

# The Effect of Using Context-Based Learning Videos on Fluid Materials on Students' Critical Thinking Ability

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**Abstract:** Starting from the learning media used in schools not being able to prepare students to think critically, using context-based learning videos is one solution to improve students' critical thinking abilities. This research aims to see the effect of context-based learning videos on fluid material on the essential thinking abilities of class XI students at SMA Negeri 5 Solok Selatan. This study uses a quasi-experiment with a posttest-only control design. The research population was all class XI IPA students at SMAN 5 Solok Selatan registered in the 2022/2023 academic year. Purposive sampling was chosen as a sampling technique, so classes XI IPA 1 and XI IPA 2 were taken as research samples. The instrument used to obtain critical thinking ability data was a written test using 8-item essay questions. Normality, homogeneity, and t-tests were used in the data analysis. The measurement results show that experimental class students (80.38) have higher critical thinking skills than the control class (70.56). Statistical analysis with the t-test shows that  $t_{\text{count}} > t_{\text{table}}$  ( $3.41 > 2.006$ ) means the working hypothesis is accepted. So, it can be concluded that using context-based learning videos on fluid material affects students' critical thinking abilities.

**Keywords:** Critical Thinking Skills; Context-Based Learning Videos; Problem-Based Learning Models.

## Introduction

In the 21st century, developments in science and technology (IPTEK) are taking place very quickly. Advances in science and technology have greatly influenced various sectors of human life. One of them is the world of education. In the field of education, the influence of technology lies in the learning process known as 21st-century learning [1]. In the 21st century, a person is not only required to be proficient in using technology but also to master various skills. Critical thinking skills are critical skills students must have to compete in the 21st century [2].

Critical thinking is very important for everyone to achieve success. Critical thinking is also important for checking the correctness of information. Critical thinking skills center on deciding what to believe and do reasonably [3]. According to Fithriyah, dkk., dan Arini & Juliadi, critical thinking is the ability to think systematically and deeply to formulate and solve problems to draw conclusions and provide new ideas from the results of one's thinking [4-5]. Critical thinking abilities are very important because a person with these abilities can think clearly, respond to situations intelligently, and make wise decisions about what to do or accept. Therefore, developing students' critical thinking skills is imperative for optimal results.

In critical thinking, a person can examine information carefully and make the right decisions when dealing with developing problems. Characteristics of someone who thinks critically include (1) looking for an explanation of an investigation, (2) looking for causes, (3) trying to find accurate information, (4) using trusted sources, (5) checking what is happening, (6) looking for a

way out of problems, (7) being tolerant, (8) accepting things according to facts, (9) looking for accuracy in a problem, (10) being sensitive to other people [6].

By getting used to critical thinking, a person can organize, match, replace, or straighten his point of view to make more appropriate choices. Besides that, by thinking critically, a person can easily find opportunities in everything because critical thinking sharpens a person's mind when analyzing everything. Therefore, it is necessary to think critically about a problem so that the information obtained is valid.

To realize students' critical thinking skills, the government continues improving the educational curriculum in Indonesia. In line with developments over time, the Indonesian education curriculum continues to be updated to improve the quality of education. The curriculum currently being taught is the 2013 curriculum. The 2013 curriculum emphasizes student-centered learning. That is, students are asked to be actively involved in learning. The 2013 curriculum is implemented in every subject at school. One of these subjects is Physics. Learning physics is additionally anticipated to ace concepts and apply the concepts that have been caught on in the solution physics problem [7]. Hence, physics is interesting to study since it closely relates to life.

However, the reality in the area shows that students' critical thinking abilities are still comparatively low. Based on observations carried out by the author at SMA Negeri 5 Solok Selatan, through interviews with physics subject teachers regarding learning resources and their influence on students'

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critical thinking abilities, information was obtained that teachers at school more often use textbooks and teaching materials following the learning materials being taught. The teaching materials used by teachers are not yet in compliance with the claims of the 2013 curriculum. On average, the teaching materials used only come from textbooks and do not contain contextual material. Therefore, teaching materials cannot fulfill the needs of students and train them to think critically.

Meanwhile, regarding the use of video media, teachers only use videos to explain complex lessons. Teachers' learning videos are also not context-based (they do not show phenomena in everyday life). Then, student involvement is still lacking, and students are even more likely to be silent and only focus on the teacher without asking, criticizing, or analyzing what the teacher says. Hence, students are less trained to think critically. In this situation, teachers are expected to apply a variety of teaching media and precise learning models that can attract students' attention and stimulate reasoning.

