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# The effectiveness of the guided inquiry learning model assisted by picture card media in improving students' critical thinking skills in natural science subjects

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ABSTRACT

This study aims to describe students' critical thinking skills in natural science learning, the effectiveness of the guided inquiry learning model assisted by picture card media in improving students' critical thinking skills in natural science learning, and the difference between before and after using the media-assisted guided inquiry learning model. picture cards in improving students' critical thinking skills in learning natural sciences. This research is a quantitative pre-experimental design. The research design used is the One Group Pretest-Posttest Design pattern. This design has a pretest, before being given treatment. The data collection technique in this study used a multiple-choice test technique. The data in this study were analyzed using descriptive and inferential statistical analysis techniques. The results of this study indicate that students' critical thinking skills before being taught the guided inquiry learning model assisted by picture card media had an average of 37.31, a standard deviation of 19.299 and a percentage of completeness of 8% and after applying the guided inquiry learning model assisted by media picture students' critical thinking skills have an average of 73.46, a standard deviation of 9.356 and a completeness percentage of 81%; the guided inquiry learning model assisted by picture card media is effective in improving students' critical thinking skills in natural science learning (p-value> 0.05); and there is a significant difference between before and after applying the guided inquiry learning model assisted by picture card media in improving students' critical thinking skills in learning natural sciences.

## 1. Introduction

Science learning is one of the lessons contained in K13 for the elementary level. Science becomes systematic knowledge that is arranged regularly, rationally, and objects in the form of collections and results of observations and experiments (Hu, Mayfield, & Kussmaul, 2019). This can be interpreted that science learning in elementary schools emphasizes providing direct learning experiences through the development of process skills and scientific attitudes. Science learning is directed at finding answers to questions or problems on their own so that they can help students gain a deeper understanding of the natural surroundings such as living things, objects, or matter, as well as energy and changes (Tucker-Raymond, Cassidy, & Puttick, 2021). However, science lessons are considered difficult by most students, from elementary to high school levels. The opinion of most students that science is difficult is true, as evidenced by the results of the final school exam (UAS) obtained from the Ministry of National Education, which are still far from the expected standards.

According to Styers, van Zandt, & Hayden (2018), the core problem of the low value of learning science is due to the following factors: (1) the lack of interest in student learning in participating in learning. (2) the teacher lacks control over the condition of students when learning is in progress. (3) teachers are uneven in giving questions and providing motivation to students. (4) the child does not dare to ask for things that are not yet clear to the teacher. Students are not very interested in learning science because so far learning science is considered as learning that only emphasizes memorization, does not apply aspects of reasoning so that student learning outcomes in science subjects are still lacking (Letloenyane, 2018). This causes a lack of student interest in learning science. In addition, there are many teachers who apply only the lecture method in learning science. Whereas for the elementary school level, the thing that should be prioritized is how to develop their curiosity and critical thinking power towards a problem.

An interesting learning model is a learning model that can train critical thinking skills in science learning (Styers et al., 2018). How to train critical thinking skills, namely: a. analyzes, b. interprets, c. evaluates, d. concludes. Critical thinking can be implemented with the inquiry learning model (Sutiani, Situmorang, & Silalahi, 2021). Inquiry is one of the common processes carried out by students to find or understand information (Liang, Hsu, & Hwang, 2021). Inquiry activities can be used to train students' thinking skills and develop knowledge in dealing with situations or problems associated with exercises from a series of questions learning science in improving students' critical thinking skills.

Media is an integral part of learning resources. According to researchers, the media that fits the inquiry learning model is Picture Card (Dewi, Rizkiana, Nurkhalisa, & Dwijayanti, 2020). Picture cards or commonly also called picture cards are included in the type of images that can help the learning process easier or clarify the delivery of learning material to make it more fun and effective (Zakiyah, Ibrohim, & Suwono, 2021). Image media is also related to subject matter which functions to convey messages from the teacher to students and can help students to express information contained in the problem, so that the relationship between components in the problem can be involved more clearly.

