Student critical thinking skills and learning motivation in elementary students

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Abstract. Critical thinking skills are 21st century life skills that are very necessary for life. The purpose of this study is to analyze the level of critical thinking skills of students, and how influential learning motivation is on students' critical thinking skills. The research method used is mixed methods with explanatory sequential strategy. The sample of this study were students in grade V SD Jagalan. Data collection is done by the method of tests, interviews, observations, and documentation. The results of this study indicate that the critical thinking skills of students at SD Jagalan reach an average score of 67. Indicators of critical thinking skills from the highest to lowest values are interpretation, analysis, inference, and explanation. Based on the results a simple regression analysis shows the value of the correlation or relationship that is equal to 0.715. The influence of learning motivation on critical thinking skills is indicated by the coefficient of determination of 51.2%, while the rest is influenced by other variables. So, it can be concluded that there is an influence of learning motivation on critical thinking skills. The higher the motivation of students to learn, the higher their critical thinking skills.
Keywords: *critical thinking skills, learning motivation, elementary students*

1. Introduction

Some life skills such as analytical, creative and critical thinking skills are very necessary for life because in life in human society is always faced with problem-solving. Solving a problem, data is needed to make logical decisions and to make the right decisions requires good critical thinking skills. Besides, those critical thinking skills are an important aspect of many jobs. This is supported by data from Contemporary evidence of the importance of critical thinking skills for employment from the National Association of Colleges and Employers which indicated that critical thinking/problem-solving skills were ranked most important by the 144 surveyed employers in table 1.

Some practitioners and researchers discuss the importance of critical skills to be involved in the education curriculum in Indonesia as the most important skills to master in the 21st century. The 2013 curriculum is a curriculum applied by the government today and is considered as an answer to the challenges in the globalization era. The 2013 curriculum which presents holistic concepts for students can develop students' critical thinking skills. This is supported by research of 0 study which found that the implementation of the 2013 curriculum could improve various soft skills of students.

Table 1. How employers rate career readiness competencies in terms of their essential need competency.

Competency	Essential Need Rating 2016
Critical Thinking/Problem Solving	4.7
Professionalism/Work Ethics	4.7
Teamwork/Collaboration	4.6
Oral/Written Communication	4.4
Information Technology Application	3.9
Leadership	3.9
Career Management	3.6

Note: Weighted average. Rated on the 5-point scale where 1 = Not essential; 2 = Not very essential; 3 = Somewhat essential; 4 = Essential; 5 = Absolutely essential [3].

But in reality, the critical thinking skills of students in Indonesia are still low. Based on a survey from the World Economic Forum (WEF), the Indonesian Global Competitiveness Index (GCI) in 2016-2017 is ranked 41st out of 138 countries, under GCI Malaysia and Thailand. This is influenced by the education level of Indonesian workers, especially aspects of critical power abilities and abilities to think analytically **Error! Reference source not found.**. Critical thinking skills of students are also relatively low. Several studies have shown that students' critical thinking skills are still low, namely research on junior high school students from [3] in Kediri, and [4] in Sumatra. Research on senior high school students reviewed by [5] in Pare-Pare, and research on university students in Indonesia reviewed by [6], [7]. Also, the critical thinking skills of students at the elementary school level are still low. This is supported by research of **Error! Reference source not found.**, showed that based on an analysis of critical thinking skills in the three primary schools of Buleleng it was still low. Furthermore, the research of **Error! Reference source not found.** explained that the results of the pre-test of critical thinking skills in his study found that the percentage score of each aspect of critical thinking skills was less than 40% or still relatively low.

Critical thinking is an ability which is beyond memorization. When students think critically, they will be motivated to formulate hypotheses, analyze and synthesize many things, and build new hypotheses based on facts they test themselves. Critical thinking individuals are people who research, question, refuse the information it's as active, think analytically and synthesize, evaluate the information and explain with true basis, treat open-minded and aware of thinking processes **Error! Reference source not found.**.

Characteristics of critical thinkers as raises vital questions and problems, formulating them clearly and precisely; gathers and assesses relevant information, use abstract ideas to interpret it effectively; comes to well-reasoned conclusions and solutions, testing them against relevant criteria and standards; thinks open-mindedly within alternative systems of thought, recognizing and assessing as need be, communicating effectively with others in figuring out solutions to complex problems **Error! Reference source not found.**. Furthermore, indicators of critical thinking skills are interpretation, analysis, evaluation, inference, explanation, and self-regulation **Error! Reference source not found.**.

