

## The Effect of Using Context-Based Learning Videos on Global Warming Materials on Students' Problem-Solving Skills

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### ABSTRACT

This study purpose was seen what there were effect of using context-based learning videos on global warming material on the problem solving students abilities of class XI at MAN 2 Pesisir Selatan. This research is a quasi-experimental research, posttest-only control design. The study population was all class XI IPA MAN 2 Pesisir Selatan who are registered in 2021/2022 school year. Sampling was conducted using cluster random sampling technique, selected class XI IPA 1 and XI IPA 3 as sampling. The data of this research is score of students' ability of problem solving. The research instrument was a written test in consist of 7 essay questions. Data analysis was carried out using the Normality Test, Homogeneity Test and U-test. The normality test, it was found that the experimental class was normally distributed while the control class was not normally distributed. The homogeneity test of the two sample classes shows that the two sample classes do not have a homogeneous variance. The results showed that the average problem-solving ability of the group for experimental was greater than the group for control. Using the U test (Man Withney) with a level of significance was 5%, the score of  $Z_{count} > Z_{table}$  is obtained. The results of the various problem solving abilities of each student could be identified. The average score of problem solving abilities in the experimental class was 90.48 while for the control class it was 76.06. This shows that the students' problem-solving abilities for the experimental class are higher than those for the control class. It can be concluded that there is an effect of using context-based learning videos on global warming material on the ability of problem-solving in class XI students of MAN 2 Pesisir Selatan.

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### Introduction

Efforts to answer the claim of the 21st century in the world of education are to apply learning that includes skills of 21st century in order to create quality students. In the 21st century learning does not only rely on mastery of knowledge but skills also play a role in learning. The skills of 21st century were *Life and Career skills*, *Learning and innovation skills*, and *Information media and technology skills* (Nurkhojin, et al., , 2022). Compete in today's era, skills such as the above are needed, one of the important skills is problem solving skills.

The skill of Problem solving was an important skill possessed by everyone in this millennium era. Skill of

problem solving was one of the level in high skill of cognitive that enable students to acquire knowledge and skills (Venisari et al., 2017). Problem solving skill was the skill of students to used their knowledge in selecting and or predicting deductively numerous potential outcomes of a phenomenon that contains or some of the causes (Rokhmat et al., 2012). So, skill of problem solving was a basic skill that must be possessed by everyone, in order to gain knowledge from a given problem.

Students who have completed the physics learning process have the ability to solve physics problems by applying the concepts they have learned to situations

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in order to find answer (Veronica et al., 2018). Problem solving difficulties by students are influenced by several factors. Lack of physics books as references is one issue that prevents student from solving, unclear writing unit conversions, and insufficient laboratory practice (Ogunleye, 2009). Additionally, inadequate student motivation, a lack of comprehension of the problems, and a lack of proficiency with physics principles and rules all contribute to the difficulty of problem-solving. Factors causing the low ability of students to solve problems, namely the low ability of students to understand ideas or ideas from the questions given and difficulties in solving a problem related to a material that is different from the problem given.

One of the subjects in the 2013 curriculum at the high school level is physics. Physics was a field of science that examines natural objects physically and mathematically so that humans can comprehend them and use them for the benefit of humanity (Sujanem, 2012). Physics learning is also expected not only to understand concepts but also to put those concepts into practice when solving physics problems (Azizah et al., 2017). Therefore physics is very interesting to study because it was extremely connected to life.

To teach physics concepts so that students comprehend the subject more easily, a teacher must pay attention to supporting factors that can make students understand physics learning well, namely the use of learning media. Learning objectives could be better and more precisely attained by using media of learning as a tool to assist in the teaching and learning process and serve to clarify the content delivered (Nurdyansyah, 2019). Media learning was one of the reasons for influence the learning success. The use of learning media as a learning aid influences the situation, circumstances, and learning environment in addition to helping students meet their teacher-set learning objectives.

