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CRITICAL THINKING SKILLS AND THEIR IMPACTS ON ELEMENTARY SCHOOL STUDENTS

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ABSTRACT

Purpose – This study aimed to examine elementary school students' critical thinking skills and their impact.

Methodology – This research was a qualitative case study. The subjects of this study were 29 fifth-grade students and three teachers at an elementary school, chosen by a purposive sampling technique. Data were collected through observation, interviews, and critical thinking skills tests with open description types. The data validation technique used triangulation, applied to the study's methods, sources, and theories. The data analytical framework of this research employed Milles and Hubberman's (1994) interactive analysis model with the following stages: data validity, data collection, data reduction, data presentation, and drawing conclusions.

Findings – Based on the research result analysis and discussion, only 10% of students whose scores were above the minimum completeness criteria from the school, and the class average only reached 50 out of 100. The scores on each indicator of critical thinking skills from the highest to the lowest, respectively, were inference with an average of 70, analysis with an average of 63, interpretation with an average of 56, and explanations with an average of 50. This low critical thinking skill was caused by students' mistakes in answering the test questions. This research concluded that elementary school students' critical thinking skills were still very low and caused by student factors: (a) students' answers were not systematic; (b) students identified questions incorrectly and simply summarized the questions, then using them as answers directly; (c) misconception; (d) students relied on memory, not understanding. Meanwhile, the teacher factors comprised: (a) the learning model used by the teachers was dominant in the direct learning model with the lecture method; (b) the problem description provided was not familiar for students; (c) the problem and its resolution strategy offered did not make the students understand; (d) the teachers did not understand the material, lacked expertise in delivering the material, and used the textbook as the only source of information and delivery content.

Significance – The study results indicated that the elementary school students' critical thinking skills were still low due to several factors. These factors were originating mainly from the students and teachers themselves. The implication is that the school needs to pay more attention to strategies to improve and develop students' critical thinking skills in the future. The findings can be used as a reference point when considering the planning of effective strategies to improve the teaching and learning of critical thinking skills in elementary schools.

Keywords: Critical thinking skills, affecting factors, elementary school, case study.

INTRODUCTION

In Indonesia, the 2013 curriculum is the curriculum used today. The 2013 curriculum requires students to master technological developments and emphasizes the importance of 21st-century skills (Minister of Education and Culture of the Republic of Indonesia Regulation Number 67 of 2013). In elementary school, one of the

21st-century skills emphasized in the learning process is critical thinking skills. Thinking skills are one set of life skills that need to be developed through the educational process because they can determine the success of one's life. Barell (2003) said that critical thinking skills are essential to be achieved by implementing a learning curriculum. Fisher (2008) has defined critical thinking as a skilled activity that demands interpretation and evaluation of observation, communication, and sources of information and is guided by intellectual standards in the form of clarity, relevance, adequacy, and coherence. According to Paul and Elder (2008), critical thinking is seen as analyzing and evaluating thinking to improve it; in other words, independent thinking, self-discipline, self-monitoring, and self-correction (cited in Mutakinati, 2018). Furthermore, critical thinking skills have been explained as a thinking process that requires high cognitive processes (Suwono et al., 2018) through analyzing problems, making arguments, evaluating, making decisions, and solving problems (Johnson, 2011). Moreover, critical thinking can be described as a systematic process that allows a person to evaluate the evidence, assumptions, and logic underlying his/her opinions and those of others, to develop a deep understanding that can affect life in the future (Facione, 2015; Fajari et al., 2020a).

Karakoc (2016) and Reichenbach (2001) identified critical thinkers as people who can think analytically and synthesize the truth or value of an idea or belief before accepting it. Students who possess the ability to think critically can ask questions well, provide effective and efficient information, make rational decisions from something trusted or unbelievable (objective), and arrive at conclusions consistent in the process of solving a problem (Bustami et al., 2018; Cahyarini et al., 2016). Someone can be called a critical thinker if he/she can do the following: ask essential questions about the problem, collect and assess relevant information, make conclusions and solutions with the right reasoning, think openly, and communicate his/her thoughts effectively (Paul & Elder, 2008). The indicators of students who possess critical thinking skills, according to Facione (2015), are interpretation, analysis, inference, evaluation, explanation, and self-regulation. In this case, learning in schools should be able to develop students' critical thinking skills.

Some experts have claimed that several things influenced critical thinking skills: physical concentration, learning concentration, intellectual development, and learning motivation (Gul et al., 2014; Saeger, 2014; Fajari et al., 2020b). Hakim et al. (2018) argued that

students' initial knowledge would influence their critical thinking skills. It was because one could develop one's mindset in accordance with one's initial concept. Furthermore, Saragih and Zuhri (2019) affirmed that interactions affect critical thinking processes, especially interactions during teaching and learning. A conducive and active learning atmosphere would also increase students' enthusiasm in the learning process, and as such, students could concentrate on solving a given problem. In addition, factors such as individual personality, emotions, and culture could also influence critical thinking skills in solving a problem (Lun et al., 2010; Stedman & Andenoro, 2007).