The results of preliminary observations at MIS Al-Ikhlas show that science scores are still low, as evidenced by the low grades in the final school exams for science subjects. This shows that students have difficulty in learning science. The problems faced are also the same as the previous problems, such as teachers who still often use the lecture method, are not evenly distributed in giving opportunities to students, students memorize more often than analyze critically. The results of previous research related to the inquiry learning method using picture card media in science learning have not been carried out much. So far, research related to science learning materials has focused on the use of experimental methods. In addition, research related to inquiry learning is rarely carried out in various regions.

This research specifically aims to complement information from previous research regarding the effectiveness of the guided inquiry learning model assisted by picture card media in improving students' critical thinking skills in science learning. It is hoped that the results of this study can motivate teachers to be able to implement the guided inquiry learning model assisted by picture card media, which is one of the common processes carried out by students to find or understand information. Guided Inquiry activities assisted by picture card media can be used to train students' thinking skills and develop knowledge in dealing with situations or problems associated with exercises from a series of science learning questions in improving students' critical thinking skills.

## 2. Method

### 2.1. Types of Research

The type of research used in this research is a quantitative pre-experimental design (Doughan & Shahmuradyan, 2022; Grønlien, Christoffersen, Ringstad, Andreassen, & Lugo, 2021). The research design used is the One Group Pretest-Posttest Design pattern. This design has a pretest, before being given treatment. Thus, the results of the treatment can be known more accurately because it can be compared with the conditions before being given treatment.

### 2.2. Time and Place of Research

This research will be carried out at MIS AL-Ikhlas Beli-Beli, Watchunu District, Bombana Regency, Southeast Sulawesi.

### 2.3. Population and Sample

The population is the entire research subject. The population in this study were all students at MIS AL-Iklas Beli-Beli, Watchunu District, Bombana Regency, Southeast Sulawesi with a total of 71 students. Sample is a small part of the population. The sample is also part of the number and characteristics possessed by the population. The samples to be studied were fifth grade students. The number of samples in this study were 26 students.

### 2.4. Data Collection Techniques

The data in this study is in the form of data on students' abilities in science learning on ecosystem material. To obtain the ability data, a multiple-choice test technique was used. Research instruments are tools or facilities used by researchers in collecting data so that their work is younger, and the results are better in the sense that they are more thorough, complete, and systematic so that they are younger, and the results are easier to process. This study uses two different instruments based on the investigation of problem statements as a test for students' critical thinking. There are two tests in this instrument, namely pre-test and post-test. The pre-test was given to students at the first meeting to measure students' critical thinking, this test consisted of 10 multiple choice questions. The post-test was given at the last meeting to measure students' critical thinking after receiving treatment.

### 2.5. Data Analysis Techniques

Descriptive statistical analysis aims to determine student scores and describe the level of students' critical thinking skills in science subjects which consist of the mean, standard deviation, highest and lowest scores using the statistical package system for social science (SPSS) Version 25. Inferential analysis is also used to statistically prove the proposed research hypothesis and answer the problem formulation set by the point before carrying out the hypothesis test, an assumption test is first carried out which consists of a normality test and homogeneity test. Inferential analysis aims to analyze data from a sample.

## 3. Results and Discussion

### 3.1. Result

3.1.1 Descriptive Data Analysis

The guided inquiry learning model assisted by picture card media is said to be effective in terms of the level of students' critical thinking skills in natural science learning with an overall average score of at least 70 KKM students. Data on students' critical thinking levels were obtained before treatment in the form of pretest data by giving multiple choice questions of 10 questions on ecosystem material and after treatment in the form of post-test data applying the guided inquiry learning model assisted by picture card media by giving multiple choice questions of 10 questions on ecosystem material. Data on students' critical thinking skills in science learning can be seen in Table 1.

**Table 1.** Description of Students' Critical Thinking Skills

| Descriptive | Pre-Test | Post-Tes |
|---|---|---|
| Mean | 45.00 | 76.15 |
| SD | 22.32 | 12.35 |
| Min | 10 | 50 |

| Descriptive | Pre-Test | Post-Tes |
|---|---|---|
| Max | 80 | 100 |
| KKM | 23% | 81% |

Based on Table 1, it was found that the pretest average score of students' learning achievement in the guided inquiry learning class assisted by picture card media was 45.00, which increased to 76.15 in the post-test. Meanwhile, the pretest average value of students' critical thinking skills in the guided inquiry learning model assisted learning class assisted by picture card media. These results indicate that the guided inquiry learning model assisted learning class assisted by picture card media is effective in improving students' critical thinking skills in subjects' natural science class V assisted by guided inquiry learning model aided by picture card media.