Global warming is one of the physics materials taught in high schools. Global warming is a phenomenon in everyday life that is becoming a problem in today's world. The context-based learning videos used in this study contain events that are closely related to students' lives which contain phenomena that can trigger and impact global warming. So that by using context-based learning videos students can present ideas and solve problems related to global warming.

Learning media is divided into audio media (can be heard), visual media (can be seen), and audio-visual media (can be heard and seen). Audio-visual media

was a media that results from the combination of audio and visual that can convey complete and optimally the content of learning (Hamdani, 2011).

One form of audio-visual media is video. Video is a form of audio-visual media that can show things and events for what they truly are. Students are better able to comprehend the message by using video, which allows them to fully comprehend the information presented in the video. Because video provides a realistic representation of what typically transpires in daily life or an environment, it can help teachers explain material in a straight forward manner.

The use of learning videos has many advantages including: (1) It is a motion medium that combines images and sounds; (2) Able to influence human behavior beyond print media; (3) Can be used instantly; (4) Can be used repeatedly; (5) Present material that physically cannot be brought into class; (6) Can present objects in detail; (7) Can be slowed or accelerated; (8) Can be used for classical or individual (Agustiningsih, 2015). Learning videos with a context approach mean that the videos produced are not only in the form of spectacles but direct students to analyze cases in elaboration of the phenomena encountered with the theory being studied (Novisya & Desnita, 2020). In addition, a context-based learning video is a video that is used in learning that relates material to natural phenomena in everyday life (Sandra Hamida, 2020). Context-based learning video is a learning media that can be seen and heard by linking the material studied with real situations or in accordance with phenomena that occur in everyday life.

In this context-based learning video, there are 6 recordings of events related to global warming material. The first video presents footage of the glass building of Semen Padang Hospital. The second video presents recordings of transmission transformers on Jalan By Pass, Padang City. The third video presents footage of the smoke of burning straw in the Pariaman rice fields. The fourth video presents footage of cultivating rice in Pariaman rice fields. The fifth video presents footage of motor vehicle smoke. The sixth video presents footage of the heat going on behind the refrigerator. After that the teacher instructs the students to pay attention to how the impact of all these events on the environment. Then students are asked to sit in groups and carry out discussions according to the worksheet given by the teacher.

This context-based learning video is not only for viewing, the learning process so that it directs students to analyze several cases with the theory they have learned. In addition, students are also able to connect

learning with real life. Solving problems that students do is solving problems related to the impact of global warming events, the events displayed are events that are close to students or events that occur in the student's environment. Students can reduce global warming from the events that are displayed based on the solutions provided by the students themselves. Based on interviews that have been conducted by the author at MAN 2 Pesisir Selatan with physics subject teachers, information was obtained that physics subject teachers have used video learning media in learning physics. The given video is taken from the internet and only explains the use of the formula. It has not facilitated students' problem solving skills because it is not designed to be interactive and one-way.

The physics teacher at MAN 2 Pesisir Selatan also mentioned that students' problem solving was also low. This can be seen at the time of learning only a few students were active and responded to the teacher's questions. In addition, students feel bored with the learning given by the teacher. This can also be seen in the low learning outcomes of students during the 2<sup>nd</sup> Semester Midterm Examination for the 2021/2022 academic year, of which 102 students of class XI MAN 2 Pesisir Selatan only one person who got a score above the minimum completeness criteria, the rest did not complete learning. The teacher mentioned that the cause of the low skill of problem solving from students was the lack of student interest in learning because the process of learning was only focus on the teacher.

Novisya & Desnita (2020) have developed context-based learning videos. The video contains a number of recordings of events related to global warming. The use of context-based learning videos can improve students' skills in problem solving. The context approach is very suitable to be applied in learning physics (Novisya & Desnita, 2020).

After conducting a search, it turns out that there has been no research on the effect of using context-based learning videos on students' skill of problem-solving in physics subjects. Therefore, research on is felt to be necessary by researchers the effect of using learning videos developed by physics researchers, FMIPA, Universitas Negeri Padang, on students' skill of problem solving. The background that has been presented necessary to conduct research to see if there is the effect of using context -based learning videos on global warming materials on the problem solving skill.

