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The Impacts of the Analysis, Debate, and Finding Models on Learning Natural Sciences

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ABSTRACT: Problem solving of low critical thinking skills, difficulty in practicing science skills, analyzing students' concepts in depth and low learning outcomes are serious problems that must be solved. This experimental study aims to compare critical thinking skills, science skills, students' analytical skills and learning outcomes between the two groups, namely the pre-test and post-test control groups. This study involved 26 students of grade 5 SDN 196/II Taman Agung, Bathin III District, Bungo Regency, totaling 26 students. The results showed that students had critical thinking skills, practicing science skills, and analyzing students' concepts in depth who believed that knowledge related to the material must be justified in various ways that showed broader and positive epistemics as evidenced by a significant increase in the science learning outcomes of grade 5 students of SDN 196/II Taman Agung, Bathin III District, Bungo Regency with a learning model of debate, analysis, and findings through experimental methods.

Keywords: Analysis, debates, findings, learning, models, science.

I. INTRODUCTION

Many researchers are concerned about students' low thinking skills and difficulties in practicing science skills and analyzing material in depth, which should not have happened in the current world of education in the 5.0 era of society where technology is increasingly sophisticated, students can gain knowledge and learning trajectories from various sources available on the Internet [1-5]. It is different from what is happening in the world of education in Muara Bungo, Jambi, Indonesia as if this problem is endless and has a solution. Field facts show that 83% of students are unable to think critically, 81% of students have difficulty in science skills and 75% of students are unable to analyze material in depth. The current research does not provide sufficient evidence to overcome students' low thinking skills, difficulty practicing science skills and analyzing material in depth in developing the personal competencies needed in learning [6-8]. However, it is generally agreed that in the future, critical thinking skills, analyzing material in depth, to obtain new knowledge continuously in developing personal competencies are needed by teachers and students in future learning [9-11]. Many countries now regard in-depth analytical skills in an effort to acquire new knowledge in accordance with the development of current learning needs as a core part of education, alongside reading, writing, and numeracy [12 -16]. Based on the evidence reviewed, researchers have identified elements to form

a learning model format based on debate, analysis, and findings that can improve students' abilities in the future by utilizing technology in the era of Society 5.0. The act of questioning encourages learners to engage in deep, scientific and creative reasoning. Given that asking questions is fundamental to science and scientific inquiry. [17, 2, 16] mentioned that teachers are expected to be able to create learning that stimulates creativity so that modifications and changes are needed.

According to [16, 18-21] debate models, analysis, and findings emphasize student-centered learning processes, respecting the opinions of friends, and the ability to analyze material and study independently. [16] stated the analysis debate learning model and the findings directed students to learn independently because independent learning will increase students' willingness and skills not to always depend on others in every learning activity and to be responsible for their obligations. Previous research has found that this learning model has many benefits for students, including increased performance. In addition, [22-26] stated he learning model applied by the teacher greatly influences student learning, especially in science learning. The syntax for the debate learning model, analysis, and findings [16-29] is as follows:

Table 1. The syntax of the debate model, analysis, and findings

Phases	Components	Learning Activities
1	Communication of learning readiness information	1. Communication of learning objects 2. Students get information from the teacher 3. Students carry out learning activities and assignments from the teacher 4. Form a group of pros and cons 5. Determine keynote speakers 6. Read the rules of debate
2	Guide	1. Focusing students' attention on the goals and topics of the debate 2. Straighten the flow of students' thinking 3. Creating a conducive debate situation 4. Give stimulus 5. Prevent monopoly talks
3	Strategy	1. Encourage active learning 2. Growing confidence 3. Encourage students to investigate the problem 4. Encouraging students to discover new knowledge from the topic being debated 5. Encouraging students to discover implicit knowledge
4	Implementation	lementation of the components of the debate learning model, analysis, and findings in science learning
5	Monitoring	1. Observing changes in student learning behavior 2. Identify learning problems 3. Guiding and being a "friend" of learning 4. Observing the interests and talents of students 5. Provide motivation
6	Evaluation Formative	1. Understanding 2. Courage 3. Fluency in speech 4. Teamwork
7	Revision	1. Summarize the data found in the summative evaluation 2. Knowing the location of the problem and the solution 3. Receive input from students
8	Summative Evaluation	luating the debate learning model, analysis, and findings that have been corrected to find out whether the model is suitable for use or not

II. METHOD AND MATERIAL

The method used in this research is the experiment method to find the comparison of student learning outcomes that receive treatment with learning models of debate, analysis, and findings with those who receive treatment using conventional learning models. The experimental design used was the randomized pre-test-post-test control group design. [30, 31, 32, 33, 34] stated the determination of the control class is done randomly by class. This research was conducted at SDN 196/II Taman Agung, Bathin III District, Bungo Regency. The subjects of this research consisted of 25 students in the fifth grade, with nine males and 15 females. The research design chart used is in Table 2 below.

