

# ABS 109

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**Submission date:** 30-Sep-2020 01:21PM (UTC+0700)

**Submission ID:** 1401093343

**File name:** full\_paper\_abs-109\_3222484066.docx (50.33K)

**Word count:** 2315

**Character count:** 13512

**Analysis of the Critical Thinking Initial Ability about Static Fluid Material  
in Class XI of SMA Negeri 7 Surakarta**

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### Abstract

This research aims to describe the initial ability of critical thinking, of high school students in Surakarta on static fluid. This study is part of the learning tools development study to improve critical thinking ability. The critical thinking skills test is compiled in ten questions. The analyzed critical thinking skills are students critical thinking abilities before a model is applied that is expected to develop a student's critical thinking skills. This research includes descriptive research. The subjects of this study were 35 students of Class XI in SMA Negeri 7 Surakarta. The data collection methods used are test methods. Data analysis techniques use quantitative descriptive analysis. The results showed that the achievement of critical thinking in the analysis aspect with sub skills of detecting arguments and analyzing arguments was 41,75%. The inference aspect with sub skills of making a logical conclusion was 29,25%. The interpretation aspect with sub skills of classify the meaning was 44,1 %. The explanation aspect with sub skills of stating results, justifying procedures, and presenting arguments was 57,7%. And the evaluation aspect with sub skills of assess credibility and assess the quality of arguments was 24,65%. These results show that students' critical thinking skills are still low, especially in evaluation aspects.

**Keywords:** *Development Studies, Critical Thinking*

### Introduction

The development of 21st century skills, students in learning require students to have 4C skills, one of which is critical thinking skills. Critical thinking skills are a directional and clear process that is used in mental activities such as solving problems, making decisions, predicting, analyzing assumptions, and conducting scientific research. Critical thinking is the ability to argue in an organized way. One cannot study well without thinking well. Critical thinking is related to career success, but also to success in higher education. The root causes of failure of Indonesian students every 3 years or 4 years in the context of TIMSS and PISA or equal distribution of education for educators, access to education and limited learning facilities. Indonesia still needs time and strong enthusiasm to continue to fight on a better level. To achieve a better ranking, it is necessary to improve the quality of education through 21st century learning with the latest models that greatly contribute to improving the quality of education in Indonesia.

One of the efforts to improve the quality of education is to carry out various innovations in the curriculum, so that it will be able to bring out the critical thinking skills of each individual, especially students (Sudarma: 2013: 34). This is supported by the opinion of Liliani (2011: 10) which states that "the ability to think which is the basis of other thinking skills is the ability

to think critically". The ability to think critically affects the formation of students' scientific attitudes (Damanik and Bukit, 2013: 28). Critical thinking is a reflective policy decision making in solving problems about what to believe and carrying out intellectual processes, active discipline, skillfully conceptualizing, applying, analyzing, synthesizing and evaluating information gathered from experiential observation, reflection, reasoning or communication as a guide for belief, and action (2). Facione, 2010: 12). Education in Indonesia has not been able to bring up and even improve the critical thinking skills of students (Noviyanti, 2017: 2).

Facts in the field show the low critical thinking skills of students. This is proven based on the results of research conducted by Rian Priyadi (2018) that the research results show that 56% of students can complete physics calculations. However, students experienced difficulties in interpreting the data provided. From this analysis, it can be concluded that students' critical thinking skills are still low in the evaluation category. It was found that students were only able to complete physics calculations (inference) but were unable to interpret the answers (evaluation). Students have difficulty identifying wrong assumptions and identifying data that was not provided during problem solving. This is in line with Ayu Lingga's (2016) research that out of 115 students who took the critical thinking ability test, 86.6% of students were in the low category.

In this study, there are six aspects of critical thinking skills developed by Facione (2010) in Table 1.

Table 1. Aspects - aspects of critical thinking skills

Aspect	Description	Sub Skills
<b>Analysis</b>	The skill of identifying the meaning of the truth of the conclusion in the relationship between the question and the concept, the description or the form of the question, the hope of expressing beliefs and decisions, experiences and reasons and information and opinions.	a. Examine ideas b. Detect arguments c. Analyzes arguments
<b>Inference</b>	The skills to identify and select elements are needed to form reasoned conclusions or form hypotheses by paying attention to relevant information and reducing the consequences resulting from data, questions, principles, evidence, judgments, beliefs or other forms of representation.	a. Ask for evidence b. Suppose alternatives c. Make logical conclusions
<b>Interpretation</b>	Skills to understand, express meaning, statements of varying experiences, situations and data, events and decisions, conversion of beliefs and rules, procedures or criteria.	a. Categorization b. Coding significance c. Classifies the meaning / meaning clearly
<b>Explanation</b>	Skills in stating the results of a person's consideration process justifying reasons based on the evidence, concept, methodology, certain criteria in reasonable consideration, and the ability to present reasons in the form of convincing arguments	a. Declare the results b. Justifies procedure c. Presenting arguments
<b>Self-Regulation</b>	A person's awareness monitors his or her cognition, the elements that are used in the thought process and the results that are developed, in particular applying the skills to	a. Self-examination b. Self-correction

	analyze and evaluate one's ability to draw conclusions in the form of questions, confirmations, validations and corrections.	
<b>Evaluation</b>	Skills to assess the credibility of questions or other presentations with values or describe a person's perception, experiences, situations, decisions, beliefs and assess the logical strength of actual inferential relationships including statements, descriptions, questions or other forms of representation.	a. Assess credibility b. Assess the quality of the argument

Source : Facione (2010)

Based on the above introduction, the researcher is interested in conducting research on the analysis of the initial critical thinking skills of Surakarta high school students as an effort to improve the quality of education by developing problem-solving-based interactive E-Modules that can improve high school students' critical thinking skills.