## Method

This type of research is a quasi experiment. This experiment has a control group, but it is not completely working to control outside factors that have an impact on how the experiment is carried out (Sugiyono, 2017). The research design is a posttest-only control design. There are two groups in this design, and each is chosen at random. The first group received treatment, while the remaining groups. Contrary to the control group, the experimental group received instruction via context-based learning video. After being given the treatment both classes were given a posttest to see the effect of context-based learning videos.

The research population consisted of students from all classes XI IPA MAN 2 Pesisir Selatan in the 2021/2022 academic year, for a total of 105 students. Meanwhile, the sample for this research was class XI IPA 1, which consisted of 33 students and class XI IPA 3, which consisted of 36 students. Class XI IPA 1 was chosen as the control class and class XI IPA 3 was chosen as the experimental class using the cluster random sampling technique.

The test instrument used was a problem-solving ability test in the form of a written test. Data collection techniques on the knowledge aspect are in the form of essays totaling 7 items which are designed according to indicators of students' problem solving abilities. This assessment is carried out after learning is carried out. This study aims to see whether there is an effect of using context-based learning videos on students' problem-solving abilities. data analysis techniques using quantitative descriptive analysis, namely the calculation of the percentage of the final results and the calculation of N-gain. In addition, inferential analysis of the results of data collection with Mann Whitney. The category of physics problem solving skills can be seen in Table 1.

**Table 1**  
*Category of Physics Problem Solving Skills*

Score	Ability level
$90 \leq \text{average} \leq 100$	Very high skill of problem solving
$80 \leq \text{average} \leq 89$	High skill of problem solving
$65 \leq \text{average} \leq 79$	Medium skill of problem solving
$55 \leq \text{average} \leq 64$	Low skill of problem solving
$0 \leq \text{average} \leq 54$	Very low skill of problem solving

## Results and Discussion

The data to be described from this study are data on students' problem-solving abilities as seen from the final test of the study which was assessed according to indicators of problem-solving abilities in the experimental class and the control class. Assessment data were obtained from tests conducted at the end of the study using a written test technique in consist of essay questions. This written test has been tested and data analysis obtained as many as seven questions that are good to use. After getting good questions, then a written test was given to the two sample classes.

Assessment of problem-solving skills is carried out based on the final test in skill of problem-solving to the class for experimental and class for control. In the experimental class, the students' problem-solving ability had a maximum score of 100 and a minimum score of 80, with a standar deviation of 5.03. In a contrast, in the control class, the students had a maximum problem-solving score of 91 and a low of 16, with a standard deviation of 17.4. After calculating the average score of the sample class problem solving ability can be seen in Figure 1.