Table 2. Pre-test post-test control group research design

Group	Pre-test	Treatment	Post-test
1	2	3	4
Experiment	01	X1	02
Control	01	X2	02

Information
O1: Initial science ability test
X1: Learning science with models of debate, analysis, and findings
X2: Learning science with conventional models
O2: Science initial proficiency test

Table 2 is the research design used to measure the effectiveness of the model by testing the differences in the quality of student learning outcomes in the experimental group and the control group. To measure the trend of changes in the quality of learning outcomes in participating in learning and teaching learning models of debate, analysis, and findings by observation and tests. Observations to measure the implementation of learning using debate learning models, analysis, and findings were carried out by two observers. The observed aspects include the initial, core, and final activities based on the steps contained in the lesson plan and by the syntax of the debate learning model, analysis, and findings. The observer records the results of observations in the categories that appear by placing a check mark (√) in the appropriate column ("yes" or "no" column). The rating score given to each aspect is a score of 1 if you mark the "yes" column and a score of 0 if you mark the "no" column.

Written tests were to measure student learning outcomes in both the experimental group and the control group. The written test consisted of 10 questions, namely essay questions. This written test was given twice, namely before using the debate, analysis, and findings model as in the build (pre-test) and after using the debate, analysis, and findings model (post-test). Data analysis techniques were to analyze the comparison of results students learn science by using the learning model of debate, analysis, and findings with those who do not use the learning model of debate, analysis, and findings, which is using the following formula, to determine the standard deviation.

$$S = \frac{\sqrt{\sum(Xi-X)2}}{N} \quad (1)$$

Information:
S = sample standard deviation
X = average value
Xi = The value of learning outcomes
N = number of sample members

To determine the value tcount.

$$\text{tcount} = \frac{X1 - X2}{\sqrt{\frac{S1}{n} + \frac{S2}{n}}} \quad (2)$$

Information:

X1: the average value of the experimental class
X2: the average value of the control class
S1: experimental class standard deviation
S2: control class standard deviation
N: number of sample members

III. RESULTS AND DISCUSSION

The findings in this research were obtained t count = 9.01 while t table with df = 23 at a significant level of 5%, namely 2.069. Therefore, t count > t table (9.01> 2.069), which means (Ha) in the research is accepted that is, there is an influence between the use of the debate learning model, analysis, and findings on science learning outcomes of SDN 196/II Taman Agung students.

1. EXPERIMENTAL AND CONTROL GROUP PRE-TEST DATA

The pre-test was carried out to find out the science learning outcomes of fifth-grade students at SDN 196/II Taman Agung, Bathin III District, Bungo Regency, both in the experimental class and the control class. The experimental class learning outcomes before using the debate model, analysis, and findings on learning for the maximum score is 80, and the minimum achievement score is 18, with an average value of 51.07. Of the 13 students, four completed, with a percentage of 31% and 69%, or nine students who did not complete, as shown in the following diagram.

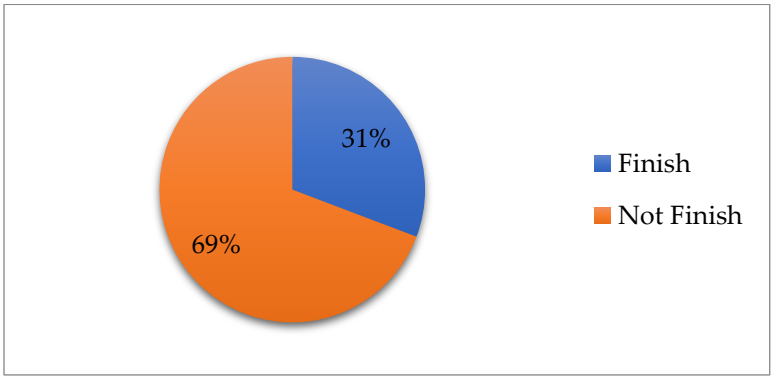

FIGURE 1. Completeness of experimental class learning outcomes

The picture above makes clear the level of pre-test and post-test mastery of the experimental group before being given the treatment of debate models, analysis, and findings in learning. Furthermore, an analysis of the learning outcomes of the control class using conventional models in learning was carried out. The maximum score was 80, and the minimum achievement score was 25, with an average value of 44.25. Of the 12 students, there was one student who passed with a percentage of 8% and 11 students who did not complete with 92%, as shown in the following diagram.

