the results of students' analytical skills were disclosed through an inquiry approach assisted by direct current video tutorials. This study aimed to analyze the description of analytical thinking skills after getting a direct current electric tutorial video.

METHOD

The research method used is an experiment with a quasi-experimental research design. The form of research that is applied is the pretest-posttest control group design. Sampling in this study uses purposive sampling. The sample of this research is Grade XII nature science program 1 (experimental group) and Grade XII nature science program 2 (control group). The research instruments used in this study were multiple-choice tests, student response questionnaires and observation sheets. Research procedures such as figure 1.

The research flow starts from field studies and literature studies. The problems and theoretical basis were obtained, followed by preparing lesson plans and research instruments. The research instrument includes tests and observation sheets which are tested first. The data from the test results were analyzed first to obtain the validity, discriminating power, level of difficulty and test reliability. In this study, a valid and reliable instrument was obtained. The implementation of dynamic electricity learning is implemented with the help of video tutorials for the experimental class and PowerPoint media for the control class. Students in control and experimental classes received pretest, posttest, and student response questionnaires. The pretest, posttest and questionnaire data were analyzed to obtain the findings.

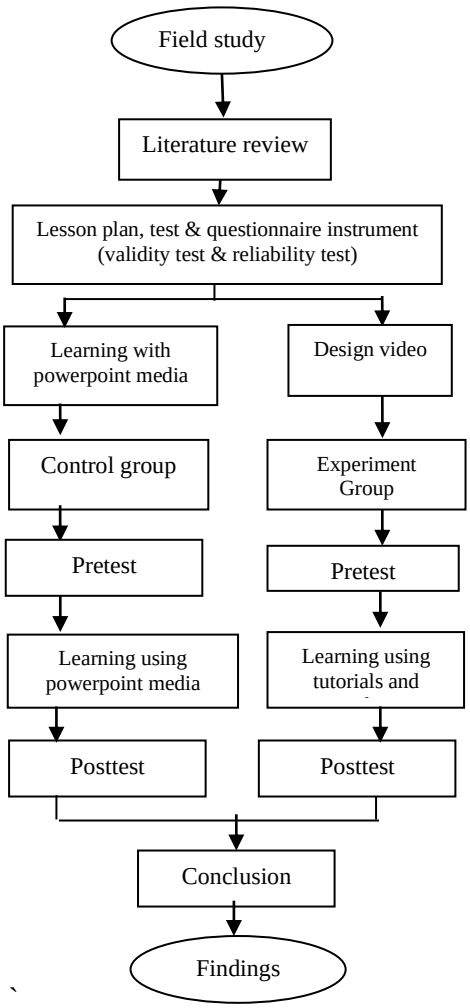

Figure 1 Research procedure

Students' analytical thinking skills are carried out by testing and examining student work in finding solutions to multiple-choice questions and student worksheets. The level of student's analytical thinking skills is based on Table 1.

Table 1 Categories of analytical thinking skills

No	Range	Category
1.	81-100	Very good
2.	61-80	good
3.	41-60	medium
4.	21-40	less
5.	0-20	Very less

RESULT AND DISCUSSION

The results of hypothesis testing on students' analytical thinking skills obtained the achievements, which are presented in Table 2.

Table 2 Hypothesis test results for analytical thinking skills

Group	Mean	N	t_{count}	T_{table}
Experiment	42.16	23	1.15	1.68
Control	37.61	20		

The results of the hypothesis testing analysis in Table 2 explain the value of $t_{hitung} < t_{tabel}$ so H_o accepted and H_a rejected. It can be concluded that there is no difference in the average analytical thinking skills of the experimental class students and the control class. At the same time, the results of the analysis of the effectiveness of the video tutorial media on students' analytical thinking skills are presented in Table 3.

Table 3 N-Gain test results for analytical thinking skills

Sample	N-Gain	Category
Control	0.008	Low
Experiment	0.242	Low

Based on the analysis results in Table 3, the analytical thinking skills of the control class and experimental class students are in a low category; besides, the video is not effective in improving students' analytical thinking skills. The results of the low effectiveness are due to several factors, including the implementation of learning that is constrained, students who are not familiar with learning patterns to analyze a problem, and the results of the t-test one indicator of analytical thinking skills which are very low so that it affects the overall results. The results of the analysis of each indicator are in Table 4.