Moreover, in the modern education era, critical thinking is an essential topic. The learning-oriented to critical thinking skills aims so that students with high critical thinking skills can achieve the competency standards set in the curriculum and design and navigate their lives in the future filled with challenges, competition, and uncertainty (Vieira & Tenreiro-Vieira, 2014; Darling-Hammond et al., 2020). Critical thinking can be effectively taught in a school environment that relies on teachers' roles in memorization and teaching methods. In this regard, a common theme in the critical thinking movement is thinking skills, which involve the ability to make reasonable decisions in complex situations. This movement emphasizes knowing how rather than knowing what. Therefore, efforts to help students obtain these abilities require self-awareness as part of the efforts from educators and, of course, students who explore critical thinking by utilizing teacher teaching methods (Fajari et al., 2020c; Puspita & Aloysius, 2019). To improve students 'critical thinking skills, teachers must use learning methods that emphasize students to be more active in the learning process and help improve students' thinking skills through analysis (Robinson & Kay, 2010). It is in line with the opinion of Fajari et al. (2020a). They asserted that learning that can improve students' critical thinking skills is by relying on inculcating concepts, using active teaching methods conducted by the teacher, and involving students' ability to make rational decisions in complex situations.

Nevertheless, the facts in the field show that critical thinking skills in Indonesia are still low. Based on a survey conducted by the World Economic Forum (WEF) on the 2016-2017 Global Competitiveness Index (GCI), Indonesia was ranked 41st out of 138 countries, under GCI Malaysia and Thailand (Nababan, 2019). It was influenced by the workers' education level, especially critical power abilities and analytical thinking abilities (Changwong et al., 2018). Globally, some studies have also demonstrated survey results that students' critical

thinking skills were also at a low level, including Pyongsangwal's (2018) study in Thailand, Manshaee et al. (2014) in Iran, Sarigoz (2012) in Turkey, and Massa (2014) in Italy. It aligns with several studies' results in Indonesia that revealed low levels of critical thinking skills at every level of Indonesian education. The studies disclosing the low critical thinking skills in junior high school students were carried out by Fuad et al. (2017) in Kediri, East Java, and Marlina et al. (2016) in Ogan Ilir, South Sumatra. High school students' critical thinking skills were also stated to be low based on a survey from Setiawati and Corebima (2017) in Pare-Pare, South Sulawesi. Besides, Mahanal et al. (2016) and Asyari et al. (2017) concluded that students' critical thinking skills at universities X and Y were low. Specifically, at the elementary school level, students' critical thinking skills were also still low. Wijayanti et al. (2015) exposed that based on an analysis in the three primary schools of Buleleng Subdistrict, the critical thinking skills were still low. Furthermore, Budiana (2013) explained the initial test results of critical thinking skills in his study, which found that the percentage score of each aspect of critical thinking skills was less than 40 percent or still relatively low.

If not handled properly, the low level of students' critical thinking skills will negatively impact the next level. Students will not be able to develop their thoughts in dealing with everyday problems, and it will affect the quality of education in Indonesia. It is consistent with Taleb and Chadwick (2016), who argued that the low level of students' critical thinking skills impacted analytical skills in drawing conclusions, adapting to higher-level thinking, and distinguishing truths and facts. Emerging Markets Consulting (2014) added that students' low critical thinking affected improving the quality of education in the face of the ASEAN Economic Community (AEC). Therefore, to build critical thinking skills, the teacher should help students with modern learning, active inquiry, and problem exploration (Changwong, 2018).

Many studies have shown that elementary school students' critical thinking skills are still low. However, these studies only focused on improving critical thinking skills by experimenting with several methods, media, or models. The novelty of this research lies in the topic raised, namely studying critical thinking skills. It is not only described as quantitative figures but also analyzed in-depth and thoroughly related to the factors influencing critical thinking skills to be used as guidelines for developing teaching strategies and improving teaching and learning processes for elementary school students in Indonesia. Thus, this study highlights students' critical thinking skills

with indicators: interpretation, analysis, inference, and explanation. This study aims to examine students' critical thinking skills and the factors influencing them at the elementary school level.

