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Critical Thinking Skills of Elementary School Students Through an Inductive Thinking Learning Model on Animal Breeding Lessons

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Abstract

This research is motivated by the tendency of low critical thinking skills of elementary school students. The habit of memorizing and remembering material in books is one of the factors that influence it. This study aims to determine the critical thinking skills of elementary school students at each stage of the inductive thinking learning model. The method used in this study is a qualitative descriptive method. The research participants involved Seven students of Sixth grade in one of the public elementary schools in Cipongkor District, West Bandung Regency on animal breeding material. The instruments used in data collection were observation sheets and test questions. The research data were analyzed qualitatively through scoring and percentages based on the emergence of aspects of critical thinking indicators. The results showed that the average percentage of students' critical thinking skills indicators in the high category based on the results of the observation of the syntax of the inductive thinking learning model was 65,6%, and 67% based on the results of the description test. Thus, the researcher can conclude that the implementation of the inductive thinking learning model is effectively used to improve the critical thinking skills of elementary school students.
Keywords: Inductive Thinking, Critical Thinking Skills, Elementary Students, Animal Breeding

INTRODUCTION

In the life of the 21st century which is the era of information and technology, special skills are needed in digesting information. Facing future global changes and demands, education needs to build students to master 21st century skills including collaboration, communication, creative and innovative skills, as well as critical thinking and problem solving skills (Astutik & Hariyati, 2021). In learning activities, critical thinking skills are needed for students. The speed and effectiveness of students in responding to changes is a must, so that intellectual skills are needed, the ability to analyze the information obtained, and integrate sources of knowledge in solving problems. Graduates are expected from 21st century skills learning to be ready to face challenges in global competition. 21st century skills which are familiarly known as 4C's include critical thinking and problem solving, creative thinking, communication, and collaboration must be possessed by students in Indonesia as 21st century learning identity (Zakaria, 2021).

The renewal of the quality of learning, as well as the concept of learning is very important in 21st century skills as well as being an answer to the demands of human resource

development. With the principle that learning is collaborative, contextual, critical thinking and integrated with a student-centered community (Mardhiyah et al., 2021). Critical thinking shows a mental process in analyzing information obtained from observations, experiences, induction deduction processes, and communication and evaluating them (Anggriani et al., 2019). Critical thinking is a way of reflective logical thinking with an emphasis on making decisions about what to do from a belief. Students who have a high level of critical thinking will be able to review information based on their prior knowledge so that they can choose the information they receive (Prasetiyo & Ma'arif, 2021).

Critical thinking skills will be developed through interactive learning. Interactive learning activities will involve students actively in the activity process so that students will get the opportunity to express their opinions, ideas or ideas. That way students will explore their own knowledge and the learning will be more meaningful for students (Mudita et al., 2019). Students will use their thinking skills to understand information and solve problems encountered in learning. Meanwhile, students' thinking skills are highly dependent on the quantity and quality of their learning outcomes (Farliana et al., 2021). Educational institutions must have a priority goal in training students to think critically, because even though students have knowledge, if they are not taught how to think analytically, then they are prone to make mistakes in reasoning.

Facts in the field, many elementary school students have not shown indicators of critical thinking skills in learning. One of the reasons for this is the students' confidence in the results orientation and has not referred to the process carried out. In learning activities, students are only focused on memorizing and hoarding information, there is no encouragement to develop their thinking skills, so that students are able to understand theory but lack of application (Wayudi et al., 2020). Memorizing what is in the book and remembering the material presented by the teacher becomes a routine for learning in class. The habit of memorizing information from books in the hope of getting a high score is one of the factors for the low skills of students in critical thinking. They do not use their thinking to be able to come up with creative ideas or ideas that are relevant to ongoing learning activities to be able to answer and solve problems. The fact that often happens is that students' mastery of the material is still classified as low category and needs to be developed. The low activity of students during the learning process causes critical thinking skills to be lacking (Rahmadina, 2021). According to Fuad, et al. that the critical thinking skills of students in Indonesia in the low category, this can be seen from the ability of students to analyze and conclude a problem properly has not yet emerged (Putri

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PRIMARYEDU

et al., 2021). Reinforced by Prameswari's statement that most students have not been trained in critical thinking because teachers have not implemented learning that can trigger students' critical thinking in learning (Komalasari et al., 2020).