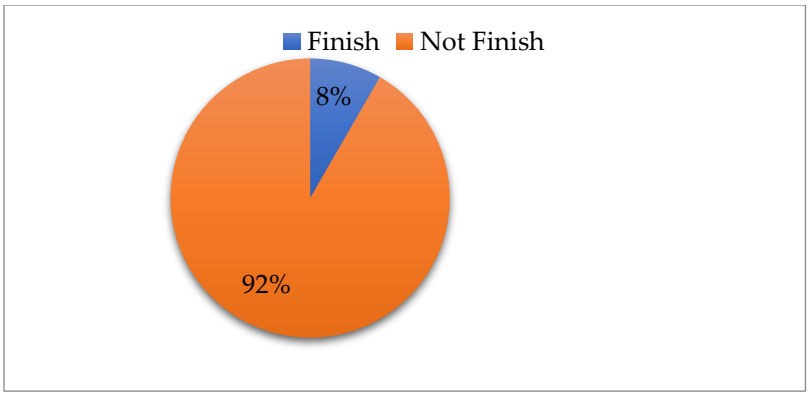

FIGURE 2. Completeness of control class learning outcomes

2. DEBATING SKILL DATA, ANALYSIS, AND FINDINGS

Data on debating skills, analysis, and student learning findings were obtained from observations. Debate skills are taken from 5 aspects: skills in constructing controversial statements, mastery of arguments, the accuracy of speaking, and respect for the opponent's opinion. Concept analysis skills are drawn from 7 aspects: reasoning skills, questioning, investigating, comparing, connecting, finding complexity, and exploring points of view. Finding skills are taken from 3 aspects, including proving mistakes, finding ideas, and concluding. Observations were made seven times in the experimental group and the control group. The distribution of the frequency of debate skills, analysis, and findings for the experimental class based on the categorization of values is in Table 3.

Table 3. Frequency Distribution of Debating Skills, Analysis, and Experimental Class Findings

No	Category	Intervals	Frequency	
			F	%
1	Very good	81-100	7	53,84
2	Good	66-80	5	38,46
3	Enough	51-65	1	7,70
4	Less	≤ 50	0	0,0
	Total		13	100,0

The frequency distribution of debating skills for the control group based on value categorization is in Table 4.

Table 4. Frequency Distribution of Debating Skills, Analysis, and Findings of the Control Class

No	Category	Intervals	Frequency	
			F	%
1	Very good	81-100	0	0,0
2	Good	66-80	6	33,33
3	Enough	51-65	4	50
4	Less	≤ 50	2	16,67
	Total		12	100,0

Based on Tables 3 and 4, the ability to debate, analyze, and find in the experimental class is in the very good category while in the control class, it is in the sufficient category. Therefore, the debate, analysis, and findings models are effectively and efficiently used in the science learning process.

3. EXPERIMENTAL AND CONTROL GROUP POST-TEST DATA

The post-test was carried out at the end of the lesson to find out the differences in science learning outcomes for class V at SDN 196/II Taman Agung, Bathin III District, Bungo Regency between the experimental class and the control class. As for the learning outcomes of the experimental class using the debate model, analysis, and findings on learning, the maximum score is 94, and the minimum achievement score is 60, with an average value of 76.5. Afterward, out of 13 students completed with a percentage of 77%, and 3 students who did not complete with a percentage of 23%, as shown in the following diagram.

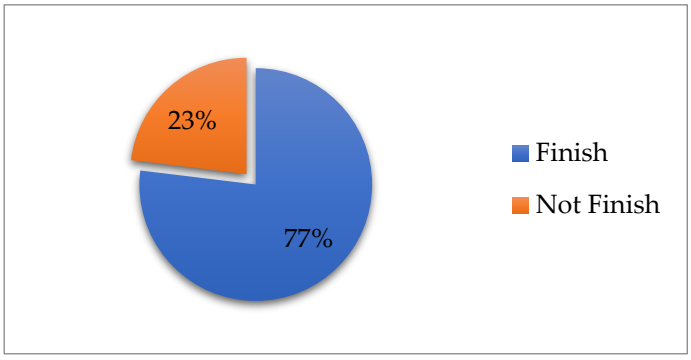

FIGURE 3. Completeness of experimental class learning outcomes

The picture above makes it clear that the completeness level of the post-test results of the experimental group was given the treatment of debate models, analysis, and findings in learning. Furthermore, an analysis of the learning outcomes of the control class data was carried out, which did not use conventional models in learning with a maximum score was 78 and a minimum achievement score was 55, with an average value of 65.1. Of the 12 students, six completed with a percentage of 50% and six students did not complete with a percentage of 50%, as shown in the following diagram.