METHODOLOGY

This research was a case study using a qualitative method. Starman and Biba (2013) stated that a case study is one type of qualitative research combining interpretive paradigms, phenomenological approaches, and constructivism to create whole meaningful facts according to the study's objectives. In this study, the subjects were 29 fifth-grade students and three teachers. The selection of the subjects for this study was through a purposive sampling technique. Purposive sampling has been described as a deliberate sampling technique, meaning that individuals were selected due to specific reasons or considerations, such as the information completeness about research problems (Buyukozturk, 2014). Purposive sampling is also seen as suitable for qualitative research because it allows researchers to take samples that meet their research criteria and are in accordance with research objectives. It can also increase the data validity obtained (Ethikan et al., 2015). Criteria for inclusion as subjects in the current research were as follows: (1) students who were still in elementary school; (2) teachers directly related to the learning process; (3) students and teachers who were willing to be research subjects; and (4) schools that had obtained permission from local officials. Meanwhile, the exclusion criteria were the students or teachers who were unwilling to be involved in the research and teachers who were not directly involved in the learning process. In this study, the researchers chose fifth-grade teachers, sports teachers, and religious teachers directly involved in teaching fifth-grade students. The researchers also selected several students with the criteria of having critical thinking skills based on the test results: high, medium, and low. The study was stopped when the data collected were considered sufficient and representative of the study sample.

Data were collected through observation, interviews, and critical thinking skills tests. The type of observation used in this study was a non-participatory observation. Researchers did not involve themselves in activities observed, and they only acted as observers. Observations were made to obtain data on students' critical thinking skills in the teaching and learning process in the classroom. Besides, semi-structured interviews were conducted with teachers and class students. In-depth interviews were carried out naturally, not formally, but based on flexible interview guidelines that had been prepared. It

aimed to make it easier for the interviewers to explore questions and avoid the questions from straying away from the research objectives. The sequence of questions was not the same for each participant, depending on the interview process and each individual's answers. The interview procedure used in this study followed the protocol suggested by Creswell (2014): (1) identifying participants and determining the type of interview to be conducted; (2) preparing a suitable recording device; (3) determining the place to conduct the interview; (4) getting informed consent from prospective participants; (5) adapting the prepared questions according to the situation and always be polite during the interview. In order to improve the data accuracy, interviews were recorded with an audio recorder, and observations were recorded with a video recorder.

On the other hand, the critical thinking skills test consisted of eight open-ended questions aimed at accommodating the broadest student answers but could still assess their critical thinking skills. The test instrument was designed with reference to the guidelines on the learning materials that the students studied and adjusted to the cognitive level (C1 to C6) to measure critical thinking skills with indicators from Facione (2015). The test instrument was tested for content validity with several experts, including critical thinking skills experts, learning instrument experts, Indonesian language experts, and child education psychology experts. Its construct validity was examined by first testing it in other schools. The eight questions were declared valid and could be used in the present research. For this study, four of the eight original questions were selected, each representing an indicator of specific critical thinking skills. As for the test instrument assessment, the scores for each question ranged between 1 and 4. Students got a score of 4 if they could explain the event correctly, thoroughly, and systematically. Score 3 was given if students could explain the event wholly and correctly. Score 2 was assigned if students could explain events correctly. Score 1 was granted if students could explain but incorrectly.

The data analysis technique of this research employed the interactive analysis model of Miles and Hubberman (2018). The data analysis stages were data validity, data collection, data reduction, data presentation, and drawing conclusions. The data validity was done by the triangulation of methods, sources, and theories. According to Creswell (2014), triangulation is a technique of checking the data validity that should utilize various sources with various methods and theories to check or compare data. In this study, the research data collection involved many participants and used various data collection

techniques. Then, the data reduction stage was carried out by summarizing, selecting, focusing, grouping, and categorizing research data according to the theme or pattern created. After that, the stage of research data presentation was done, which has been considered crucial because it would make it easier for researchers to understand the information compiled so that drawing conclusions or taking action in the future is more appropriate. The qualitative data presentation can be done in the form of brief descriptions, charts, tables, relationships between categories, graphs, and so on. Finally, drawing conclusions were performed, and it can be repeated. Initial conclusions drawn in qualitative research are temporary and can develop to adjust the data or other evidence collected in the field. The conclusion in question is an object's description that was previously unclear to become apparent after the examination.

RESULTS

Results of the Critical Thinking Skills Test

The indicators of critical thinking skills measured in this study were interpreting, analyzing, concluding, and explaining. The tests carried out referred to the grading and question assessment rubrics and the minimum completeness criteria set by the school, which was 70. The results of the tests of students' critical thinking skills are as presented in Table 1.

