

THE INFLUENCE OF RECIPROCAL TEACHING LEARNING MODEL ON THE CRITICAL THINKING ABILITIES OF FOURTH-GRADE STUDENTS IN SCIENCE SUBJECTS AT SDN 32 CAKRANEGARA

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Abstract

The purpose of this study was to determine the Effect of the Reciprocal Teaching Learning Model on the Critical Thinking Ability of Students in Class IV Science Content of SDN 32 Cakranegara. This research design is an experimental design used is Quasi Experimental Design with Nonequivalent Control Group Design pattern. This study uses 4 stages of Reciprocal Teaching research, namely, summarizing, questioning, predicting, and clarifying. The research was conducted at SDN 32 Cakranegara, Sandubaya District, Cakranegara. Data collection tools use observation and tests. The results showed that the Reciprocal Teaching Method had a significant effect on students' critical thinking skills. Based on the calculation of the hypothesis test using the independent samples t-test formula assisted by the statistical application SPSS 16.0 for windows obtained data that $t_{count} (6.496) > t_{table} (1.998)$. That is, H_0 is rejected H_a accepted, namely the Reciprocal Teaching method affects students' critical thinking skills in science lesson content.

Keywords: Learning Model, Reciprocal Teaching, Science.

INTRODUCTION

Education is one of the important pillars in a country (Ana, 2016). Every country plays an important role in developing quality education for all people and especially Indonesian children (Mustari & Rahman, 2014). The role of quality education will bring a good influence from generation to generation to create reliable and characterful human resources (Rahmat, 2016). According to Law No. 20 of 2003, the purpose of national education functions to develop the character of students. Through education, it is expected to be able to form a noble character. Efforts are made to instill these values and norms and pass them on to the next generation to be developed in life and life that occurs in an educational process. Without education a person will be difficult to progress, develop, be happy and even prosperous.

Education is very important for humans because through education, a person will get various kinds of knowledge, skills, and changes in attitude (Indy et al., 2019). With education, humans can gain various knowledge and can develop the abilities they have to

be applied in their lives (Sukmawijaya, 2019). One of them is the ability to think critically. Critical thinking is an activity through thinking about ideas or ideas related to the given concept or problem presented (Susanto, 2013; Syarifah et al., 2018). Critical thinking is related to the assumption that thinking is a potential that exists in humans that needs to be developed for optimal ability. Critical thinking is a directed and clear process used in mental activities such as solving problems, making decisions, persuading, analyzing assumptions, and conducting scientific research. By practicing, the ability to think critically will become a habit not a difficulty.

In the elementary school education curriculum, there are several main contents that must be mastered by students. One of them is the IPA charge. The purpose of learning science in elementary schools is for students to be able to learn the environment and develop knowledge and understanding of science concepts that are useful and can be applied in everyday life (Rahmah et al., 2017).

A good learning model used in the classroom by teachers can help students become active in learning and become more understanding of the material taught because they are able to capture the learning received (Christina & Kristin, 2016). It will also foster great curiosity from within students and teach them to think critically about existing problems and related to science content (Maulidati et al., 2018). Students will also often ask teachers about things that are not yet known and they will try to find answers to the problems faced (Jannah et al., 2021). Thus the way of thinking of students will develop into critical, objective, and creative in dealing with various gaps that occur.

Based on observations in July 2021 at SDN 32 Cakranegara, through observations made at school, several shortcomings contained in the learning process, one of which is students' critical thinking ability in making or solving questions given is still not optimal and not too confident. This result is obtained from the observation of seeing and assessing student activities in the learning process through student learning readiness in starting lessons, enthusiasm for learning, the process of observing, and the focus of one of them is activities when making questions according to the material, solving questions and concluding activities. Through observations made at school related to students' low critical thinking skills due to several factors, namely students still lack confidence in expressing their opinions during learning science content, the questions given by the teacher have not been able to train students' critical thinking skills, students make the teacher the only source of learning, so students do not try to find other sources. When the teacher finishes explaining almost no students want to ask questions about the newly learned material, even students seem indifferent, hesitant, shy and afraid to ask the teacher. Students' lack of attention to the subject matter in the learning process makes the level of students' critical thinking skills still low because students consider the lesson difficult to understand. The need to use innovative learning models in the classroom to help make students play an active role and be able to develop their ideas in the learning process in the classroom.