Critical thinking skills are influenced by several factors, one of which is one's motivation to learn. Students who have high learning motivation make it possible to obtain high learning outcomes as well, meaning that the higher the motivation, the greater the intensity of effort and effort, the higher critical thinking skills **Error! Reference source not found.**. This is supported by the results of **Error! Reference source not found.** which states that based on the results of the analysis, there is a positive correlation between motivation to achieve learning achievement and critical thinking skills.

Motivation is the drive or need to achieve its main goals in a constant, endless, changeable and complex way **Error! Reference source not found.**. This is in line with the opinion of **Error! Reference source not found.** which states that learning motivation is a belief that helps students engage in learning by using various strategies. There are four indicators of learning motivation, including (1) choice of tasks; (2) effort; (3) Persistence or perseverance; and (4) Achievement **Error!**

Reference source not found.. On the other hand, **Error! Reference source not found.** suggested that aspects of learning motivation include attention, relevance, confidence, and satisfaction. Based on the background reviews that have been described, a study was conducted aimed at analyzing critical thinking skills in terms of learning motivation

2. Research method

This research method uses mixed methods with sequential explanatory strategies. Quantitative methods are used to analyze the relationship between learning motivation and critical thinking skills. Qualitative methods are used to describe critical thinking skills in terms of student motivation. The population of this research is fifth-grade students in Jebres Subdistrict, Surakarta City. To determine the research sample, a purposive sampling technique was used, namely 35 students in grade V of SD Jagalan.

Data collection techniques using test, observation, questionnaire, and interview techniques. The data analysis technique used is quantitative and qualitative analysis techniques. Quantitative techniques consist of instruments validity and reliability, and simple linear regression tests. Qualitative data analysis uses an interactive model with the stages of reduction, presentation of data, and concluding. Critical thinking skills measured in this study refer to **Error! Reference source not found.** indicators, namely interpretation, analysis, inference, and explanation.

3. Results and Disscussion

Critical thinking skills of students are measured using a free description test instrument that is equipped with a grid, answer keys, and assessment rubrics. The eight-question items have passed the expert test stage with language lecturers, lecturers in critical thinking skills, and education evaluation lecturers. Then, the test instrument was tested for validity with Product Moment and reliability with Alpha Cronbach. The results of the validity test with SPSS 18 show all valid questions with r count > r table of 0.279. The results of the overall reliability test items of 0.765 with the category of high reliability.

Table 2. Results of critical thinking skills test.

No.	Score Interval	Frequency	Description
1.	31 – 40	2	Incomplete Score
2.	41 – 50	7	Incomplete Score
3.	51 – 60	5	Incomplete Score
4.	61 – 70	2	Incomplete Score
5.	71 – 80	11	Complete Score
6.	81 – 90	3	Complete Score
7.	91 – 100	5	Complete Score
The Numbers of Students		35	
Total Score		2338	
Class Score Average		67	
Complete Numbers of Students		19	
Incomplete Numbers of Students		16	

Based on the analysis of students' critical thinking skills test results, the average score of students is obtained on each indicator. The indicator that has the highest average value is an interpretation or the ability to identify the meaning of words. The second sequence is the indicator of analysis, namely the ability to analyze information obtained from reading. Then, followed by inference indicators namely the ability to infer information, and finally, the explanatory indicator is the ability to describe information.

Table 3. Student scores for each indicator of critical thinking skills.

	Critical Thinking Skills Indicator							
	Interpretation		Analysis		Inference		Explanation	
Question Number	3	7	1	2	4	5	6	8
Average Score	3.4	2.6	2.7	3.1	2.7	2.6	1.8	2.5
Average Score of Each Question Item	84.3	64.3	68.6	77.9	67.9	65.7	44.3	61.4
Score of Each Indicator	74.3		73.2		66.8		52.9	

The results of the critical thinking skills test showed that only 19 students or around 54% had scored above the minimum completeness criteria set by the school which was 70. The average grade obtained was also quite far with the minimum completeness criteria score of 67. Then, the acquisition of student scores in each indicator of critical thinking skills in a row from highest to lowest are interpretations with a mean value of 74.3, analysis with a mean value of 73.2, inference with a mean value of 66.8, and finally an explanation with a mean value of 52.9.

