

Profile of Critical Thinking Skills of Elementary School Students in Surakarta City Based on Elements Curriculum Merdeka

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Abstract. One of the focuses of education in Indonesia today is improving students' critical thinking skills. This focus is evident by incorporating the dimension of critical thinking as one of the characteristics that must be developed in the Merdeka curriculum. This research aims to determine the profile of critical thinking skills among elementary school students in Surakarta city as a consideration for the implementation of the Merdeka curriculum. This study used a survey method. The sample consisted of 225 Phase B Grade IV students from 9 elementary schools located in 5 districts in Surakarta city. The sample selection was carried out using purposive sampling, with each district being represented by 2 elementary schools. The research instrument used is a case study-based written test. Questions on the research instrument are formulated based on elements and sub-elements of critical thinking skills derived from government regulations on the Pancasila Student Profile in the Merdeka curriculum. The data was analyzed quantitatively using a descriptive approach. The research results indicate that students' critical thinking skills fall into the low category at 57%, the moderate category at 26%, and the high category at 17%. Based on this data, it can be concluded that the average critical thinking skills of elementary school students in Surakarta city can be categorized as low or inadequate.

1 Introduction

The rapid development of the era, marked by technological and cultural advancements, has given rise to new paradigms in various aspects of life, including education. Education needs to enhance its quality to meet the demands of 21st-century developments. The Indonesian government's effort to improve the quality of education is evident through the implementation of the Merdeka Curriculum. This curriculum is considered to be a response to the intense global competition for human resources in the era of Society 5.0 [1]. Within this curriculum, there is the Pancasila Student Profile, which outlines the competencies and characteristics that students should be taught from early childhood education to middle-level education. The Pancasila Student Profile consists of six dimensions: (1) Faithful, Devout to

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God Almighty, and Noble-Morale; (2) Global Diversity; (3) Mutual Cooperation; (4) Independent; (5) Critical Thinking; and (6) Creative [2].

Critical thinking is a crucial component of the Pancasila Student Profile that is essential in facing challenges in the Society 5.0 era. The ability to think critically empowers an individual to have strong, unwavering thoughts, avoiding being easily swayed or blindly following their surroundings [3]. Critical thinking is highly demanded in the 21st century as it enables an individual to comprehend complex problems, connect and consider information from various perspectives, and find precise solutions to issues [4], [5]. Engaging in critical thinking makes a person open-minded to all existing facts, enabling them to make decisions based on logical evidence [6] and allowing students to hone their personal experiences [7]. However, the reality is that many studies indicate low levels of critical thinking skills among students in several Elementary Schools in Indonesia [8]–[13].

Further scientific confirmation is needed regarding the level of critical thinking skills among students. This research aims to determine the profile of critical thinking abilities among elementary school students in Surakarta city. An initial evaluation of students' critical thinking skills allows the identification of areas that need strengthening. By understanding the weaknesses and strengths of students, teachers can design learning strategies that effectively encourage the development of critical thinking skills. Understanding the students' conditions, particularly their critical thinking skills, allows educators to create a more effective, focused learning environment tailored to individual needs. Thus, the results of this research are expected to be a consideration for the implementation of the Merdeka Curriculum, especially concerning the achievement of critical thinking skills for elementary school students in Surakarta.

2 Methods

This research employed a survey method. The sample consisted of 225 fourth-grade students from phase B in 9 elementary schools located in 5 districts in Surakarta city. The sample included 119 female students (53%) and 106 male students (47%). The sample selection was conducted using purposive sampling, focusing on fourth-grade classes that had implemented the Merdeka Curriculum for 2 years.

The research instrument used was a written test based on case studies. In order to develop this written test, the process began by defining critical thinking skills according to experts and the Merdeka Curriculum. The formulation of written test questions was based on the elements and sub-elements of critical thinking skills derived from government regulations regarding the Pancasila Student Profile in the Merdeka Curriculum. Assessments were obtained from two experts to validate the test questions. The first validator was a lecturer with expertise in elementary student development, while the second validator specialized in educational technology. The test questions were then revised based on the feedback from the validators.

Data from student responses were quantitatively analyzed using a descriptive approach. The analysis process involved the following steps: (1) correcting student answers based on the answer key, (2) scoring each question and providing a final score based on assessment criteria, and (3) converting the final scores of student responses using critical thinking skill criteria as outlined in Table 1.