3.1.2 Inferential Data Analysis

Inferential data analysis in this study aims to see the average comparison before and after being given treatment. comparison of the average value after treatment aims to test the research hypothesis that has been compiled. Before testing the hypothesis, it is necessary to test the assumption of normality.

*3.1.2.1Normality Test*

The normality test is carried out on the pre-test and post-test data of students' critical thinking abilities in natural science subjects on ecosystems. In this study, the normality test used was the Kolmogorov-Smirnov test with the Dallal-Wilkinson-Lilliefors correction. The results of the normality test using the Kolmogorov-Smirnov test with the Dallal-Wilkinson-Lilliefors correction are presented in Table 2.

**Table 2.** Normality Test Results

| Kolmogrov-Smirnov | Pre-Test | Post-Tes |
|---|---|---|
| p-value | 0.06 | 0.82 |
| Information | Normal | Normal |

Based on Table 2, information is obtained that the pre-test and post-test data normality test for critical thinking skills in natural science subjects, ecosystem material assisted by the guided inquiry learning model assisted by picture card media has a significance value that is greater than the alpha value of 0.05 (p-value>0.05). The same information was also obtained in the pre-test and post-test data of critical thinking skills in natural science subjects in the V guided inquiry learning model assisted by picture card media where the resulting significance value was greater than the alpha value of 0.05 (p-value> 0.05). Thus, it can be concluded that the alternative hypothesis is accepted and there is no reason to accept the null hypothesis.

*3.1.2.2Hypothesis Test of Differences Before and After using the Guided Inquiry Learning Model assisted by Media Picture Card*

To test the difference between before and after using the guided inquiry learning model assisted by picture card media in improving students' critical thinking skills there are natural science subjects on ecosystem material then used paired. The students' critical thinking data used in the test are pre-test and post-test data display in Table 3.

**Table 3.** Difference Test Results Before and After using the Guided Inquiry Learning Model assisted by Media Picture Cards

| One-Sample Test | Post-Test |
|---|---|
| p-value | 0.00 |
| Information | There are Significant Differences |

Based on Table 3, information is obtained that the results of the effectiveness test of pre-test data for students' critical thinking skills in natural science subject matter ecosystems have a significance value that is greater than the alpha value of 0.05 (p-value> 0.05). This shows that there is no difference in the effectiveness of the guided inquiry learning model assisted by picture card media in improving students' critical thinking skills before being given treatment. Different results were found in the post-

test data effectiveness test where the significance value produced was smaller or less than an alpha value of 0.05 (p-value <0.05). This shows that the null hypothesis (H_0) is rejected. Thus, it can be concluded that after being given the treatment it was found that there was an average difference between the guided inquiry learning model assisted by picture card media in improving students' critical thinking skills.

*3.1.2.3Hypothesis Testing the Effectiveness of the Guided Inquiry Learning Model assisted by Picture Card Media*

To follow up on the results of the difference test on the effectiveness of the guided inquiry learning model assisted by picture card media in improving students' critical thinking skills in natural science subjects on ecosystem material, then a comparative test of the effectiveness was carried out using test Independent-Sample Test. The data used in the test is the reduced data between the post-test and pre-test data of students. The results of the effectiveness test of the experimental class assisted by the guided inquiry learning model assisted by picture card media in improving students' critical thinking skills.

**Table 4.** Results of Testing the Effectiveness of the Guided Inquiry Learning Model assisted by Media Picture Cards

| **Paired-Sample Test** | **Pre-Test – Post-Test** |
|---|---|
| p-value | 0.02 |
| Inormation | Effective |

Based on Table 4, information is obtained that the results of the effectiveness test from the data gain score of students' critical thinking abilities in natural science learning have a significance value that is smaller or less than an alpha value of 0.05 (p-value <0.05). This shows that there is a difference in effectiveness between before the guided inquiry learning model was applied with the help of picture card media and after the guided inquiry learning model was applied with the help of picture card media in terms of students' critical thinking skills in natural science subjects. Thus, it can be concluded that after being given the treatment it was found that there was a difference between before and after the application of the guided inquiry learning model assisted by picture card media in terms of students' critical thinking abilities in natural science subjects. Thus, it can be concluded that the null hypothesis is accepted and there is no reason to accept the alternative hypothesis. That is, there is a difference between the distribution of pre-test and post-test scores in the experimental class, then H1 is accepted and H0 is rejected.