**Figure 1**

*The Final Skill of Problem-Solving Average on The Two Sample Classes*

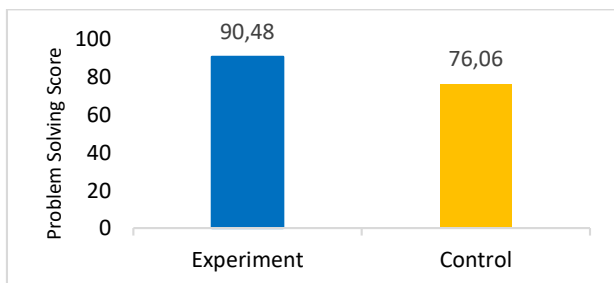


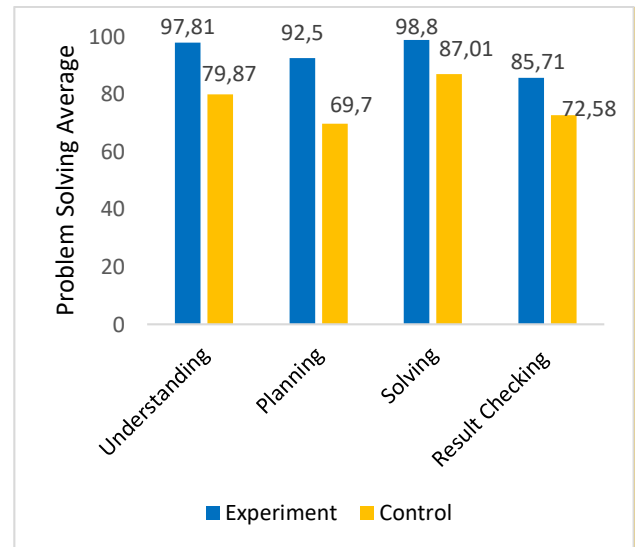
Figure 1 illustrated that the average score of the problem solving ability of the experimental class students is higher than the control class. The difference in the score of the problem solving ability of the two sample classes of 14.42. Skill of problem solving has 4 indicators which include understanding problems, planning problems, solving problems and re-examining the problem solving result.

Figure 2 shows a comparison of the four indicators of student problem solving for the experimental class and the control class. The problem understanding indicator for the experimental class was higher than the control class with a difference of 17.94. The problem solving planning indicator in the experimental class is higher than the control class with a difference of 22.80. The problem solving indicator in the experimental class is higher than the control class

with a difference of 11.79. The indicator to re-examine the problem solving results of the experimental class, it is also higher than the control class with a difference of 13.13. Based on this, the four indicators of the experimental group were always higher than the control class.

**Figure 2**

*Problem-Solving Score of The Two Sample Classes.*



Students' problem solving abilities have five categories. From very low category to very high category. The level of students' problem solving ability is said to be very high if all indicators of problem solving are carried out in order and very well by students. For the medium category, if there are several indicators of problem solving that students do not do. Whereas for the very low category students are not indicators of problem solving.

The average of the experimental class is higher than the control class on the problem understanding indicator. At this stage of understanding the problem, the experimental class was good, on average all students in the experimental class were able to understand the problem; while the ability to understand problems in the control class is in the sufficient category, not all students can understand the problem. Experimental class students are able to plan problem solving very well while in the control class, some students are able to plan problem solving well, and there are still some students who are not able to plan problem solving.

The category of problem solving for experimental class students is in very high criteria while the control class is in high criteria. The problem solving indicator is said to be high if students can apply the strategies

that have been planned in the second indicator properly, namely by using the concepts, formulas, and theories that have been selected. The indicator for examining the results of problem solving in the experimental class is in the high category while the control class is in the medium category.

The improvement of students' skill of problem solving for each indicator of the class for experimental was higher than the improvement of the skill of problem solving of each indicator of the class for control on the subject of global warming. The class for experimental uses context-based learning videos while the control class only uses videos of learning taken from Youtube. This shows that there are several advantages of context-based learning videos compared to videos from Youtube.

This is also strengthened by the hypothesis testing carried out. Hypothesis testing is carried out after the results are obtained on the normality test and homogeneity test. Hypothesis testing is used to determine whether the hypothesis is accepted or rejected. Hypothesis testing is done by using a comparison test. The data obtained is not normally distributed with non-homogeneous variants. Then the U test (Mann - Withney ) was used. U test (Mann - Withney) was conducted to determine the results of the hypothesis.

**Table 2**  
*Results Analysis of the Average Problem Solving Ability of Students*

No	Statistical Parametric	Class	
		Experiment	Control
1.		Descriptive statistic	
	n	36	33
	Mean	90.48	76.06
	Modus	91	49
	S	5.03	17.4
2.		Normality test	
	$\alpha$	0,05	0,05
	Lo	0.128	0.214
	Lt	0.148	0.154
	Description	Normal	Abnormal
3.		Homogeneity test	
	$\alpha$	0,05	0,05
	Fh	11.79	
	Ft	1.79	
	Description	Inhomogeneous	
4.		Similarity test of two means	
	$\alpha$	0,05	0,05
	U	1,030.5	157.5
	Zcount	5.24	
	Ztable	1.96	
Description	There is influence		

A normality test is used to check whether two sample s are normally distributed. Table 2 seen the Lo score for the Experimental class is 0.128, and the Lt score for N=36 is 0.148 at a significant level of 0.05. The data obtained is the score of  $Lo < Lt$ , so that the experimental class is normally distributed. The control class, the Lo score was 0.214 while the Lt at a significant level of 0.05 for N=33 was 0.154. The data obtained is the score of  $Lo > Lt$ , so that the control class is not normally distributed.