Table 1. Criteria for Critical Thinking Skills

No	Average Score	Category
1	Score \geq 80	High
2	60 - 79	Moderate
3	Score \leq 59	Low

3 Result And Discussion

3.1 Result

3.1.1 Development of critical thinking skills test

The development of critical thinking skills test questions began with defining critical thinking skills according to experts and the Merdeka Curriculum. The next step involved identifying indicators of critical thinking skills within the Merdeka Curriculum. At this stage, it was discovered that the government regulation, SK BSKAP No. 009/H/KR/2022, comprehensively outlined the elements and sub-elements of all dimensions of the Pancasila Student Profile, including critical thinking. Based on this document, a framework was created to develop test question grids for critical thinking skills for fourth-grade elementary school students. The following outlines the elements, sub-elements, and test question grids for critical thinking skills for fourth-grade elementary school students.

Table 2. Elements and Sub-elements of Critical Thinking Skills for Fourth-grade Elementary School Students

Element of critical thinking	Sub Element of critical thinking	Blueprint of Question
Element 1: Obtaining and processing information and ideas.	Asking questions to identify a problem and confirm understanding of a problem regarding oneself and the surrounding environment.	Students ask questions to identify a problem and confirm their understanding of a problem regarding themselves and their environment.
	Collecting, classifying, comparing, and selecting information and ideas from various sources.	Students collect, classify, compare, and select information and ideas from various sources.
Element 2: Analyzing and evaluating reasoning and its procedures	Explaining relevant reasons in problem-solving and decision-making.	Students explain the decisions made to solve problems.
		Students state the reasons for the decisions made.

Element of critical thinking	Sub Element of critical thinking	Blueprint of Question
Element 3: Reflection on thinking and thought processes.	Expressing thoughts and explaining the reasons behind them.	Students explain their assessment of the problem and provide reasons for the problem.

The next stage involved formulating test questions based on the Elements and Sub-elements of critical thinking skills for fourth-grade elementary school students according to the mentioned regulation. The four sub-elements were translated into four written test questions based on case studies. Assessments were obtained from two experts to validate these test questions. The first validator, an expert in elementary student development, provided a score of 87 out of 100, stating that the instrument was in line with the development of elementary school students and highly suitable for use. The first validator recommended changing the introductory passage from descriptive text to a narrative story, as elementary school students are more interested in stories than descriptive texts.

The second validator, an expert in educational technology, gave a score of 84 out of 100, affirming that the instrument's construction was in line with the applicable curriculum and highly suitable for use. The second validator suggested breaking down question number 4 into two separate questions to enhance the measurement of the sub-element. Based on these two suggestions, the test questions were revised. A contextual narrative was added, and the questions were detailed, resulting in the development of five test questions.

3.1.2 Description of Research Data

The process of collecting data on critical thinking skills from 9 elementary schools involved class teachers. The teachers first read a narrative text from the instrument, after which the students were asked to answer the 5 written questions on the instrument. The research data, derived from student responses, were quantitatively analyzed using a descriptive approach. The analysis process comprised the following steps: (1) correcting student answers based on the answer key, (2) scoring each question and providing a final score based on assessment criteria, and (3) converting the final scores of student responses using critical thinking skill criteria. Below is the data on the critical thinking skills of fourth-grade elementary school students in Surakarta city.

Table 3. Results of Critical Thinking Skills Data Analysis for Fourth-grade Elementary School Students in Surakarta City.

Criteria	Score in each Question					Final Score
	1	2	3	4	5	
<i>Max</i>	20	20	20	20	20	100
<i>Min</i>	0	0	0	0	0	5
<i>Average</i>	12.47	12.64	10.62	9.38	8.67	53.78
<i>MODUS</i>	20	5	10	5	10	40

Based on the table above, the average score of student answers varies for each question. The highest average score is in question number 2, while the lowest average score is in question number 5. Critical Thinking Skills of Elementary School Students in Surakarta City Based on Elements Curriculum Merdeka is still relatively low, with an average score of 53.78.

In this study, the data on students' critical thinking skills represent three types of areas. These areas are categorized based on their geographical proximity to the city center. The three areas are the city center, suburban areas, and areas bordering other districts. The comparison of data on critical thinking skills among fourth-grade elementary school students from each area can be observed in the table 4.