Table 1

Critical Thinking Skills Test Results

No.	Score Interval	Frequency	Percentage	Description
1.	25 – 39	10	34%	Incomplete Score
2.	40 – 54	8	28%	Incomplete Score
3.	55 – 69	7	24%	Incomplete Score
5.	70 – 84	3	10%	Complete Score
6.	85 – 99	1	3%	Complete Score
Total Number of Students		29	100%	
Total Score				1458

(continued)

No.	Score Interval	Frequency	Percentage	Description
Class Average				50
Numbers of Students with Complete Score				3
Numbers of Students with Incomplete Score				26

It is clear from the results displayed in Table 1 that the average score of students was still less than the minimum completeness criteria set by the school for the fifth grade of 70. Only four students, or around 13 percent, were with grades above the minimum completeness criteria. Besides, the class average only reached 50, and only 16 out of 29 students or around 55 percent of the total students were more than the class average. In addition, 13 students or around 44 percent of students had scores below the class average. It indicated that the critical thinking skills of fifth-grade students were still very low.

Table 2

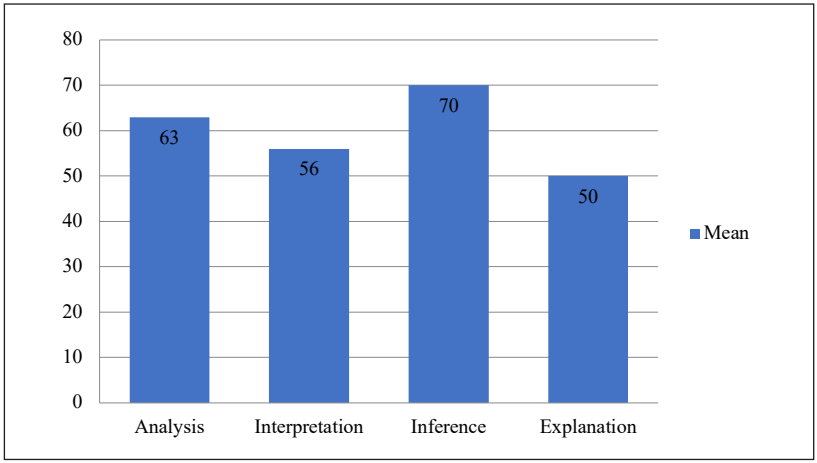
Student Scores for Each Indicator of Critical Thinking Skills

Indicator	Number of students per range of answer scores				Total Score
	1	2	3	4	
Interpretation	19	1	1	8	56
Analysis	15	1	6	7	63
Inference	7	11	3	8	70
Explanation	18	6	0	5	50

Critical thinking skills were measured in this study with the following indicators: the ability to interpret, analyze, conclude, and explain. Table 2 provides more detailed data on student grades per the indicators of critical thinking skills. In this study, inference indicators were with the highest average score, complete minimum school completeness criteria, and above-average grades. The analysis indicator occupied the second highest indicator of critical thinking skill and was above the average class score. Then, it was followed by the last indicator of interpretation and explanation that had an average of precisely the average grade score of 50. The data are presented in Figure 1.

Figure 1

Students' Scores for Each Indicator of Critical Thinking Skills



The 'interpretation' indicator test result:
As an indicator of interpretation skill, students were expected to understand and express the meanings of various situations, data, experiences, events, judgments, beliefs, rules, procedures, and criteria. To measure the interpretation indicator, a problem with reading about types of business was presented, and students had to explain the meaning of the term to increase agricultural output (intensification, extensification, diversification, rehabilitation, and mechanization) correctly. The following transcript provides the details of the sample questions used to test the interpretation indicators and the excerpts of students' responses as evidence of their ability to use the appropriate critical thinking skills abilities.

'Interpretation' test question:
Pak Budi has a farm in the back of his house. A few years later, Pak Budi made an extension by clearing forests and bushes in other areas to expand his farming business. In addition, Pak Budi mechanized by buying soil processing machines such as tractors and grain grinding machines to simplify his work.
Based on the paragraph above, explain the meaning of the words extensification and mechanization!

On the question that measured the interpretation indicator as in the excerpt above, some students could identify the meaning of a word contained in the reading. However, most students could not identify

the meaning of the word. Many of them answered by (a) mentioning meaning briefly without explanation, (b) summarizing the question and making it an answer, (c) and answering it unsystematically. A comparison between students who answered questions correctly and students who got the minimum score is as follows.

Example of student answer with a maximum score:
Extensification means an agricultural business by opening forests & bushes in other areas to expand the agricultural business. The meaning of mechanization is the effort to buy soil processing machines such as tractors and grain grinding machines to facilitate their work.

Example of student answer with a minimum score:
Mmmmm… Mr. Budi owns land and plants rice, corn, and sugar. Mr. Budi cleans Pak Budi's business; the extent of Mr. Budi expands.