To overcome the problems above, for the learning process to be more effective, interesting and not boring, a communication tool is needed to make it easier to deliver the material. The connecting tool used is learning media. Media is a communication and information tool that can provide lessons. According to Daryanto, media is part of the learning framework, and without media, communication cannot run, and the learning process cannot be carried out well [8]. According to Yaumi et al., media is anything that functions to produce and disseminate information [9].

Meanwhile, according to Kusumawati & Sri Maruti, learning media are devices (physical and non-physical) that are used as a connecting bridge in understanding learning material [10]. A varied learning media is needed to stimulate students' reasoning and attention. Context-based learning videos are one of the media that can support improving student reasoning.

According to Rozie, video is the only type of learning media that utilizes images, sound, and graphics as case study examples of the material being studied [11]. By using videos, the messages conveyed in learning are more attractive. This encourages and increases student motivation, making it simple for students to remember the material presented. Besides being effectively used in various learning processes, videos help students comprehend the material more easily [12]. Not only that, learning with videos in physics makes learning more interesting, interactive, and communicative, and it focuses more on increasing knowledge. It can focus on students' views during the learning process [13].

Some of the benefits of videos include making lesson material more accessible to understand because pictures accompany it, attracting students' attention, clarifying changes in movement using slow-motion and fast-motion techniques, increasing students' affective, cognitive, and psychomotor domains, and making it easier for students to understand events that are challenging to understand [14]. Warsita also stated that one of the benefits of films/videos is to increase students' criticality because they are faced with the realities of the world [15]. Besides that, using videos can also train students to use IT well. Therefore,

videos are very appropriate to apply in physics learning. This is because videos have the advantage of being able to be played back when we need additional clarity and can develop students' thoughts and opinions.

The FMIPA UNP physics research team chaired by Dr. Desnita, M.Si, and Sandra Hamida, S.Pd has developed context-based learning videos. Learning experts have tested the validity of these learning videos, and the findings show that context-based physics learning videos are valid and suitable for use as class XI physics learning media. The video presents events in life-related to fluids (static and dynamic). Therefore, researchers propose the use of context-based learning videos as a solution to overcome the above problems.

To maximize the video function, researchers use a learning model. The learning model is a guide for a teacher in providing lessons. Using an effective learning model makes learning goals more straightforward to achieve. The model that researchers use is a problem-based learning model. This model requires students to solve real problems given by the teacher during learning, namely by providing real solutions. In addition, this model has several advantages of this model, namely that it can increase students' understanding of lesson content, encourage students to discover new knowledge, train critical thinking abilities, and increase their interest in learning [16].

Based on the background displayed, the researchers believe that further inquiry is required on the effect of using learning videos created by FMIPA UNP physics researchers on skilled students' critical thinking. From the background presented, this research proves that context-based learning videos on fluid material affect the critical thinking abilities of class XI students at SMA Negeri 5 Solok Selatan. The problems above illustrate how important it is for students' critical thinking abilities to be researched. Therefore, researchers are interested in conducting research titled "The Effect of Using Context-Based Learning Videos on Fluid Material on the Critical Thinking Ability of Class XI Students of SMA Negeri 5 Solok Selatan".

**Research Methods**

This research was conducted at SMA Negeri 5 Solok Selatan in the 2022/2023 academic year with nine meetings. This study is quasi-experimental. This experiment had a control group but could not fully regulate external variables influencing research implementation. The study was a post-test-only control design (table 1) [17].

**Table 1.** Research Design

Group	Variable	Post-test
Experiment	X	O <sub>1</sub>
Control	-	O <sub>2</sub>

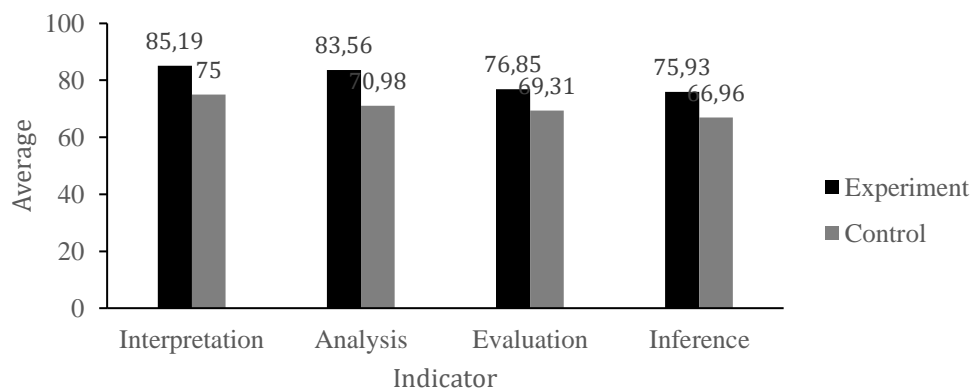
Note: O<sub>1</sub> = post-test (final test) in the experimental class, O<sub>2</sub> = post-test in the control class. X = treatment given