### 3.2. Discussion

Effective learning is learning that is active, interactive, creative, and fun. In other words, effective learning is learning that can involve students in the learning process. One of several ways that can be used so that students can be actively involved in learning is to use a learning model. Based on this, this study applied a guided inquiry learning model assisted by picture card media in improving the critical thinking skills of fifth grade students at private Islamic elementary schools, Mis Al-Ikhlas Beli-Buy.

Learning natural sciences by utilizing the guided inquiry learning model has a positive impact on the level of students' critical thinking skills. This can be seen before being given treatment in natural science learning activities, there are many students who are not active when the educator asks several questions about the material being taught and makes learning take place in a monotonous manner (Arifin & Baginda, 2018). In addition, students do not get various experiences that can improve students' critical thinking skills, after the implementation of the guided inquiry learning model there is a significant difference. This can be seen from the results of descriptive statistical analysis based on the Minimum Completeness Criteria (KKM) which was set at 70. After being given treatment 17 students achieved KKM. Based on the researcher's goal to improve students' critical thinking skills, there was an increase when seen from the results of the pre-test and post-test scores. The results of the descriptive statistical analysis were also strengthened by the results of inferential statistical analysis using the one-sample T-Test which showed that learning natural science using the guided inquiry model was effective in improving students' critical thinking skills.

Critical thinking is a student's thinking process in describing a problem, students are required to think at a higher level to formulate, evaluate the beliefs of the students' own opinions. critical thinking

is also associated with cognitive dimensions: a). analyze, b). interpret, c). evaluate, d). conclude. The aim of training elementary school students' critical thinking skills is to prepare students to become critical thinkers, able to solve problems they face, able to make decisions appropriately and responsibly, and prepare students for a mature life in addressing problems.

The results of Pahrudin et al. (2021), with the title of guided inquiry learning model assisted by picture card media for class IV students in science on alternative energy material at SDN Ngastemi, the results of the class IV pre-test scores can be seen that the average pre-test result is 61.3. So that class IV students have not been able to think critically well. After obtaining the pre-test data, then get the results from the post-test. From the results of the class IV post-test data, the average post-test or final test result is 77.73. From the results of the post test, it can be categorized as having an increase with a good score.

Before and after the implementation of the guided inquiry learning model assisted by picture card media in class V Mis Al-Ikhlas Purchase-Purchase can be proven by the completeness score for the pre-test of 23% while for the average score for the post-test it reaches 81% with minimum completeness criteria Learning natural science class V at Mis Al-Ikhlas Beli-Beli reaches 70. Based on the results of the one sample T-test analysis. by using data processing computer facilities through the IBM statistical package for social science (SPSS) version 25 in column 3.1, information is obtained that the resulting significance value is smaller or less than the alpha value of 0.05 (p-value <0.05). This shows that the null hypothesis (H0) is rejected.

## 4. Conclusion

Based on the results and discussion of research related to the effectiveness of the guided inquiry learning model assisted by picture card media in improving students' critical thinking skills in fifth grade natural science learning at Al-Ikhlas Beli-Beli Private Madrasah Ibtidaiyah, it can be concluded that 1) students' critical thinking skills class V before being taught the guided inquiry learning model assisted by picture card media had an average, standard deviation and percentage of completeness respectively of 45.00; 22.316; 23% and after being taught using the guided inquiry learning model assisted by picture card media has an average, standard deviation and percentage of completeness respectively of 76.15; 12.354; 81%; 2) there is a difference between before and after being taught using the guided inquiry learning model assisted by media\ picture cards in improving students' critical thinking skills in natural science learning class V MIS Al-Ikhlas Beli-Buy the resulting significance value is smaller than alpha 0.05 (p-value < 0.05). This shows that the null hypothesis (H0) is rejected; and 3) learning using the guided inquiry model assisted by picture card media in improving students' critical thinking skills is effective in natural science subjects with a resulting significance value that is smaller or less than an alpha value of 0.05. (p-value < 0.05).

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