The 'analysis' indicator test result:
On the analysis indicator, students were expected to identify the intent and correct conclusions in the relationship between statements, questions, concepts, descriptions, or forms of statements intended to express beliefs, judgments, experiences, reasons, information, or opinions. To measure the analysis indicator, a problem with reading about a case of the animal respiratory system was presented, and students had to analyze the cause of the case correctly. The following excerpt gives the details of the sample questions used to test the analysis indicators and the students' responses as evidence of their ability to use the appropriate critical thinking skills.

'Analysis' test question:
Rudi, Tino, and Andre planned to fish. They decided to look for the bait that would be used on the fishing rod. Tino returned home and brought a pot of saltwater. Together, they scratched the ground using a ground fork then poured salt water into the ground that has been scratched. A few moments later, worms wriggled to the surface.
Based on the paragraph above, explain the cause of earthworms writhing and getting out of the ground when doused with salt water!

Similar to the interpretation indicator, on the analysis indicator, several students have understood the intent of the problem and could analyze the causes of an event in the reading presented. However, most students still did not answer correctly. The majority of students' wrong answers were: (a) misconception of the animal respiratory system, (b) incorrectly identifying the cause of an event, and (c)

answering non-systematically. Students held misconceptions about animal respiratory devices; for example, students answered, 'worms breathe with their lungs'. Furthermore, students incorrectly identified the cause of the emergence of worms that were doused in salt water, namely by answering that the worm could not breathe underground so that it came out of the ground. The other answer was that the worm has thin and smooth skin so that when watered with saltwater, the worm's skin will become rough and came out of the ground. A comparison between students who answered questions correctly and students who got the minimum score is as follows.

Example of student answer with a maximum score:
Because earthworms breathe using moist skin. So, water mixed with salt will cause the earthworm's skin not to be moist and the earthworm to stretch to the ground to take air or oxygen.

Example of student answer with a minimum score:
Worms breathe with the lungs because they feel tight in the ground; the worms rise to get air to breathe.

The 'inference' indicator test result:
In the matter of inference, students were expected to identify and select the elements needed to make rational conclusions, make hypotheses, and consider relevant information. To measure the inference indicator, students were presented with a question with the text of the interview regarding the respiratory disease, and students should conclude how to prevent contracting respiratory diseases correctly. The following excerpt details the sample questions used to test the inference indicators and the students' answers as evidence of their ability to use the appropriate critical thinking skills.

'Inference' test question:
Note the following dialogue interview from Dani's group with the doctor!
Dani, Safi, Riris, and Kanza were given the task of interviewing doctors about respiratory organs' diseases.

Dani : "Assalamualaikum, Doc! We are a group of 5 from class V of SDN Sukacita who will interview Doctor Rudi about diseases of the respiratory organs, Doc."
Doctor: "Oh yeah, come in!"
Dani: "Doc, yesterday, our friend was sick. After checking into the doctor, it turned out that he was sick with influenza. Now, we still do

not understand what the connection between breathing instruments and influenza pain is that our friends have suffered?"
Doctor: "Influenza is a disease of the human respiratory system. In addition to influenza, there is also tuberculosis, ARI, bronchitis, asthma, sinusitis, diphtheria, and some more diseases that interfere with respiratory organs."
Riris: "Oh yeah, Doc. Then, what are the symptoms of influenza?"
Doctor: "Nasal congestion, pain throat. Now the nose and throat are respiratory organs, right?"
Safi: "Yes, Doc. So, that means influenza attacks the respiratory organs. Then, how can we not be infected by people who are suffering from influenza or other respiratory diseases, Doc?"
Doctor: "It is easy. For sure, we have to get a healthy life. First of all, we have to protect the surrounding environment so that it is free from pollution, especially air pollution because it is always breathing oxygen. Air containing harmful bacteria and viruses will be easily inhaled. The next way is to increase indoor air vents. Because, if the air exchange is very little, the fresh air we breathe will be even less. Then, do not forget always to exercise, huh. Exercising regularly also prevents us from breathing disorders. If we lack exercise, blood flow in the body is not smooth, so nutrients for organs are very lacking. Even though our breathing has several organs, right?".
Kanza: "Yes, Doc. Thank you very much for the knowledge, Doc".
Based on the interview text above, explain how to prevent contracting respiratory diseases!

In the inference indicator, some students answered correctly and systematically. However, most students got low scores because their answers were (a) incomplete and unsystematic, and (b) only a summary of the questions and then making answers. In fact, student answers were contained in the reading because they were only asked to infer based on the reading. The answers between students who answered the questions correctly and students who got the minimum score are as follows.

Example of student answer with a maximum score:
We must familiarize healthy living and maintain the surrounding environment free from pollution, especially air pollution, because every time we breathe oxygen, we increase indoor air ventilation and exercise regularly.