Table 4. Differences in Critical Thinking Skills for Fourth-grade Elementary School Students in the City Center, Suburban Areas, and Border Areas

No	Criteria	City Center	Suburban Areas	Border Areas
1	Max	100	90	100
2	Min	10	15	5
3	Average	56.55	49.71	54.24
4	MODUS	60	45	40

It can be described in a graph as follows:

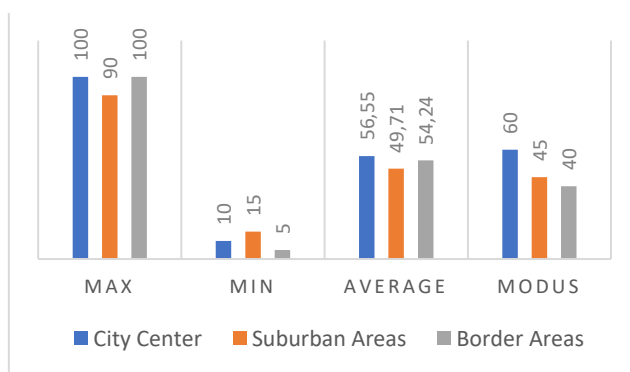


Fig. 1. Graph of Critical Thinking Skills for Fourth-grade Elementary School Students in the City Center, Suburban Areas, and Border Areas

Based on the table and graph above, differences in critical thinking skills among fourth-grade elementary school students in the city center, suburban areas, and border areas with other districts are evident. The highest average scores belong to students in the city center, followed by students in border areas, while the lowest average scores are observed among students in suburban areas.

3.1.3 Conclusion of Research Findings

From the entire research sample that completed the critical thinking skills test, there were 106 male students, constituting 47%, and 119 female students, constituting 53%. The data on critical thinking skills for male and female students are presented in the table below:

Table 5. Differences in Critical Thinking Skills for Fourth-grade Male and Female Elementary School Students in Surakarta City

No	Criteria	Male	Female
1	Max	100	100
2	Min	5	10
3	Average	50	57.14
4	MODUS	40	55

It can be described in a graph as follows:

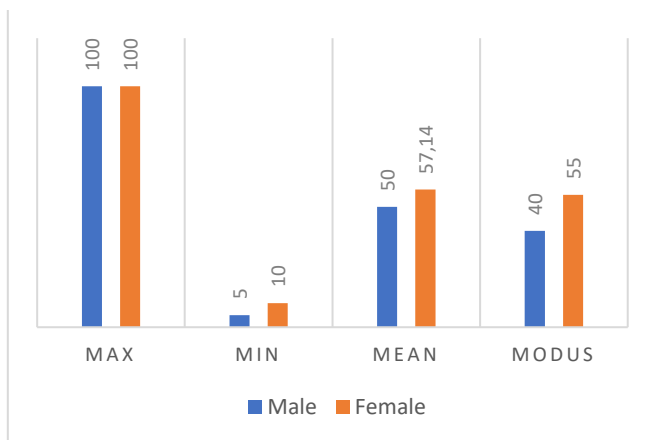


Fig. 2. Graph of Differences in Critical Thinking Skills for Fourth-grade Male and Female Elementary School Students in Surakarta City

Based on the table and graph above, it is evident that female students have higher average and mode scores compared to male students. There is a difference of 7.14 points in the average critical thinking skills between male and female students.

The data on students' critical thinking skills were subsequently converted using the criteria for critical thinking skills to determine the categories of students' critical thinking skills. The categories of students' critical thinking skills can be seen in the table below:

Table 6. Results of Critical Thinking Skills Data Analysis for Fourth-grade Elementary School Students in Surakarta City

Criteria	Number of Students	Percentage
<i>Low</i>	129	57%
<i>Moderate</i>	59	26%
<i>High</i>	37	17%
<i>Sum</i>	225	100%

The following graph described the finding in Table 2.