There are so many factors that cause students in Indonesia to lose their intellectual power, but the most prominent and significant is the tendency of Indonesian students to learn using methods that do not develop higher order thinking skills (Agustin & Pratama, 2021). In order for students' critical thinking skills to develop optimally, it is important for a teacher to understand and improve his abilities in order to make learning interesting and optimize the abilities of his students (Rahmadina, 2021). One of the causes of the low critical thinking skills for elementary school students is because students are not familiar with several indicators of critical thinking skills, there is still a lack of application of learning that can empower and optimize students' abilities in critical thinking (Magdalena et al., 2021).

According to Ennis, there are twelve critical thinking indicators which are simplified into five aspects. The critical thinking indicators used include: 1) providing simple explanations, 2) building basic skills, 3) concluding, 4) providing further explanations, 5) setting strategies and tactics (Khumairok et al., 2021).

The tendency of teachers in Indonesia to use conventional lecture methods in teaching children. In learning activities are still dominated by teachers rather than student activities. Although the lecture method shows more teacher activity than students, this method remains the main choice and cannot be eliminated in learning activities (Hasanah, 2019). Especially in rural areas with limited educational facilities, many still use traditional teaching.

Based on the problems above, it is deemed necessary to innovate the application of alternative learning models that can bring up indicators of critical thinking skills of elementary school students. Learning that can demand more active student involvement in mastering teaching materials through direct learning and observation. In the process, students must be actively involved in exploring the information they have, such as making predictions of what can be observed, or triggering activities to train students' skills in communicating the relationship between predictions and the observations obtained. These activities can make learning more meaningful for students. Students really understand the information and knowledge obtained, not just rote memorization. Thus, it is hoped that it can help achieve basic competencies, especially in Natural Science subjects.

In the goal of achieving basic competencies, especially natural science, students are required not only in terms of mastery of the material, but also inductive thinking skills (Sari &

Suryanti, 2013). In its learning, Natural Sciences presents natural phenomena and problems related to living things and their environment. To bring up these skills, it is first necessary to present facts and problems in each material being taught. Then the students themselves must find the answers to become a conclusion.

Inductive thinking according to Markman & Gentner has the meaning of forming a concept in decision making a conclusion about all members in a category based on observations from several members (Santrock, 2015). In its activities, inductive thinking will demand a process of how students think. Beginning with data identification, data classification, which will form a concept, interpret data to be able to conclude and apply a principle to problem solving. The inductive thinking learning model requires students to be able to compile data in the form of concepts, connect data elements, make generalizations from the information obtained, and draw conclusions with a hypothesis, then predict and explain phenomena (Susanto, 2020).

Based on Susanto's research, it was stated that the learning outcomes tenth grade of first semester at one of one of the high schools in Medan City in the 2019/2020 academic year had a significant influence on physics learning in terms of aspects before and after applying the inductive thinking learning model (Susanto, 2020). In line with that, Sari's research concludes that learning with inductive thinking models can increase student activity in learning, student learning outcomes, and skills in inductive thinking, so as to create meaningful learning for students (Sari & Suryanti, 2013). Other relevant research concludes that there is a significant influence from the application of inductive thinking models in learning on student learning outcomes on the subject matter of geometric optics in tenth grade of second semester of one high school in Medan City, as evidenced by the results of the t-test of one party obtained t-count > ttable that is (5.021 > 1.668). Where = 0.05 means that H0 is rejected and H1 is only accepted (Sirait & Sihombing, 2017).

Based on study results before, the authors conclude that the application of the inductive thinking learning model has a significant influence on learning activities and outcomes. In this study, an analysis of the critical thinking skills of elementary school students will be carried out with the application of an inductive thinking learning model on animal breeding material in sixth grade in West Bandung Regency on. The purpose of this study was to determine the emergence of indicators of critical thinking skills of elementary school students in each phase of the inductive thinking learning model.

P-ISSN: 2580-9326
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METHOD

The method used in this study is a qualitative descriptive method. Descriptive analysis in this study in the form of the percentage of results from each aspect contained in the indicators of critical thinking skills according to (Reeder, 1984) there are twelve which are simplified into five aspects. The critical thinking indicators used are listed in table 1.