The use of learning models that do not involve student activity is one that results in students' critical thinking skills in low science content (Zubaidah & UM, 2017).

Therefore, the role of teachers is needed in developing students' critical thinking skills through various ways of classroom management. The ability to think critically will arise in students if teachers can build active student interaction and communication during the learning process. An interactive learning model is needed such as reciprocal teaching.

Reciprocal teaching is a learning model for teaching students learning strategies (Simbolon, 2020). Reciprocal teaching requires students to play an active role in the science learning process in class. (Sanjaya, 2014) explained that the reciprocal teaching learning model is a learning model that familiarizes students with using four independent understanding strategies, namely: (a) Summarizing teaching materials, (b) Compiling questions and solving them (questioning), (c) Explaining back the knowledge that has been obtained (clarifying), and (d) Predicting. In this strategy, students act as "teachers" replacing the role of teachers to teach their friends. Flipped learning was primarily developed to help teachers use cooperative learning dialogues to teach reading comprehension independently in the classroom.

Previous studies have shown that critical thinking skills and science learning outcomes of the group of students who are taught with Reciprocal Teaching based on a scientific approach are significantly higher than the group of students with a scientific approach both individually and simultaneously. So that the Reciprocal Teaching learning model is expected to be able to develop students' critical thinking skills because the Reciprocal Teaching model helps students find meaning in their learning by connecting academic material with the context of students' daily lives. In addition, using the Reciprocal Teaching learning model can foster concept reinforcement to students because the Reciprocal Teaching learning model adheres to the flow of constructivism, where a student is guided to find his own knowledge. Through the foundation of constructivism, students are expected to learn through experiencing instead of memorizing so that they can train students' critical thinking skills to actively ask questions and participate in learning activities.

RESEARCH METHODS

In this study, the experimental design used was Quasi Experimental Design with a Nonequivalent Control Group Design pattern. Quasi Experimental Design is used in research because this research design aims to reveal causal relationships by involving control groups in addition to experimental groups, but the selection of the two groups is not by random techniques.

This research was carried out in the odd semester of the 2022/2023 academic year. The research site will be carried out at SDN 32 Cakranegara located in the area of Jl. Brawijaya, Kel. Gerung Butun Timur, Sandubaya District, Cakranegara. Population in research includes everything that is made the subject or object desired by the researcher. The population in this study was grade IV students at SDN 32 Cakranegara. The sample in this study was all grade IV students totaling 48 students at SDN 32 Cakranegara.

The data collection method used in this study is documentation and observation. Analysis in this study is an important part in the research process because with analysis,

the data will appear to be useful, especially in solving research problems and achieving the final goal of research.

Before testing data analysis, an analysis prerequisite test was first held, namely by testing normality between subjects in the experimental group and the control group. The normality test of this research data will be analyzed using the Kolmogorof Smirnov test. In the calculation, researchers used the help of SPSS. If the significance value (p) is greater than 0.05 at the 5% significance level, then the data from the variable are normally distributed. Testing the homogeneity of samples is based on the assumption that if the variance possessed by the samples concerned is not much different, then the samples are quite homogeneous. If $F(\text{count}) > F(\text{table})$ then the sample is not homogeneous and if $F(\text{count}) \leq F(\text{table})$ then the sample is homogeneous at a significance level of 5%. The t-test used in this study is the Pooled Variance t-test formula which is used to determine whether there is a significant difference between the two samples. To test how much influence the Reciprocal Teaching model has on critical thinking learners can use Cohen's Size effect calculation.