The homogeneity test is used to determine whether the data from the two sample classes have the same variance. The homogeneity calculation results are shown in Table 2 the two samples will have a homogeneous variance if  $F_h < F_t$  and the two sample classes will have an inhomogeneous variance if  $F_h > F_t$ . The calculation results for the two sample classes obtained Fh of 11.79 and Ft of 1.79. These results indicate that  $11.79 > 1.79$  means that the two sample classes have variants that are not homogeneous.

In the two-average similarity test, the U-Test was used. The U score for the control class was 157.5 and the U score for the experimental class was 1,030.5. of these two U scores, the smallest U score is used to obtain a Z score. The Z score is used to test the existing hypothesis. The calculated Z score is 5.24 while for the Z table at a significance level of 0.05 the score is 1.96. Ho acceptance area if  $Z_{score} < Z_{table}$ . The score obtained  $Z_{count} > Z_{table}$  that it is in the Ho rejection area. in this case  $H_1$  is accepted, this shows that the use of contextual learning videos on global warming material affects the problem solving abilities of class XI MAN 2 Pesisir Selatan students.

Context-based learning videos can improve students' abilities. This opinion is consistent with the results of the study that the score of the problem-solving ability of the experimental class is higher than that of the control class. Because the experimental class uses context-based learning videos while the control class does not use context-based learning videos.

The role of context-based learning videos on students' skill problem-solving can be seen during the process for learning. The time of student learning, various phenomena that are closely related to daily life are shown, then students are asked to provide arguments related to the phenomena or events that are broadcast so that students more easily solve real problems in life related to global warming material. This was supported by the opinion that by using contextual-based learning videos students can provide a real picture of the concept being studied, and indirectly students are

invited to understand the concept in real terms in the environment (Susilawati et al., 2022). This is also reinforced by the opinion of that context-based learning Videos can adapt instruction to the demands and needs of the modern world (Desnita et al., 2021).

In addition, this context-based learning video is also able to help students to provide arguments related to the material. Students can solve the problems contained in the video. Learning videos play a role in developing students' opinions and thoughts (Busyaeri et al., 2016). Improving problem-solving skills is also assisted by the use of problem-based learning models. In this learning model it can encourage students to be more active and maximize problem-solving skills to get solutions to real-world problems (Nanda et al., 2017). In this learning model, for the first time a teacher presents real problems to students, namely by using context-based learning videos. Then the teacher helps students to understand the problem from the video shown. The teacher then guides students to collect data/information then the teacher gives instructions to determine the correct problem solving from various problem solving options. Finally, the teacher helps students evaluate the problem-solving process they have created. If this happens continuously, students' problem solving skills will be honed even more. The using context-based learning videos students' problem solving abilities increase compared to students who do not use context-based learning videos in learning.

## Conclusion

Based on the results of statistical tests and analysis of data obtained after the data collection process, it was found that there were differences in the score of problem solving abilities between the control class and the experimental class. After applying contextual learning videos on material about global warming, students' problem-solving abilities for each indicator increased. The increase in students' problem solving abilities for each indicator of the experimental class was higher than that of the control class. The results of the hypothesis test show that there is an effect of using context-based learning videos on global warming material on the problem solving abilities of class XI MAN 2 Pesisir Selatan students. This research can be used as a reference for further researchers. Suggestions for this research are that this research is not only limited to global warming material but also to other physics material.

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