Example of student answer with a minimum score:
Dani and his friends were given the assignment to Dani's doctor to the doctor's house to color his friend Dani he fell ill with influenza. The

throat is a respiratory organ. If he is allowed to catch it to his friends, then his friends fall ill.

The 'Explanation' Indicator Test Result

The explanation indicator is a person's ability to present the results of reasoning through belief and sensibility. This ability is seen when someone justifies a reason based on evidence, concepts, methodologies, and logical criteria of information or data. In this study, explanatory indicators were measured by presenting questions equipped with a table of research results on body activity and its effect on the intensity of human breathing, and students should explain the research results correctly. The following excerpt details the sample questions used to test the explanation indicators and the students' answers as evidence of their ability to use the appropriate critical thinking skills.

'Explanation' test question:
Consider the table of research results below!

Name	*Number of breaths in various activities*			
	Sleep	*Sit*	*Jogging*	*Run Fast*
Adel	*11 times/ minute*	*15 times/ minute*	*30 times/ minute*	*45 times/ minute*
Juniardi	*12 times/ minute*	*16 times/ minute*	*31 times/ minute*	*46 times/ minute*
Ade	*11 times/ minute*	*16 times/ minute*	*30 times/ minute*	*45 times/ minute*
Hasbi	*12 times/ minute*	*15 times/ minute*	*32 times/ minute*	*45 times/ minute*
Fadhil	*11 times/ minute*	*15 times/ minute*	*30 times/ minute*	*44 times/ minute*
Zaza	*11 times/ minute*	*15 times/ minute*	*32 times/ minute*	*44 times/ minute*

Based on the data from the research results above, explain the research results on the number of breaths in these various activities!

In questions that measured explanatory indicators, mistakes made by students included: (a) only describing table data and making answers, (b) incorrectly identifying questions, (c) incomplete and less systematic, and (d) too short without explanation additional support. There was no mention of differences in body weight in the above questions, but some students answered that each person's weight influenced the number of breaths in the above research results. In

addition, students were not careful and noticed no influence of gender, but many students answered that the number of breaths in the matter was influenced by gender. The comparison of answers between students who answered the questions correctly and students who got minimum scores is as follows.

Example of student answer with a maximum score:
Because the number of breaths each person varies. When we sleep, sit, jog, and run, it will make our breaths different. Pulling your breath while sleeping is less than breathing when sitting, less than when we run small, and smaller than when we run.

Example of student answer with a minimum score:
Because Adel, Juniardi, Hasbi, and Fadhil, Zaza had different postures and had different activities.

Based on the analysis of student's answers to the critical thinking skills tests above, it could be concluded that most of the students' mistakes in answering were not systematic. The same results were obtained by Fajri (2016) in his research, stating that some students did not answer with elements of unity and coherence, or their answers were disorganized and using wrong words. The students' memorizing habits and the lack of intensity of answering these description questions resulted in students' answers being less systematic and not coherent. In fact, in writing, unity, systematic, and demanding are essential elements. It is supported by Duan and Qin (2012), stating that for essential elements and making writing interesting, easy to read, and easily captured, the main idea is a sentence that contains unity, coherence, right words, and a harmonious combination of words.

Interview and Observation Results

Analysis of student answer errors in the critical thinking skills test revealed that students only summarized the questions and made answers. This finding was supported by the interview results with several students who stated, "I am confused about what to answer, so I summarized the test questions." and "I think this is a summarizing test, so I conclude the test question." It indicated that students had no willingness to ask, did not know what to ask, etc. It is because students did not understand the question and the answers to it. This finding is reinforced by Saja's (2018) research, which examined the difficulties faced by students in problem-solving problems. The results showed that many students did not understand the sentence

contained in the question, students did not understand the intended meaning of the question, and students did not understand what was asked in the question to be answered. Etemadzadeh et al. (2013) study also revealed that students had difficulty completing the problem description. It was because they did not understand the questions, as they were only used to memorizing answers to questions. In addition, when students were asked to answer questions in the form of stories, most of them did not understand, and when asked to explain their work results, many students were still confused. As a result, their scores were low.

Analysis of the student's answer errors in the form of unsystematic answers and students who only summarized the question and then used it as an answer as explained above was caused by students who were not accustomed to dealing with questions in the form of open descriptions. Students more often filled in questions that presented answer choices and required them to answer briefly, such as limited description questions in the form of a brief description. It was evidenced by the interview results from several students who stated, "I prefer multiple choice questions rather than the description questions with the long answer." Moreover, "the teacher rarely uses the test questions in the daily test, only in the midterm or end of semester tests. Thus, we are not used to filling out the description questions."