Table 1. Critical Thinking Indicators Used

Aspects of Critical Thinking	Critical Thinking Indicator
Give a simple explanation	Analyze questions. Ask and answer questions
Building basic skills	Observing and considering reports of observations. Reporting based on observations
Provide further explanation	Defining terms and considering a definition Identify assumptions
Set strategy and tactics	Selecting criteria to consider completion Formulate alternative solutions
Conclude	Define an action

The research was conducted in one of the elementary schools in Cipongkor District, West Bandung Regency, West Java, with the research subject of class VI students, totaling 7 students. Explain the reason why the researcher chose 7 students to be a samples implementation of the research was carried out in November 2021. The object of this research is the emergence of aspects of students' critical thinking skills in also explain why animal breeding material that you chose learning through the application of an inductive thinking learning model.

Data collection techniques for students' critical thinking skills were collected through tests and observation sheets during the learning activities. Tests and observations were carried out to see the effect of the inductive thinking learning model on the emergence of students' critical thinking skills by checking students asked and answered questions, made observations, defined terms, identified assumptions, formulated alternative solutions, and took action in drawing conclusions.

Students who have reached a certain category can be expressed in percent by using equation 1 (Sudijono, 2011).

$$P = \frac{f}{N} x\ 100\%$$

Information:

P = Percentage

f = Frequency searched percentage

N = Number of Samples

The author used descriptive statistical techniques in data analysis then critical thinking skills are analyzed by determining the percentage value of each student's answers which is then calculated on average based on aspects of critical thinking indicators. Furthermore, the average value is classified as in Table 2.

Table 2. Classification of Students' Critical Thinking Skills based on student achievement scores

Points	Criteria
80,1-100	Very high
60,1-80	High
40,1-60	Currently
20,1-40	Low
0,0-20	Very low

RESULTS AND DISCUSSION

Results

The results of the implementation of the inductive thinking learning model include two aspects, namely the results of activity observations and the results of the five-item description test. The percentage of occurrence of each indicator of critical thinking skills in the syntax of the inductive thinking learning model is presented in table 3.

Table 3. Results of Observation of the Implementation of Inductive Thinking Learning Model

Inductive Thinking Model Step	Aspects of Critical Thinking	Critical Thinking Indicator	Appearance	Percentage	Average	Category
Phase 1 (Concept Formation Stage)						
Calculate and create lists	Give a simple explanation	Identify the problem	6	86%		
Grouping	Give a simple explanation	Ask and answer questions	3	43%	64,5%	High
Creating Tables and Categories	Building basic skills	Reporting by observation	3	43%	57%	Currently

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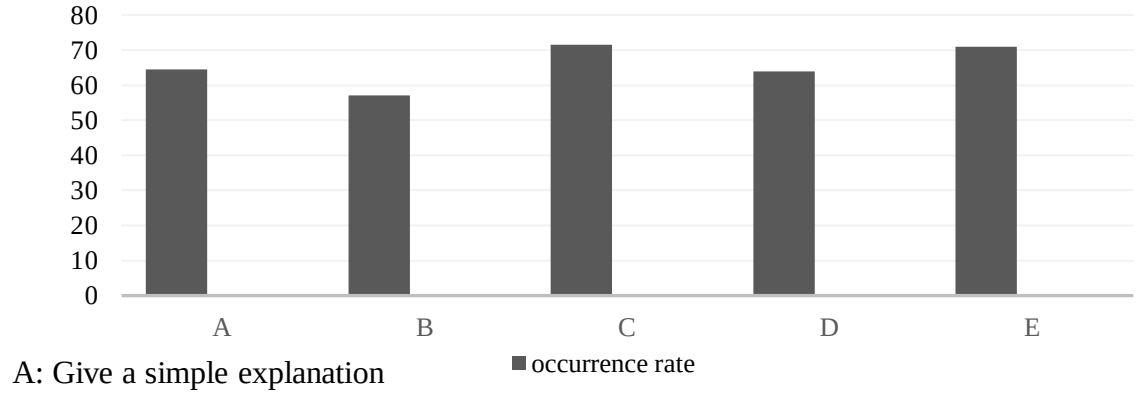
Inductive Thinking Model Step	Aspects of Critical Thinking	Critical Thinking Indicator	Appearance	Percentage	Average	Category
Phase 2 (Data Interpretation Stage)						
Identifying relationships	Building basic skills	Observing and considering reports observation	5	71%		
Explore relationships	Provide further explanation	Defining terms and consider a definition	6	86%		
Making a guess	Provide further explanation	Identify assumptions	4	57%	71,5%	High
Phase 3 (Principle Application Stage)						
Predict consequences, explain unfamiliar phenomena and hypothesize	Set strategy and tactics	Selecting criteria to consider completion	5	71%	64%	High
Explain data or support predictions and hypotheses	Set strategy and tactics	Formulate alternatives solution	4	57%		
Testing the truth	Conclude	Define an action	5	71%	71%	High
Amount					**328/5 = 65,6%**	**High**