RESULTS AND DISCUSSION

Result

Learning Implementation Data Using the *Reciprocal Teaching* Method

The treatment given to the experimental group with a total of 33 students was carried out as many as two meetings. The treatment is carried out by applying learning using *Reciprocal Teaching* learning in the content of science lessons. In this case, the researcher acts as a teacher while the class teacher becomes an observer to see the implementation of learning in the experimental class using the *Reciprocal Teaching* model, from this treatment using observation sheets. The results of the observations made can be seen in the following table.

Table 1 Implementation of *reciprocal teaching* learning methods in experimental groups.

| Day/Date | Implementation | Category |
|---------------------------|----------------|---------------|
| Monday, 5 September 2022 | 90% | Very powerful |
| Tuesday, 6 September 2022 | 100% | Very powerful |

Based on the table, it can be concluded that the treatment on Monday, September 5, 2022 did not reach 100% because the teacher did not carry out the 3rd point of the observation sheet, which is asking students to study the reading. In this treatment, students were asked to learn the reading, therefore the researcher only implemented the syntax of *Reciprocal Teaching* learning only 90%. As for other pointers, it has been implemented as well as possible. And on Tuesday, September 6, 2022, the treatment process in the experimental group has been carried out very well. This is because the teacher has carried out all the core activities of the *Reciprocal Teaching* learning process

Data on Students' Critical Thinking Skills

Data on critical thinking skills in the sample group and experimental group are divided into two, namely pre-test data and post-test data. The description of the two data is as follows:

a. Pretest data

The *pretest* was held on Monday, September 5, 2022 in the experimental group and Monday September 12, 2022 in the control group. After processing, the *pretest* result data can be interpreted as follows.

Table: 2 frequency distribution of experimental and control group *pre-test* scores.

| No | Interval values | Frequency of experimental groups | Control group frequency | Percentage of experimental classes | Control class percentage |
|---------|-----------------|----------------------------------|-------------------------|------------------------------------|--------------------------|
| 1 | 78-81 | 3 | 2 | 9,09% | 6,45% |
| 2 | 74-77 | 7 | 6 | 21,21% | 19,35% |
| 3 | 70-73 | 4 | 8 | 12,12% | 25,80% |
| 4 | 66-69 | 8 | 12 | 24,24% | 38,70% |
| 5 | 62-65 | 7 | 1 | 21,21% | 3,22% |
| 6 | 58-61 | 4 | 2 | 12,12% | 6,45% |
| Sum | | 33 | 31 | 100% | 100% |
| Average | | 68,44 | 64,40 | - | - |

Based on the table, it can be concluded that the average score of students' critical thinking skills in the experimental class was 68.44 and the average score in the control class was 64.40. So the score between the experimental group and the control group has a *range* that is not too far with a difference of only 4.04.

Thus, it can be assumed that the initial states of the experimental group and the control group are relatively equivalent. In addition to the aspect of the average score, the distribution of data also showed almost the same distribution with the mode between scores 66-69 which had a percentage in the experimental class of 24.24% and a percentage in the control class of 38.70%.

The control group and the experimental group had almost the same distribution of data and reflected an equal level of ability in critical thinking. The students' critical thinking skills when viewed from the *pre-test* scores show that only a few people are able to get high scores.

b. Posttes data

After the treatment was completed in the experimental group, post-tests were then carried out on the experimental group and the control group to determine the difference in students' critical thinking skills in the two groups. *Posttes* were held on Tuesday 6 September 2022 for the experimental class and on Tuesday 13 September 2022 in the control group. After processing, the *posttest* result data can be interpreted as follows.