This observation was also supported by the interview results with fifth-grade teachers, who stated, "I use multiple choice questions and brief descriptions for daily tests, and sometimes free descriptions." Then, the teacher also added, "Examples of free description questions that I use are like "Mention 3 functions ...", "Explain your understanding ...", "State the tools used for ..." and many more." From the teacher's statement, it could be denoted that the teacher felt it was difficult to get students to answer the analysis questions because the teacher was accustomed to using multiple choices with low cognitive taxonomy and without problem questions that required students to provide critical answers. The open explanation questions given by the teacher required only the memorization of answers by students rather than developing students' thinking skills. The habit of asking students to fill in multiple-choice questions and providing brief descriptions caused students to be unable to develop better answers to the free/open description problem. This point is confirmed by Putri and Widjajanti's (2019) study, which found that the main factor in the error of students' answers to each item was that students were not accustomed to encountering open-ended questions, so most students did not understand the problem and resolution strategies.

Furthermore, based on the observation results from the group discussions during the learning process, it was found that students had difficulty answering the questions in the discussion sheet. It could be seen from the students' behaviors who still used the recalling process by referring to their study notes to answer questions. Besides, students' critical thinking skills were still low, as evidenced by students' inability to answer group assignments that demanded answers based on their critical thinking. Students preferred to complain about the teacher's difficult task and then copied their friend's work results. It was supported by the interview results from several students, who stated, "The test questions are very difficult, I gave up doing it.", "In my group, there are smart students, so I just watch them do it." and "Sometimes, smart students do it quickly, so I am overwhelmed to follow it, I am slow."

The third analysis of student error was on the issue of student misconceptions. Students in the 'analysis' question answered that the worm breathes with its lungs. When researchers asked questions about worm breathing, students were sure of the answer. However, when students were asked in groups or together, students who claimed worms breathe with their lungs argued with students who thought worms breathe with their skin. It indicated that students experienced misconceptions about how worms breathe. Regarding this, the pretest results in the Silva and Almeida (2017) study uncovered that students in both experimental groups had misconceptions about the respiratory system. The misconception arose because students only memorized material without understanding by observing it directly. In this case, learning presented by the teacher was not meaningful, did not provide space for students to develop their thoughts, and did not generate student activity and interest. Malikah et al. (2016) verified this point that conventional learning and passive students impacted unsatisfactory results and students' disinterest in the learning material. Kurt et al. (2013) also added that using conventional models, if not interpreted correctly by students, could cause misconceptions about the learning material.

This student misconception could be caused by a teacher's lack of mastery or understanding of the material. This point has been supported by several studies, which affirmed that many elementary school teachers held misconceptions. Ilyas and Saeed (2018) explained that teachers held misconceptions about many concepts in science. The research results from Widodo et al. (2017) also revealed that the existence of misconceptions in mathematics among primary

school teachers was predominantly due to their preconceptions about concepts in the subject. Besides, Bayuni et al. (2018) asserted that self-factors predominantly caused misconceptions in primary school teachers.

Furthermore, Zwiep's (2008) study results exposed that most teachers were aware of their misconceptions but did not understand the impact on their teaching. This misconception of elementary school teachers could be addressed by utilizing various teacher education strategies that supported learning at the time of their pre-service program. This view is supported in research by Koray et al. (2007), who examined the influence of learning methods in a laboratory-based study on creative and critical thinking to improve the process skills and academic achievement of primary school teachers undergoing a pre-service program. The study results indicated that the process skills and academic achievements of elementary school teachers in the experimental group with laboratory learning/practicum experience were more successful than those of the control group.

Based on the class observation results in the present study, it became clear that the teacher still did not involve students in the learning process. The dominant teacher used the direct learning model in each lesson. The teacher only utilized textbooks as the main input in their teaching. The teacher wrote the content to be learned on the board, and then students copied it. After finishing writing on the board, the teacher just sat down while waiting for the students to finish copying. Learning was not effective because the level of student understanding was different. 'Learning' was continued only when all students have finished copying. Such a teaching routine caused the class condition to be not conducive because some students who had finished copying the writing began to chat with their friends. After the students finished writing what was on the board, they listened to the teacher's lecture about the material. Then, the lesson was continued by dictating to students the content from textbooks. Students complained because they had to write a lot and felt tired. Learning was not efficient because the teacher had to repeat the words. To complicate matters, some students could not clearly hear what the teacher was saying.

Such a teaching repertoire has resulted in students being given less opportunity to discover and build upon their knowledge discovery. Students were expected to be silent and became passive listeners during the learning process. Teachers dominated class activities by treating students as empty vessels filled with content, not as active

participants in learning activities. As a result, students became passive and not motivated to take part in learning. It was evidenced by differences in student motivation at the beginning and the end of the learning process. Students by nature tended to be active and looked very motivated to learn; however, when the teacher started to teach using only prepared materials, students' motivation started to decrease rapidly, and many complained about this common problem they faced. Such a traditional pedagogical method has undoubtedly failed to develop critical thinking skills because students were not given the opportunity to express their opinions under this one-way learning model.