Table 4 T-test results for each indicator of analytical thinking skills

Indicators	t-test		final
	Pretest	Posttest	
Observe	0.763	0.391	low
Hypothesize	0.163	0.326	low
Analyze	0.534	0.517	low
Apply concept	0.276	-0.015	low
conclude	0.528	0.101	low

The results of the analysis in Table 4 state that the indicator of applying the concept has the lowest t-test value in the posttest. This states that students have not been able to apply the concepts that have been built on the problems given.

The effect of video tutorials on dynamic electrical materials provides significant value. This is because learning methods are growing more effective and interesting according to the interests and habits of students today. Video tutorials transfer more knowledge in a short time and can be repeated. Video tutorials are relevant to the current trend of dominant e-learning assisted learning. Video-assisted learning facilitates processing information faster, retaining knowledge and remembering it accurately. Information received by student participants can survive and develop in visual form rather than in text form. In addition, creative ways of knowledge can be presented through videos so that students can understand the lesson.

The results of the questionnaire analysis of student responses to analytical thinking skills are listed in Table 5

Table 5 Results of questionnaire analysis of student responses to analytical thinking skills

Indicator	Response (%)	Category
I am very happy to follow physics learning by using video tutorial media	76.02	very good
Learning physics using video tutorials is interesting because it	71.01	good

Indicator	Response (%)	Category
can combine audio and visual		
Boring learning activities	67.38	good
The video tutorial media used in this study is very helpful in understanding the tasks being carried out.	72.83	good
Video learning media is used to the maximum.	75.04	good
The use of video tutorial media helps nurture my analytical skills.	75.03	good
The content of the video tutorial media attracts students to follow the learning process	66.31	good
Learning physics with video tutorial media makes me more interested in learning physics concepts.	66.31	good
The media video tutorial that was delivered increased my motivation to analyze the problems given.	69.57	good
The language used in the video tutorial media is Indonesian, so it is easy to understand.	71.74	good
This tutorial video media helps me to be active in analyzing the problems given.	67.38	good
Pictures/photos in the video tutorial media follow the content of the material and make it easier for students to understand the delivery of the material.	69.55	good
Mean	70.68	good

The analysis results in Table 5 show that the average student response to the video tutorial media is in a good category. The highest percentage was obtained from the first statement regarding students interested in participating in learning with video tutorial media, including the very good category. The good category is because the video tutorial media is a new thing for students at senior high school SMAN 1 Pangkalan Banten, as well as a combination of audio and visuals that can stimulate students to follow the learning process; this is supported by research which states that the integration between audio and visual components can create an atmosphere effective and efficient learning (Mamin & Arif, 2018). This is supported by an inquiry approach to achieving student understanding. Inquiry can be carried out in the learning process with clear guidelines, resources, media and appropriate teaching materials (Azizah, Poernomo & Faqih, 2019).

The lowest percentage of student response questionnaires got the eighth statement, 66.31%. The statement is about video tutorial media that makes students interested in learning other physics concepts; even though they get the lowest percentage among other statements, the percentage results are classified as good categories. This good result is because the video tutorial media can help students observe and understand physics-related events, even though not directly, especially during pandemic conditions like today which slightly limits students' space for movement. This statement is supported by the results of a study that states that using video tutorial media during online learning during a pandemic can support student teaching and learning activities (Ridha, Firman, & Desyandri, 2021). Conceptual knowledge of content can be increased through the help of innovative and varied learning media (Susilawati, 2020). Innovative learning media and other variations can be in the form of

animation or video (Susilawati et al., 2020).

CONCLUSION

Video tutorial learning media with an inquiry approach has not improved students' analytical thinking skills. Based on the results of hypothesis testing, it was obtained that there was no difference in the posttest scores between the experimental classes. The student's response to the video tutorial learning media is in the good category. The results were proven by the percentage of response questionnaires of 70.68%, which were transformed into good criteria. Some students are interested in learning through video tutorials. However, there are still shortcomings, namely requiring more directed explanation and assistance from the teacher in conducting inquiry activities and observing direct current video tutorials. Video tutorials, especially electrical experiments, require detailed steps and demonstrations. video tutorials, a special preparation section, and some examples of data collection as the beginning of the activities recorded on the video can be added can be added.

The implications of dynamic electricity learning assisted by video tutorials increase teacher creativity in developing learning media, especially video tutorials for physics practicum. The limitations of this research are that video tutorials tend to be slow, and the steps of the practicum work have not shown the innovation of practicum procedures and produce productive works that have certain aesthetics or products. Further research can develop more innovative videos and lead to appropriate technology.

ACKNOWLEDGMENT

Thanks are given to Physics Education Department for granting administrative approval and senior high school SMAN 1 Pangkalan Banten as a place of research.

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