Based on table 3, the indicators of critical thinking skills in the syntax of the inductive thinking learning model as a whole appear in students with various variations. However, from the percentage of occurrences, it can be seen that not all indicators of critical thinking skills appear in the high category.

The percentage of indicators of critical thinking skills in these students can be depicted in Chart 1.



A: Give a simple explanation
B: Building basic skills
C: Provide further explanation
D: Setting strategy and tactics
E: Summing up

Chart 1. Chart of the Percentage of occurrence of Critical Thinking Indicators

The percentage of the emergence of critical thinking skills based on the test results of the implementation of the inductive thinking learning model is presented in table 4.

Table 4. Student Critical Thinking Skills Test Results

Question Number	Aspects of Critical Thinking	Critical Thinking Indicator	The weight of the questions achieved	Percentage	Category
1	Give a simple explanation	Identify the problem	8	57%	Currently
2	Building basic skills	Reporting by observation	8	57%	Currently
3	Provide further explanation	Defining terms and consider a definition	23	82%	Very high
4	Set strategy and tactics	Selecting criteria to consider completion	21	75%	High
5	Conclude	Define an action	13	62%	High
Amount				**333/5= 67%**	**High**

Based on table 4, the indicators of critical thinking skills on the results of the implementation of the inductive thinking learning model as a whole appear in students with various variations. However, from the percentage of occurrences, it can be seen that there are

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indicators of aspects of critical thinking skills in providing further explanation, sub-indicators of defining terms and considering a definition appear in a very high category.

In summary, the percentage of indicators of critical thinking skills in these students can be described in Chart 2.