Table 3 Frequency Distribution of Final Test (*Post-test*) Values of Experimental Group and Control Group

| No | Interval values | Frequency Experiment al group | Frequency Control group | Percentage Experiment al class | Control class percentage |
|---------|-----------------|-------------------------------|-------------------------|--------------------------------|--------------------------|
| 1 | 84-86 | 8 | 2 | 24,24% | 6,45% |
| 2 | 81-83 | 11 | 9 | 33,33% | 29,03% |
| 3 | 78-80 | 5 | 2 | 15,15% | 6,45% |
| 4 | 75-77 | 6 | 6 | 18,18% | 19,35% |
| 5 | 72-74 | 1 | 5 | 3,03% | 16,12% |
| 6 | 69-71 | 1 | 2 | 3,03% | 6,45% |
| 7 | 66-68 | 1 | 5 | 3,03% | 16,12% |
| Sum | | 33 | 31 | 100% | 100% |
| Average | | 80,37 | 73,83 | - | - |

Based on the table, it can be concluded that the average score of students' critical thinking skills in the experimental class was 80.37, and the average score in the control group was 73.83, so the score between the experimental group and the control group in the post-test showed a relatively long range when compared to the pre-test results previously with a difference of 6.54. In addition to the aspect of average score, the distribution of data also showed a distribution that was no longer the same as the mode for the control group ranging from a score of 66-69 while the mode for the experimental group ranged from a score of 81-83 with a percentage in the experimental group of 33.33% and in the control group of 29.03%.

Between the control group and the experimental group had an unequal distribution of data. In this case, the frequency of the experimental group's scores ranged more from relatively higher scores than the control group. So it can be said that after the treatment of the experimental group, there was a difference between the level of critical thinking skills of students in the experimental group and the control group which in the previous *pre-test* results showed equality.

Prerequisite Test

The pretest and post-test data as described above are then tested for normality and homogeneity as a prerequisite test before conducting a hypothesis test.

Normality Test

The normality test is intended to determine whether the research data is normally distributed or not using the *Kolmogorov-Smirnov* test with a significance level of 0.05. In this case, the guideline for drawing conclusions in *Kolmogorov Smirnov's One-sample* test is if sig. > 0.05 then the data is normally distributed, while if sig. < 0.05 then the data is abnormally distributed.

This Normality Test is carried out on experimental class and control class data which includes the results of the initial test (pre-test) and final test (*post-test*) of each group. From the calculation of the normality test, the results of the analysis are obtained as in the following table.

**Table 4 Normality Test Results Using Kolmogorov Smirnov Test
One-Sample Kolmogorov-Smirnov Test**

| | | Posttest |
|--------------------------------|----------------|----------|
| N | | 64 |
| Normal Parameters ^a | Mean | 76.2152 |
| | Std. Deviation | 6.13882 |
| Most Extreme Differences | Absolute | .106 |
| | Positive | .091 |
| | Negative | -.106 |
| Kolmogorov-Smirnov Z | | .852 |
| Asymp. Sig. (2-tailed) | | .463 |

Based on the results of the normality test, it was found that the final test results (*post-test*) with sig. 0.463 were normally distributed because they had sig. > 0.05.

Homogeneity Test

The homogeneity test is intended to determine the degree of similarity of variance between two groups, namely the experimental group and the control group using the F test. The criterion for inferring homogeneous or inhomogeneous data variance is to compare the price of sig. in *Levene's Statistic* with a price of 0.05 (sig > 0.05). The results of the homogeneity test on pre-test and post-test data in this study are as follows.

**Table 5 Homogeneity Test Results Using Levene's Test
Test of Homogeneity of Variances**

| | Levene Statistic | df1 | df2 | Sig. |
|-----------------|------------------|-----|-----|-------|
| <i>posttest</i> | .893 | 1 | 62 | 0.348 |

Based on the homogeneity test, *post-test* data with a significance of 0.348 has a homogeneous data variance because it has a sig > 0.05.