Table 4. Percentage of student's answer in each score.

Critical Thinking Skills Indicators	Number of Students per Answer Score							
	4		3		2		1	
	N	%	N	%	N	%	N	%
Interpretation	31	44.3	16	22.9	13	18.6	10	14.3
Analysis	29	41.4	19	27.1	10	14.3	12	17.1
Inference	18	25.7	25	35.7	13	18.6	14	20
Explanation	19	27.1	4	5.71	13	18.6	34	48.6

Based on table 4 above, it can be obtained the number of students on each answer score of each indicator of critical thinking skills. The percentage of students on interpretation ability with the highest answer score of 4 reached 44.3% of the total number of students. The percentage of students on scores 3, 2, and 1 is 22.9%, 18.6%, and 14.3%. Based on the overall analysis of student answers, it was found that students with less than the maximum score could not identify the meaning of words based on the text. Students answer with answers that have nothing to do with the meaning of words in the problem. Some students also answer the meaning of words out of context. Furthermore, some students answer meaning incompletely.

The lack of complete student answers can be caused by the level of critical thinking skills of students who are only at the level of initial thinking (beginning thinking) and thinking practice (practicing thinking). According to research of **Error! Reference source not found.**, **Error! Reference source not found.**, the beginning thinkers began to be able to modify their thinking abilities but had limited insight so they lacked systematic planning. The practicing thinker can begin to analyze his thoughts but also has insights that are not deep enough. This causes students to be able to analyze the questions but the answers are incomplete.

The indicator with the second-highest average is analysis. The percentage of students in the analysis ability indicator with answer scores 4 to 1 in a row is 41.4%, 27.1%, 14.3%, and 17.1%. There is an increase in the percentage of students who get an answer score of 1 from the previous indicator. Based on the analysis of student answers as a whole, student errors in analyzing information and describing it as a fact that is due to a lack of systematic and incomplete information presented in the answers. The information students must get in the problem with the news text is already explained in detail but implicitly. However, students only mention some of the overall information.

This low student analytical ability is supported by observations that show the behavior of students who rarely ask questions to the teacher or their peers. Students are only diligent in answering the

teacher's questions but when asked to ask questions students just stay quiet. When interviewed, students claimed that they did not have questions that they wanted to ask solely because there were none because they did not pay attention to the lesson. Fact, the ability to ask students is the entrance to analytical, critical, and creative thinking. The more students often ask, the greater the possibility of high analytical, critical, and creative abilities **Error! Reference source not found.**. F and O (Fact and Opinion tests) can develop and evaluate students' analytical skills more effectively **Error! Reference source not found.**.

Furthermore, the percentage of students on the indicator of inference ability with a score of answers 4 to 1 in a row that is 25.7%, 35.7%, 18.6%, and 20%. Just like students' mistakes in answering analysis questions, students cannot deduce information precisely because students answer with information outside the context of the problem. Some questions require students to conclude how to prevent infectious diseases of the respiratory organs based on the text of the interview with the doctor. Students answer how to prevent the disease with answers outside the text of the interview. Students answer by memorizing how to prevent infectious diseases of the respiratory organs that were taught at the previous meeting.

The low value of students in concluding questions with long enough reading can be caused by low student interest in reading. This low student interest in reading is caused by a lack of student awareness about the benefits of reading and students often apply wrong habits when reading such as reading out loud or by pointing fingers which makes the reading activity ineffective **Error! Reference source not found.**. Besides the low ability to conclude can also be caused by the inability of students to summarize the statements contained in a statement, describe and understand aspects of the problem concluded. This is in line with the opinion of **Error! Reference source not found.**, **Error! Reference source not found.** which states that the skill to conclude the ideal reading is the activity of summarizing statements, describing, and understanding various aspects gradually to form conclusions.

Finally, the percentage of students on the explanatory ability indicator with 4 to 1 answer scores in a row is 27.1%, 5.71%, 18.6%, and 48.6%. Students who get a minimum answer score reaches almost half of the total number of students. This puts the explanation indicator as to the indicator with the lowest average value. Students are not able to explain the information requested in the problem. For example, some questions present a table of research results regarding the intensity of the breath that is affected by various bodily activities. Students incorrectly explain that the information in the table is the number of breaths that are influenced by gender because in the table there are names of male and female students. Then, students simply copy the numbers in the table into the answers and do not explain it.