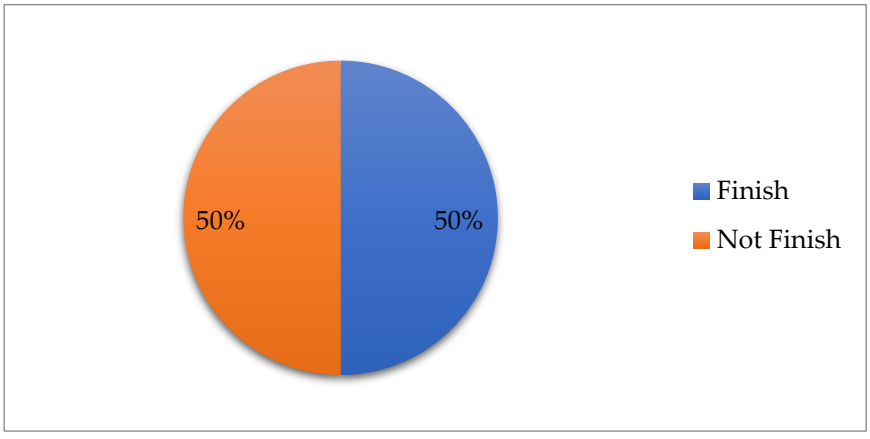

FIGURE 4. Completeness of control class learning outcomes

Based on the experimental class and control class data described above, the last step is to calculate the interpretation of the t value with the following formula:

$$\text{Tcount}=\frac{X1-X2}{\sqrt{\frac{S1}{n}+\frac{S2}{n}}}=\frac{76{,}5-65{,}1}{\sqrt{\frac{11{,}27}{13}+\frac{7{,}63}{12}}}=\frac{11{,}4}{\sqrt{0{,}86+0{,}635}}=\frac{11{,}4}{1{,}22}=9{,}01 \qquad (3)$$

Before consulting t-table, first determine the value df = (n1 + n2) – 2 = (13 + 12) – 2 = 25 – 2 = 23. Based on the calculation above, when consulted with ttable with df = 23 at a significant level of 5%, namely 2.069. Therefore, the value of tcount (9.01) is greater than ttable (2.069). Afterward, the working hypothesis (Ha) in this research is accepted, which is, that there is an influence of the debate learning model, analysis, and findings on science learning outcomes for fifth-grade students at SDN 196/II Taman Agung.

In this research, the researcher played a direct role as a science teacher in the VA class and VB of SDN 196/II Taman Agung, Bathin III District, Bungo Regency. The researcher gave treatment to class VA by using a model of debate, analysis, and findings, while in class VB, the researcher gave treatment to conventional learning. To find out the comparison of learning outcomes in the two classes, researchers used the posttest as a data collection technique. After learning using the debate learning model, analysis, and findings in the VA class and treatment without using debate models, analysis, and findings in the VB class. From testing the research hypothesis using the t-test to the experimental group with the results obtained, tcount = 9.01 while t-table with df = 23 at a significant level of 5%, namely 2.069. Therefore, tcount > ttable (9.01> 2.069), which means (Ha) in the research is accepted and there is an influence between the use of debate learning models, analysis, and findings on student science learning outcomes of SDN 196/II Taman Agung.

Through the application of models of debate, analysis, and findings, students are allowed to think deeply to construct new knowledge through a process of debate and analysis of the concepts learned. It to the results of research by [16, 17, 24, 27], stated debate, analysis, and findings learning models can provide concrete experiences so that students gain more learning experiences and opportunities to reflect on that experience in a process of generalization and abstraction regarding subsequent experiential activities.

IV. CONCLUSION

Based on the research that has been carried out, the researcher concludes that there is an influence of the debate learning model, analysis, and findings on the science learning outcomes of SDN 196/II Taman Agung students. The results of calculations from testing the research hypothesis using the t-test on the experimental group with the results obtained, t-count = 9.01 while t-table with df = 23 at a significant level of 5%, namely 2.069. Therefore, tcount> ttable (9.01 > 2.069), which means (Ha) in the research is accepted. There is an influence between the use of the debate learning model, analysis, and findings on student science learning outcomes of SDN 196/II Taman Agung.

This shows that the debate, analysis and findings model can help students in practicing critical thinking skills, analyzing materials and finding new understanding in learning natural science. This shows that the more teachers give students space to think critically and analyze materials, the higher the knowledge and learning outcomes of students in natural science.

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Author contribution

All authors made an equal contribution to the development and planning of the study.

Conflict of Interest

No potential conflict of interest or any other similar divergence associated with this research article by the authors.

Data Availability Statement

Data are available from the authors upon request.

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