Based on the interview results with fifth-grade teachers, essential feedback was obtained, among others: (a) teachers often used the direct learning model with lectures, discussions, and rarely conducted experiments; (b) occasionally, the teacher applied a simple collaborative learning model, such as think pair share or learning together in learning and only did it 3-4 times a week in learning; (c) teacher always employed the team quiz model to ask students questions; (d) the reason teachers did not often use innovative learning models was that the teacher considered that the student's understanding level was different, so students who did not understand the material would have difficulty if they had to be faced with various models and demands in their activities.

The fifth-grade teacher also often used media in the form of books during class. It was supported by the interview results with fifth-grade teachers, who stated, "The book has many advantages, Ma'am. Books can provide complete information, and they are easily available, available everywhere, easy to carry, and easy to use. Because the convenience offered by the book is the reason why I often use books as a learning medium." The students also expressed a similar about the heavy reliance of the teacher on the textbook, "The teacher often uses books in learning, the teacher reads books and dictates us to copy in books, or the teacher copies on the board then we copy the writing on the board to our book, and the teacher asks us to read and understand the book in a particular lesson".

In fact, the use of media in the form of books was not entirely effective in learning. Sometimes, some books used language at a higher level posed a daunting challenge to students, and the sentence structures were complex and difficult to understand. Not all students could properly digest what was written in the book, leading to

misconceptions. According to Kose et al. (2009), if the book is the only source of teacher input, it can lead to misconceptions. Galvin et al. (2015) also stated that misconceptions in literature, such as textbooks, are sources of strong misconceptions that may cause problems, such as oversimplification and generalization of difficult concepts, lack of clarity of concepts, and inaccurate analogy. This misconception resulted in a weak accuracy of a student's knowledge. In addition, King's research (2009) affirmed that out of 500 misconceptions identified through surveys, fifteen of them were misconceptions caused by the sentences used in the textbook.

Moreover, the ability of teachers to deliver material also greatly influences the student misconception level. It is indicated by the research of Saracaloglu (2011), which found that the ability of elementary school teachers to deliver material was low, especially concerning their critical thinking skills. In this case, the teacher's limitations in delivering material could be minimized using learning media. Learning media could optimize the process of transferring knowledge from teacher to student effectively and efficiently. It is in agreement with Fajari et al. (2020d), who stated that the media are everything that can be used to channel messages from the sender to the recipient to stimulate the students' thoughts, feelings, attention, and interests in such a way that the learning process can occur. It is supported by the research results of Suhandi et al. (2017), which indicated that visual multimedia used in learning could concretize abstract concepts, showing things that were difficult to display for students directly and reducing misconceptions. Daly et al.'s (2016) study results also revealed that the use of animation could reduce students 'misconceptions, while Kusumaningrum et al.'s (2018) research results uncovered that concept cartoons could diagnose student misconception while reducing it.

CONCLUSION

Based on the research result analysis and discussions, it could be concluded that only three students or around 10 percent whose scores were above the minimum completeness criteria from the school. Besides, the class average only reached 50, and only 16 out of 29 students, or around 55 percent of the total students, had scored more than the class average, while 13 students or around 44 percent of students had scores below the class average. It indicated that the critical thinking skills of fifth-grade students were still very low. The

scores on each indicator of critical thinking skills from the highest to the lowest, respectively, was the category of "inference" with an average of 70, "analysis" with an average of 63, "interpretation" with an average of 56, and "explanation" with an average of 50.

These low critical thinking skill scores were perhaps due to the students' mistakes in answering the test questions. The analysis of the student errors suggests that (a) student answers were not systematic; (b) students only summarized the questions and then used them as answers; (c) misconception. These errors could be due to the following causes: (a) the learning model used by the teacher was dominantly the direct learning model and mainly employing the lecture method; (b) students were not familiar with the problem description; (c) students did not understand the problem and its resolution strategy; (d) the teacher did not understand the material, lacked expertise in delivering material, and only utilized the textbook as the only source of information and content for delivery.

Therefore, it can be denoted that the critical thinking skills of fifth-grade students were still very low. In light of the above conclusions, it is recommended that: (1) future studies should conduct broader, in-depth, and specific research regarding critical thinking skills and the factors influencing them. Besides, (2) by knowing the factors influencing the primary school students' critical thinking skills, elementary school teachers should identify the effective strategies to use in their teaching of the critical thinking skills required by their students.

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