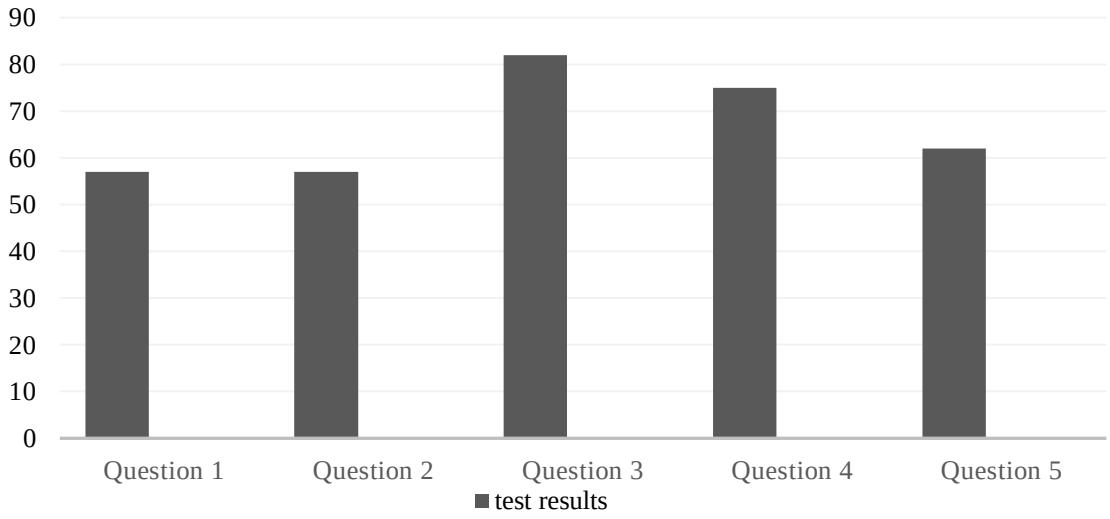

Chart 2. Critical Thinking Indicator Test Results

Discussion

Based on the observation of the implementation of learning with the inductive thinking model, the results show that at the Phase 1 stage (Concept Formation Stage) the critical thinking aspect provides a simple explanation with the sub-indicator identifying the problem there are 6 students got 86% and the sub-indicator asking and answering questions as many as 3 students got 43% so that the average obtained is 78% and is included in the High category. Then, on the critical thinking aspect of building basic skills, the sub-indicator reported based on observations that there were 3 students equivalent 43%. Furthermore, in Phase 2 (Data Interpretation Stage) the critical thinking aspect of building basic skills with the sub-indicator of observing and considering the observation report there were 5 students equivalent 71% so that the average critical thinking aspect of building basic skills was obtained 57% and was included in the Medium category. Then, in phase 2 the critical thinking aspect provides further explanation in the sub-indicator defining terms and considering a definition there are 6 students equivalent 86% and the sub-indicator identifies the assumptions of 4 students equivalent 57% so that the average is 71,5% and is included in the High category. Then, in phase 3 (Principle Application

Stage) aspects of setting strategies and tactics with the sub-indicator choosing criteria to consider completion there are 5 students equivalent 71% and the sub-indicator formulating alternative solutions there are 4 students equivalent 57% so that the average is 64% and included in the High category. In the critical thinking aspect, concluding with the sub-indicator determining an action, there are 5 students equivalent 71%, and are included in the High category. The final result shows the emergence of students' critical thinking skills with an average score for each indicator and sub-indicator of critical thinking aspects of 65,6% which is included in the High category.

Based on the test results of the implementation of the inductive thinking learning model in the form of 5 essay questions, the results show that the answer to question number 1 in the critical thinking aspect provides a simple explanation with sub-indicators identifying the problem, the weight of the questions achieved is 8 out of a maximum score of 14 or 57% in the Medium category. Answers to question number 2 aspects of building basic skills sub-indicators report based on observations of the weights achieved by 8 out of a maximum score of 14 or 57% in the Medium category. The answer to question number 3 aspects provides further explanation of sub-indicators defining terms and considering a definition, the weight achieved by 23 out of a maximum score of 28 or 82% is in the Very High category. The answer to question number 4 aspects regulates strategy and tactics, the sub-indicator selects the criteria to consider completion, the weight achieved is 21 out of a maximum score of 28 or 75% in the High category. And the answer to the question number 5 aspect concludes that the sub-indicator determines an action, the weight achieved is 13 from a maximum score of 21 or 62% in the High category. With an average percentage of weights obtained from student answers 67% in the High category.

Based on the presentation of these results, it can be seen that from the five aspects of critical thinking skills consisting of 9 sub-indicators that are expected to appear in students seen from the results of implementation observations, there are 4 aspects that are included in the High category. and 5 sub-indicators seen from the test results, there is 1 aspect that is included in the Very High category. This is in line with research conducted by (Mertasih, 2020) where there was a positive response in Class XI students of Network Computer Engineering Skills Competency at SMK Negeri 1 Denpasar towards the implementation of an inductive learning model with an analogical approach to the learning process.

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CONCLUSION

Inductive thinking learning model is a learning model that starts with collecting information specifically, requiring students to process the information they get in determining a general conclusion. Processing the information obtained requires students to think critically to make conclusions. After the implementation of the inductive thinking learning model in the learning activities of animal breeding lessons, students were actively involved in the class and showed the emergence of aspects/indicators of critical thinking skills of elementary school students in the high category. Based on the results of observations obtained an average percentage of 65,6%, and from the test results obtained an average of 67%. Consequently the inductive thinking learning model is effectively used to improve the critical thinking skills of elementary school students.

ACKNOWLEDGMENTS

The author suggests that further researchers conduct research related to the effectiveness of the inductive thinking learning model on other 21st century skills to measure the relevance of the learning model.

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