The population in this study were all students in class XI MIPA SMAN 5 South Solok, for the 2022/2023 academic year. Meanwhile, class XI MIPA 2 is taken as the sample for the experimental class with learning activities using context-based learning videos, and class XI MIPA 3 is used for the control class using the purposive sampling technique.

The research data described is data on students' critical thinking abilities obtained from test results at the end of the research, which were assessed based on the observed critical thinking ability indicators. Four critical thinking indicators are observed: interpretation, analysis, evaluation, and inference. Two sample classes were given a post-test of eight essay questions to assess their critical thinking abilities. The data analysis technique began with normality and homogeneity testing, then continued with parametric statistical testing, specifically the t-test, with a significance level 0,05.

**Results and Discussion**

After the calculations were carried out, data on students' critical thinking abilities related to aspects of



**Figure 1.** Student Thinking Ability Score for Each Indicator

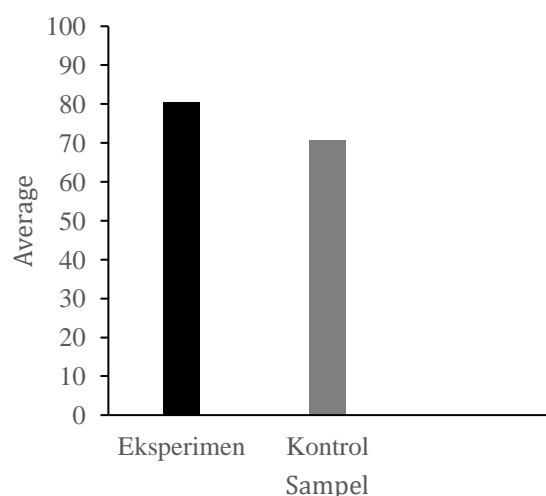
Figure 1 compares the scores of the four indicators of students' critical thinking abilities for the two classes studied. It can be seen that the interpretation and analysis indicators for the experimental class are in the very high category, which shows that all students can understand the question statement and can relate the conceptual relationships that will be used in solving the problem very well. Meanwhile, the control class is in the high category, meaning almost all students can understand the question statement and relate the conceptual relationships used in solving the problem.

Next, the evaluation and inference indicators for the experimental class are in the high category, meaning that almost all students can use the right strategy to solve questions and make good conclusions. Meanwhile, the control group is in the medium category. That is, some students can use the right strategy in solving questions and making conclusions, but some students still cannot use the right strategy in solving questions and making conclusions. Based on this, the four indicators of critical thinking abilities for the experimental class (the lesson given the treatment) were continuously higher than the control group.

knowledge for the two sample classes was obtained. This data shows the value of students' critical thinking abilities as a whole and for each indicator. According to Ermayanti & Dwi, there are five criteria for evaluating critical thinking skills, from very low to very high. Students' critical thinking level is considered very high if all indicators are met well. For medium criteria, if several indicators are not met. Meanwhile, for students, the requirements are very low; almost all/all indicators are unmet [18].

Appraisal of students' critical thinking abilities is based on the ultimate test of critical thinking abilities within the experimental and control classes. Within the experimental class, students' critical thinking skills have a greatest score of 99 and a least score of 68, with a standard deviation of 9.68. In the interim, the control class includes a greatest critical thinking ability score of 90 and a least score of 41, with a standard deviation of 13.11. After carrying out the calculations, critical thinking ability information was obtained for the two test classes, as seen in Figure 1.

It appears that understudies within the experimental class are much more critical than the control class.



**Figure 2.** Final Average of Students' Critical Thinking Ability for the Two Sample Classes

Figure 2 demonstrates that students in the experimental class had a higher final average score on critical thinking abilities than those in the control group. The difference in scores between the two is 9,82. By the critical thinking ability category, the experimental group was at a high level, while the control group was at the medium criteria. This means that students in the experimental class have almost all four indicators that met well, while in the control class, some indicators have been met well, and some indicators have not.