When giving explanatory questions to students, many students who complain of difficulties even ask the teacher continuously about how to answer the question. The results of interviews of several students showed that students did not understand how to explain the answers to these questions. Students do not understand what is asked by the problem. In the example questions above, which requires students to explain that the results of the research table are tables that present differences in the number of breaths in various activities. The more activities of the human body, the faster and more breathless. This is because the body needs more oxygen. But when interviewed the students answered did not understand how to do it and did not understand the differences in the table so students decided to copy the words in the table and then arranged into paragraphs. They made the paragraph as a form of explanation requested by the matter. The solution to deal with these problems is to arrange questions that use words familiar to students and have a gradual level of complexity**Error! Reference source not found.**, **Error! Reference source not found.**.

Then, it can be concluded that students are not able to identify the purpose of the problem. According to the results of interviews with teachers, the factor considered to be responsible for the low ability of students 'explanation was the lack of students' familiarity with such questions. The teacher recognizes that students are only served with multiple choice questions and short answers so far. This causes students not accustomed to answering questions with descriptions that require explanatory abilities.

Student learning motivation is measured using 34 items of learning motivation questionnaire. The questionnaire has passed the expert test with language lecturers, counseling guidance lecturers, and education evaluation lecturers. Based on the results of the validation of the questionnaire instrument trial, there were 24 valid questionnaires and 10 invalid items. The reliability test results showed a high level of learning motivation questionnaire reliability that was equal to 0.735. Student learning motivation can be categorized into high, medium and low learning motivation. Based on the results of the categorization, it was found that as many as 20% of students with high learning motivation, 46% of students with moderate learning motivation, and 34% of students with low learning motivation.

Table 5. Student's learning motivation categories.

Learning Motivation Categories	Interval	Frequency	Percentage
High	56 – 66	1	20%
	67 – 77	6	
Medium	78 – 88	9	46%
	89 – 99	8	
Low	100 – 110	10	34%
	111 – 121	1	

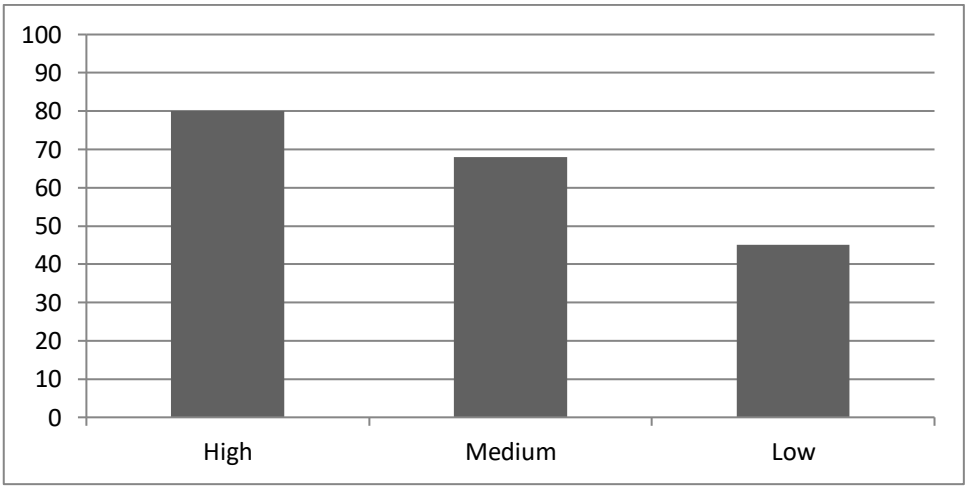

Figure 1. Average student's score based on learning motivation categories.

Simple linear regression analysis shows the magnitude of the correlation or relationship value that is equal to 0.715. There is an influence of learning motivation on students' critical thinking skills as indicated by the simple linear regression equation Y = 56.052 + 0.514X. The equation means that if there is no value of learning motivation, then critical thinking skills will increase by 56,052. This means that each increase in learning motivation by 1, then critical thinking skills will increase by 0.514. The influence of learning motivation on critical thinking skills is indicated by the coefficient of determination of 51.2%, while the rest is influenced by other variables.