Test the hypothesis

Independent Sample T-Test

The hypothesis tested in statistical tests is the null hypothesis (H₀). in this study (H₀) is: "the use of the *Reciprocal Teaching* model does not have a positive and significant effect on students' critical thinking skills in science lesson content" In conducting this hypothesis testing, researchers used an *independent sample t-test* assisted by the statistical analysis program *SPSS 16.0 for windows*, by using an *independent sample t-test*, the effect of treatment can be identified well and accurately. In this hypothesis test, it will be compared with at the level of significance of 5% with the conclusion that if $t_{count} > t_{table}$ then the null hypothesis (H₀) is rejected and the alternative hypothesis (H_a) is accepted and if $t_{count} < t_{table}$ then the null hypothesis (H₀) is accepted and the alternative hypothesis (H_a) of the study is rejected.

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To find out the significance of the influence given by variable X can be concluded with the provision that if $\text{sign.} < 0.05$ then the variable has a significant influence but if $\text{sign.} > 0.05$, the variable does not have a significant effect. The results of the analysis of hypothesis testing using *an independent sample t-test* with the help of the *SPSS 16.0 for windows* analysis program can be seen in the following table.

Table 6 Independent Samples Test Results

| | | Independent Samples Test | | | | | | | | |
|--------------------------|-----------------------------|---|------|------------------------------|--------|-----------------|-----------------|-----------------------|---|----------|
| | | Levene's test for equality of variances | | t-test for Equality of Means | | | | | | |
| | | F | Sig | T | Df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% confidence interval of the difference | |
| | | | | | | | | Lower | | Upper |
| Critical thinking skills | Equal Variances assumed | .012 | .913 | 6.496 | 62 | .000 | 24.74470 | 3.80905 | 17.13053 | 32.35888 |
| | Equal variances not assumed | | | 6.484 | 61.065 | .000 | 24.74470 | 3.61635 | 17.11361 | 32.37580 |

Based on table 4.6, a result of 1,998 is obtained. With this, it follows that $t_{\text{counts}} (6.496) > t_{\text{table}} (1.998)$. This means that H_0 is rejected and H_a is accepted, namely the *Reciprocal Teaching* model affects students' critical thinking skills in class IV science lesson content.

The results of the t test to determine the difference in critical thinking skills of the control class and the experimental class are seen in the *t-test column for equality of means* with a value of *Sig. (2-tailed)* which is $0.05 < 0.000$. So based on the research hypothesis, if the value of *Sig.(2-tailed)* < 0.05 then H_0 is rejected and H_a is accepted. This means that there is a significant difference between critical thinking skills in control classes that use the conventional learning model and experimental classes that use the *reciprocal teaching* model.

Effect Size Test

Based on the results of the *independent samples* test and the results are influential, the next test is the effect size test with the aim of knowing the magnitude of the influence of the use of *Reciprocal Teaching* on critical thinking skills in grade IV science lesson content at SDN 32 Cakranegara for the 2022/2023 Academic Year can be known by calculating the *effect size* using the formula *cohen's* assisted with *SPSS application version 16.0 for windows* with the following results:

Table 7 Effect Size Test Results
Tests of Within-Subjects Effects
 Measure: critical thinking skills

| Source | Type III Sum of Squares | Df | Mean Square | F | Sig. | Partial Eta Squared |
|----------------------------------|-------------------------|--------|-------------|--------|------|---------------------|
| StageSphericity Assumed | 2689.567 | 3 | 896.522 | 49.957 | .000 | .625 |
| Greenhouse-Geisser | 2689.567 | 2.508 | 1072.392 | 49.957 | .000 | .625 |
| Huynh-Feldt | 2689.567 | 2.755 | 976.149 | 49.957 | .000 | .625 |
| Lower-bound | 2689.567 | 1.000 | 2689.567 | 49.957 | .000 | .625 |
| Error(taha Sphericity Assumed p) | 1615.121 | 90 | 17.946 | | | |
| Greenhouse-Geisser | 1615.121 | 75.240 | 21.466 | | | |
| Huynh-Feldt | 1615.121 | 82.658 | 19.540 | | | |
| Lower-bound | 1615.121 | 30.000 | 53.837 | | | |

Based on table 4.7 of the *effect size* test results, it can be seen that the *effect size* value using the Partial Eta Squared technique is 0.625. If presented, the influence given from the use of the *Reciprocal Teaching* method on students' critical thinking skills in this study is 62% and is classified as large based on the *effect size* classification in the table of $0.6 \leq d < 0.8$.