### Research Methods

This type of research is a descriptive study with a quantitative approach that aims to describe carefully and systematically the facts and characteristics of certain populations. This is used to describe the achievement of the analytical aspect with the sub skills to detect arguments and analyze arguments, the inference aspect with the sub-skill of making logical conclusions, the interpretation aspect with the sub-skills to classify the meaning clearly, the explanation aspect with the sub-skills of stating results and justifying procedures and presenting arguments, and the evaluation aspect with sub skills assessing the credibility and assessing the quality of the argument.

Descriptive research design is a research design, structured to provide systematic description of scientific information originating from the subject or object of research. The method used in this research is a survey method. This research was conducted in the odd semester of the 2020/2021 school year at SMA Negeri 7 Surakarta. The sample in this study were students of class XI IPA SMA Negeri 7 Surakarta. The instrument used in this study was a test sheet. The test sheet is used to determine the profile of students' critical thinking skills. Types of research Students' answers are categorized into five aspects of critical thinking skills, then a percentage according to aspects of critical thinking skills. The data analysis technique used in this research is quantitative descriptive analysis. This quantitative descriptive analysis technique is used to process data obtained from the test in the descriptive form of the percentage of critical thinking skills.

Data collection in this study used a preliminary ability test. This test uses Static Fluid material which is a prerequisite material for studying Temperature and Heat material. The research instrument used was 10 descriptive questions. In preparing the critical thinking test, the researcher was guided by the aspects of Facione's critical thinking ability and some of it was adapted from Dwie Pratiwi's research. Students' initial critical thinking abilities were analyzed by the criteria listed in Table 2.

Table 2. Criteria for the average ability of students' initial critical thinking in percentage

86 % – 100 %	Very high
71 % – 85 %	High
56 % – 70 %	Medium
41 % – 55 %	Low

&lt; 40 %

Very low

(Adaptation Wahyu *et al.*, 2018)

## Result and Discussion

The initial ability of students to think critically is the ability that students have before the learning process takes place. The initial ability of students to think critically in this study was based on the average score of students' test scores on static fluid material, but categorized based on the aspects of critical thinking skills can be seen in table 3.

Table 3. Students' initial critical thinking abilities in each aspect.

No	Aspect	Sub skills	Question number	Average score	Percentage	Total
1	Analysis	a. Detect arguments	1	1,71	42,75 %	41,75 %
		b. Analyze arguments	2	1,63	40,75 %	
2	Inference	a. Make logical conclusions	8	3,51	29,25 %	29,25 %
3	Interpretation	a. Classify the meaning / meaning clearly	6,7	4,41	44,1 %	44,1 %
4	Explanation	a. Declare the results	3	3,21	40,12 %	57,7 %
		b. Justifies procedure	4	7,86	65,5 %	
		c. Presenting arguments	5	5,4	67,5 %	
5	Evaluation	a. Assess credibility	9	3,43	17,15 %	24,65 %
		b. Assess the quality of the argument	10	3,86	32,16 %	

There are 5 categories of students' critical thinking measured in this study, namely category A (analysis), category B (inference), category C (interpretation), category D (explanation), category E (evaluation). The results of the achievement of students' initial critical thinking abilities in each category can be seen in Figure 1.

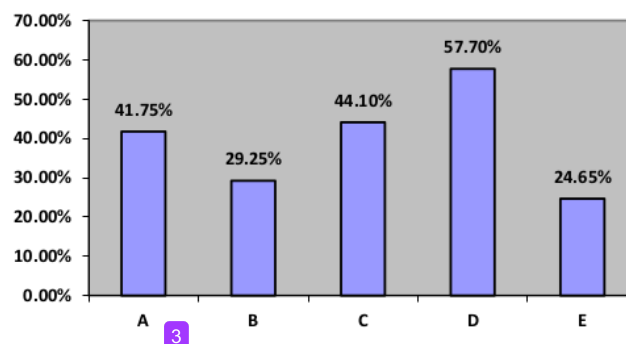


Figure 1. Achievement of students' critical thinking skills in each category

Based on table 3, the average critical thinking ability of students is 39.49% or is in the very low category. The average is obtained from the results of the students' initial critical thinking abilities which are categorized in each aspect. In the analysis aspect, the sub skills to detect arguments and analyze arguments are 41.75% or in the lowest category. The inference aspect with the sub-skills of making logical conclusions is 29.25% or it is in the very low category. The interpretation aspect with the sub-skills of classifying meaning is 44.1% or it is in the low category. The explanation aspect with sub skills stated the results, justified the procedure, and presented arguments was 57.7% or in the medium category. And the evaluation aspect with sub skills assessing credibility and assessing the quality of the argument is 24.65% or is in the very low category.

The low initial ability of students to think critically makes the researcher assume that students are not used to getting questions with a cognitive level that are categorized by each aspect of critical thinking skills on static fluid material. This is still very reasonable so that better guidance is needed to improve students' critical thinking skills, especially in the evaluation aspect with the sub-skills of assessing credibility and assessing the quality of the arguments that are in the very low category.

Initial critical thinking skills are very important. According to Winkel in Wahyono (2013), initial ability is likened to a bridge to final ability. So, it can be assumed that the initial ability is not something that can be underestimated. Students' initial abilities will lead students to their next abilities. This is in accordance with the opinion of Razak (2017) which states that good initial abilities will have good critical thinking skills as well.

### Conclusion

Based on the results of data analysis and discussion, the following conclusions can be drawn: The students' initial critical thinking ability of static fluid material got 39.49% results or was in the very low category.

### Acknowledgement

The author would like to thank profusely to the supervisor and author to thank the teachers of SMA Negeri 7 Surakarta for their permission to be able to do research.

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