The significance value of a research hypothesis is the truth value of the hypothesis rejected or accepted. H_o is accepted if t arithmetic is smaller than t table, and H_1 is accepted if t arithmetic is greater than t table. Simple linear regression analysis showed a count of 5.880 with a significance level of 0.000 <0.05. While t table with a significance level of 0.025, df = 35-2 = 33 is equal to 2.0345. Based on the results of the t-test analysis it was found that the value of t arithmetic is greater than t table, it can be concluded that there is an influence of learning motivation on critical thinking skills.

Furthermore, based on the results of the t-test analysis, it can be concluded that there is an influence of learning motivation on critical thinking skills by 51.2%. This can be seen from the comparison of the average value of the critical thinking skills of students in each category of learning motivation. The mean value of critical thinking skills of students with high learning motivation is 80,

students with moderate motivation 68, and students with low motivation 45. This can prove that the higher the motivation of learning students, the better critical thinking skills.

The results of this study are in line with research by **Error! Reference source not found.**, **Error! Reference source not found.**, **Error! Reference source not found.**, who stated that students with high learning motivation have an interest in problem-solving and critical thinking that are higher perfectionists and have an impact on their thinking ability and learning achievement. Therefore, students with high learning motivation are usually eager to add insight that can be used as a provision to clarify and analyze their thoughts.

Qualitative data obtained from the interviews of several students, as well as learning observations. Interviews were conducted with several fifth-grade students and fifth-grade teachers. Students were selected using purposive sampling techniques, where when researchers felt they had strong data, the interviews could be stopped. The observation was carried out for 6 times learning. Interviews are conducted at the end of each lesson.

Observation results show students with high learning motivation have higher learning activities during the learning process. Students actively give arguments by raising their fingers when the teacher throws questions, students try to answer even if the tip is wrong and justified by the teacher. Then, students actively express their opinions in group discussions and presentations to the maximum. Also, students actively work both individual and group assignments given by the teacher and are done to the maximum. For example, when a teacher asks students to answer 4 impact points due to illegal logging, students can answer 4-6 answers.

When interviewed, students claimed the spirit of learning because learning is their obligation as a student. Some students said they liked challenging questions and wanted to master more material than other friends. This is in line with the results of interviews with teachers stating that only a few students dominate the class and are always active in learning, among the active students most are students with high learning motivation.

Students with learning motivation have moderate critical thinking skills too. This is in line with the results of observations on some students with moderate learning motivation, namely students claiming the spirit of learning but when confronted with questions that are quite complicated for them and group assignments that require a lot of learning activities, they tend to give up quickly. Then, when asked if the problem likes challenging and the problem continues, students answer no. Students tend to be satisfied with their ability to answer a problem and do not want any additional questions to enrich their abilities. This causes the low insight of students in solving problems because students easily give up on learning and only try when faced with the material they like.

Students with low learning motivation have low critical thinking skills too. Observation results show students with low learning motivation lack enthusiasm in the teaching and learning process. Students do not participate in discussions and more often delegate group responsibilities to students who are considered smarter. Students also tend to ask for more rest time than study time and are not happy if appointed by the teacher to convey the results of discussions in learning. Also, students with low learning motivation often complain when answering questions that contain quite long reading texts, and problem descriptions.

This is supported by the results of the interview which states that the saturation of the questions has a long reading. Students are lazy to read too long and prefer to be the person who writes group assignments rather than people who think and present their group discussion assignments. This is in line with the opinion of **Error! Reference source not found.** which states that students with low learning motivation will tend to have low critical thinking skills as well. This is because students lack interest in problem-solving problems, do not like challenges, and do not have demands for learning outcomes.

4. Conclusion

Based on the results and discussion of the above research, it can be concluded that the critical thinking skills of students in SD Jagalan reach a mean score of 67. Indicators of critical thinking skills from

highest to lowest successive are interpretations with a mean of 74.3, analysis with a mean of 73, 2, inference with mean 66.8, and explanation with 52.9. Furthermore, there are 20% of students with high learning motivation, 46% of students with moderate learning motivation, and 34% of students with low learning motivation.

Based on the results of simple regression analysis shows the value of the correlation or relationship that is equal to 0.715. The influence of learning motivation on critical thinking skills is indicated by the coefficient of determination of 51.2%, while the rest is influenced by other variables. This is supported by the average value of critical thinking skills of students with the high motivation of 80, low motivation of 68 and 45. So, it can be concluded that there is an influence of learning motivation on critical thinking skills. The higher the motivation of students to learn, the higher their critical thinking skills.

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