The use of context-based learning videos by the experimental class was the cause of the difference in critical thinking ability scores between the two sample classes. This is because the context-based learning videos encourage students to analyze various events/phenomena in the videos, by identifying questions that arise from them so that students can develop their thinking abilities. This is often in line with the comes about of inquire conducted by Indayani, R.,Supeno & Wicaksono, that learning media using videos has an impact on the level of students' critical thinking abilities because it can increase students' curiosity, improves students' activeness and enthusiasm for learning [19]. This is also reinforced by research conducted by Firdaus et al., which found that contextual-based learning videos can train students to improve their critical thinking skills so that every indicator of their critical thinking ability increases [20].

Apart from that, context-based learning videos can clarify learning material and make learning more alive. Typically in line with inquiries by Hamida & Desnita, contextual-based learning videos can degree 21st century skills, namely students' 4C skills [21]. Next, Novisya & Desnita in their research results also stated that CTL-based videos not only display events in their entirety, but can also improve students' high-level thinking abilities by examining the events displayed as a whole [22]. Based on this opinion, it is following the research results that using context-based learning videos influences students' critical thinking abilities.

To obtain valid results, a problem-based learning model is used to strengthen the use of context-based videos. In this model, students are first faced with a problem. After that, students must be active in solving the problem. Using this model also helps improve critical thinking, because with this model students can find solutions to given problems. This aligns with the research results conducted by Draghicescu, et. al that the problem-based learning model stimulates students to think critically and carefully when solving problems [23]. This is often in understanding with investigate conducted by Iskandar et al., that the problem-based learning model demonstrates a tall impact on students' critical thinking skills and is additionally more viably utilized at the high school level, specifically exceptionally tall on fluid material [24]. In this learning model, students are directed to solve, analyze, and evaluate a problem. Students will be directly involved in solving problems, and they will also be trained to think critically, develop their analytical skills, and become independent students.

This problem-based learning model is used for both classes. However, understudies within the experimental class had higher thinking skills than understudies within the

control class. This happened because the control class contained only material explanations, only a few life-related phenomena. Meanwhile, the context-based learning video in the experimental class contains more than two phenomena related to real life. Context-based videos contain questions and questions that arise from the video, which trains and emphasizes students to be critical and creative in answering these questions and questions.

This is also supported by the hypothesis tests performed. However, normality and homogeneity tests are first performed before testing the hypothesis, as shown in Table 2.

**Table 2.** Result Analysis of the Average Final Critical Thinking of the Two Sample Classes

NO	Statistical Parametric	Class	
		Experiment	Control
1	Deskriptive statistic		
	N	27	28
	Mean	80.38	70.57
	S	9.68	13.11
	S <sup>2</sup>	93.79	171.85
2	Normality test		
	A		0.05
	L <sub>h</sub>	0.14	0.10
	L <sub>t</sub>	0.17	0.16
	Description	Normal	Normal
3	Homogeneity test		
	α		0.05
	F <sub>h</sub>		1.83
	F <sub>t</sub>		1.92
	Description		Homogeneous
4	Hypothesis test		
	α		0.05
	t <sub>h</sub>		3.41
	t <sub>t</sub>		2.006
	Description		Hypothesis accepted

Normality testing is performed to see whether two types of samples are normally distributed. In table 2, it can be seen that the value  $L_h < L_t$  for both types of samples. This shows that the two types of research samples have a normal distribution. Next, to ensure that data from the two sample classes have homogeneous variations or not, a homogeneity tets is performed. The calculation results are presented in table 2 for two sample classes have a value of  $F_h < F_t$ , namely  $1.83 < 1.92$ , meaning that the variance is homogeneous.

After that, hypothesis testing using the t-test is used to see whether the working hypothesis is accepted or rejected. For the t-test, the value obtained is  $t_h > t_t$ ,  $3.41 > 2.006$ , so the working hypothesis is accepted. This proves that the use of context-based learning videos facilitates students to think critically compared to students who do not use context-based learning videos so that the use of context-based learning videos in fluid material affects students' critical thinking abilities.

## Conclusion

Based on the results of statistical tests and data analysis, it was found that the use of context-based learning videos on fluid material influenced the critical thinking abilities of class XI students at SMAN Solok Selatan. Context-based learning videos affect students' critical thinking skills as evidenced by the t test results, namely  $t_{\text{count}} > t_{\text{table}}$  ( $3.41 > 2.006$ ).

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