Discussion

The Effect of the *Reciprocal Teaching* Learning Model on students' critical thinking skills

This research is an experimental research with a *quasi-experimental* research design type of *non-equivalent control group design*. The research activities were carried out in the first and second weeks of September, starting from September 5-6, 2022 in the experimental class with a total of 33 grade IV A students and on September 12-13 in the control class with a total of 31 grade IV B students. This study aims to determine the influence of *Reciprocal Teaching* on Students' Critical Thinking.

The learning process that only relies on the teacher to explain and students who listen will make students bored and reluctant to follow to follow the learning enthusiastically. In contrast to the learning process that is carried out using the *Reciprocal Teaching* learning process, students will be happy and serious in following the lesson, as evidenced when researchers carry out the learning process using the *Reciprocal Teaching* learning model students are very happy. This is also reinforced by (Nonita et al., 2021), the principle in the *Reciprocal Teaching* model is that the material is learned by students independently and continued with the delivery of the material by students. Students independently learn the material to be understood then able to explain it to other friends or it can be said as a learning strategy through teaching friends. It is further explained

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that in addition to independent learning, student findings can be explained to other parties is one of the objectives of the Reciprocal Teaching model. *Reciprocal Teaching* is a constructivist approach based on the principles of making questions, teaching metacognitive skills through teaching, and modeling by educators to improve reading skills and comprehension in low-ability learners (Trianto, 2013).

Model *Reciprocal Teaching*, involves students actively in completing their group assignments. All students in the group must work to complete the task, through reading and understanding the text of the article (reading) given by the researcher to each student, then looking for answers to questions that have been made by thinking critically analyzing the text. Students get answers and they discuss in groups to conclude the answers that will be written on the answer sheet. The role of the researcher is as a facilitator who supports the learning process of students. While in the control class, the material is entirely given directly by the teacher, the acquisition of material for control class students is very limited, only from listening to the teacher's explanation. So that the learning process takes place monotonously and students easily forget the material taught. Understanding different materials will certainly give different results. This is what causes differences in students' critical thinking skills in the control class and experimental class as evidenced by the calculation of the *effect size* test.

Reciprocal Teaching is the right model in the application of science lesson content. Based on the explanation mentioned, it was concluded that the use of the *Reciprocal Teaching* model had a positive and significant effect on students' critical thinking skills in the science subjects of grade IV students of SDN 32 Cakranegara for the 2022/2023 academic year. This is in accordance with previous research, namely students' critical thinking skills can be improved through the *Reciprocal Teaching* model with the results of hypothesis tests with t-tests obtained t-count results of 2.307 and t_{table} of 1.671. Since $t_{count} > t_{table}$ or $3.064 > 1.671$ then H_0 is rejected. This means that there is an influence of the *Reciprocal Teaching* model on the content of grade IV science lessons on the critical thinking skills of SDN 32 Cakranegara students for the 2022/2023 academic year.

CONCLUSION

Based on the calculation of the hypothesis test using the *independent samples t-test* formula assisted by the statistical application *SPSS 16.0 for windows* obtained data that t_{count} (6.496) > t_{table} (1.998). That is, H_0 is rejected H_a is accepted, namely model *Reciprocal Teaching* affects students' critical thinking skills in science lesson content. While the value of *Sig. (2-tailed)* < 0.05, which is 0.000. Through these results, Model *Reciprocal Teaching* has a significant effect on students' critical thinking skills in grade IV science lesson content at SDN 32 Cakranegara for the 2022/2023 academic year.

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