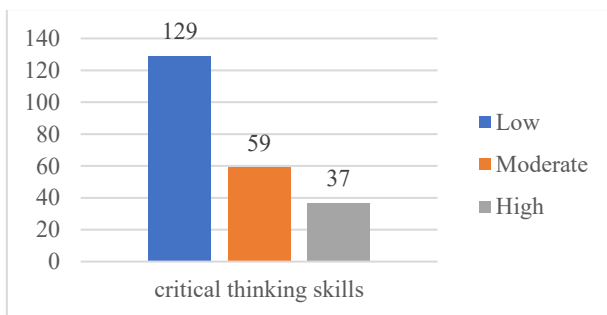


Fig. 3. Graph of Results of Critical Thinking Skills Data Analysis for Fourth-grade Elementary School Students in Surakarta City

The table shows that students' critical thinking skills are in the low category at 57%, the moderate category at 26%, and the high category at 17%. Based on this data, it can be concluded that most students of 4th-grade elementary school students in Surakarta city have low critical thinking skills

Based on all the data presented above, it can be concluded that The Profile of Critical Thinking Skills of Elementary School Students in Surakarta City Based on Merdeka Curriculum Elements is still relatively low, with an average score of 53.78.

3.2 Discussion

3.2.1 Preparation of critical thinking instruments

Instruments for measuring critical thinking skills can be developed in the form of multiple-choice and essay questions [14]. According to Hartini [15] and Akbar et al. [16], critical thinking skills can be measured using multiple-choice tests with items containing higher-order thinking (HOT) abilities. Several studies have already applied multiple-choice questions to measure critical thinking skills [17], [18], [19]. When developing instruments for critical thinking skills in the form of multiple-choice, several factors need to be considered, including the difficulty level. Wilson[20] and McPeck, J. [21] state that test instruments used to measure critical thinking abilities should have a high level of difficulty.

Essay questions can also be used to measure critical thinking skills, in addition to multiple-choice format. The essay question model has proven to evaluate students' critical thinking skills more deeply than the multiple-choice model [22]. Therefore, it is recommended that the assessment of critical thinking skills be conducted using essay questions [23]. Many studies use essay questions to measure critical thinking skills [24].

Between the two types of questions to measure critical thinking skills mentioned above, the choice can be made considering the existing conditions, such as student conditions, student backgrounds, subject matter, etc. Another option is to collaborate between multiple-choice and essay questions. This type of question is called Multiple-Choice with Reason (MCR). MCR questions involve selecting an answer and providing a closed reason [25]

Most instruments for measuring critical thinking skills today are based on the critical thinking skill indicators from Ennis, such as instruments developed by Dewi [26], Nugroho [27], Putri [28], and Trimawati [29]. This is because the indicators presented by Ennis are widely acknowledged. However, the instrument for critical thinking skills in this research differs from others. The instrument in this study is developed based on the elements and sub-elements of critical thinking skills from the Merdeka Curriculum document. Through the Merdeka Curriculum, the Indonesian government has detailed the critical thinking skills that students must achieve at each age/phase. Since the Merdeka Curriculum applies nationally, the learning conducted in fourth-grade elementary schools in Surakarta also adheres to this curriculum, including the indicators of critical thinking skills that must be achieved.

3.2.2 Differences in Critical Thinking Skills

Based on the research data, it is evident that the critical thinking skills of female students are superior to those of male students. All of the 9 elementary schools sampled for the study indicate that female students exhibit better critical thinking skills than their male counterparts. These findings align with research conducted by Erna Dwi Yanti, Haifa Azizzah, Latifaatul Nur Azizah, and Resky Hidayanti [30], [31], [32], [33]. Across educational levels, from elementary school students to university students, most studies consistently show that females tend to excel in critical thinking skills compared to males.

The superiority of critical thinking skills in females can be attributed to several factors. One of them is that when answering test questions, male students often do not thoroughly review their answers, only checking their final responses. In contrast, female subjects tend to scrutinize the correctness of the entire solution and express confidence in their answers with conviction that they are correct [33]. Additionally, females are proven to have an advantage in language-related skills. Language can be seen as a tool for conveying one's thoughts, and verbal language or symbolic systematics are crucial in thinking, perhaps even the most crucial. Therefore, thinking is often regarded as an internal conversation.

Biologically, there are structural differences in the brain between males and females. In the limbic system, males and females have distinct structures. Generally, females also have a larger hippocampus than males, potentially enhancing long-term memory storage. Furthermore, another brain region with differing structures between males and females is the cerebral cortex, responsible for thinking, decision-making, and intellectual functions. These structural differences contribute to variations in brain function between male and female students in aspects such as information processing, response, emotions, motivation, behavior, and long-term information storage.

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