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The Effect Of Implementing The Radec Learning Model On Improving Students' Critical Thinking Skills Integrated With Cultural Diversity

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ABSTRACT

The learning process greatly influences students' success in achieving learning goals, one of which is increasing students' critical thinking . Critical thinking at this time is one of the skills that really needs to be improved in 21st century education. This research aims to provide an overview of the influence of the RADEC learning model on students' critical thinking in elementary school science learning. This type of research is quantitative in the form of a quasi experimental design . The design applied is The Non equivalent Control Group Design . The technique used for sampling is cluster random sampling . The data analysis technique used is using a prerequisite test in the form of a normality test, then a homogeneity test and hypothesis testing using the t test. The average on the pretest in the experimental class was 44.05263 , after applying the RADEC learning model the post-test was 82.47. The control class obtained an average of 44.15 in the pretest and 69.5 in the post-test after learning using the conventional approach. After carrying out the t-test, it was obtained that t = 3.68 and t table was 1.68709 with a significance level of 0.05. Thus, t = 3.68 > t table = 1.68709, it can be concluded that the influence of the RADEC model was found on students' critical thinking in elementary school science and science learning.

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1. INTRODUCTION

Tourism is a field that is currently being discussed a lot by many parties. The law on tourism defines tourism as various things related to tourism activities and supported by various facilities and services provided by related parties such as the community, entrepreneurs, government and regional governments (Prathama, Nuraini & Firdausi, 2020). According to Amerta (2019) the existence of unique and interesting tourism potential in an area should be exploited through good tourism development. The relationship between tourism and culture is a close and complex network, where the two fields support and influence each other in various aspects (Ariyani, Fauzi & Umar,

2020). Based on this, several relationships between tourism and culture include developing tourist destinations, increasing creativity, and also developing the local economy.

Apart from that, tourism is very closely related and related to various fields, one of which is education. According to Widodo (2020) tourism and elementary schools are related to each other in several ways, such as teaching, competency development, and influence on society. The relationship between the two is that elementary schools can use tourism as learning material to introduce students to local culture, history, geography and economics (Warastri, 2022). Based on this, students can learn about cultural heritage and the role of tourism in driving the local economy.

At this time The 21st century continues, which is closely related to technology. Technology innovates continuously to make work easier. According to Lestyaningrum, et al (2022: 39) say that technological innovation causes a sense of concern in humans, this is because human work can be replaced with technology that is currently developing, one of which is robots. To avoid this, each individual needs to have skills. These skills become a stronghold for every individual in facing current developments, one of which is in the 21st century (Kiska, 2024). This is reinforced by the opinion of Sabil, et al (2021) who say that every human being needs skills to be able to compete in the development of the 21st century. These skills are often referred to as the 4Cs which consist of *critical thinking skills* , creativity thinking skills, communication skills, and collaboration skills. Based on this, every individual must be able to master at least one skill in dealing with developments in the 21st century which are very closely related to technology, one of which is in the field of education.

Teaching and learning activities or often known as the learning process. Learning is carried out by involving teachers, students and learning resources that can increase interaction in the learning process so that learning objectives can be achieved. According to Zulkhi, et al (2024) say that learning plans or learning steps must be prepared by the teacher when carrying out the learning process so that it takes place effectively. According to Suparlan (2019: 80), constructivist learning can maximize the learning process and outcomes, teachers need to encourage students to be actively involved in discussions, ask and answer questions , think critically, explain each answer given, and provide reasons for each answer given. submitted. Constructivist learning is a form of learning process that gives students the freedom to express ideas and give meaning to the students themselves (Supardan, 2016). Based on this, learning with constructivism theory

can provide active and creative opportunities for students so that children's conceptions can change and develop properly. There are four conditions that must be met, especially in learning so that it can lead to learning effectiveness.

In learning planning there are several important components, one of which is the learning model. Learning models are structured based on various principles or theories of knowledge. According to Joyce and Weil (1986), the learning model contains design guidelines for how the learning process has been planned and there are also learning tools needed for implementing the learning. This is also reinforced by the opinion of Andriani, Hidayat & Indawan (2021) who say that learning models can be used as a reference for teachers in choosing and also preparing a form of learning process that is adapted to the characteristics and needs of students to achieve learning goals.

The varied learning model can be adapted to the conditions in the classroom. One learning model that can be used is the RADEC learning model. According to Sopandi (2023: 5) the RADEC learning model has the basic principle of being able to increase the potential and abilities of more qualified students independently regarding insight, knowledge and skills. The RADEC learning model is a new idea in the world of education that hopes for 21st century achievements in developing character and also improving students' creative and innovative thinking abilities (Tulljanah & Amini, 2021: 5512). This is reinforced by the opinion of Sopandi (2019: 23) that the RADEC model has the advantage of helping students develop communication and critical thinking skills in the learning process, this is because the application of the syntax or steps in the RADEC learning model is easy to remember and supports Students gain an understanding of concepts and improve their analytical skills which are included in 21st century educational skills, namely 4C skills.

Based on research conducted, it was found that critical thinking in class IV students has not developed as a whole. Looking closely at the results of observations, it was found that in critical thinking activities in group learning where the students' responsibility was still lacking, when the teacher gave assignments, the students did not do them and only chatted with friends on the right and left, thus making the class atmosphere calm. not conducive. The results of identifying this problem are due to the lack of varied teachers in the learning process and it only seems monotonous by using the conventional model which is dominated by lectures by teachers and assignments so that the science learning carried out by students and teachers is not optimal. Based on the explanation of the problems above, the causes of students' low skills in critical thinking

in the learning process are learning activities that are less interesting for students so that students get bored easily and also a lack of involvement of students in the learning process such as problem solving, especially in science and science learning.

Based on these problems, researchers are interested in conducting research to determine the effect of implementing the RADEC learning model on improving students' critical thinking in elementary school science lessons.

2. RESEARCH METHOD

The research carried out is quantitative research, experimental research methods using quasi experimental design. The design applied in this research is a research design according to Sugiyono (2015) Nonequivalent Control Group Design. The research design was divided into 2 groups, namely the experimental group and the control group. The experimental group and control group were initially assigned pretest (O1, O3) as a foundation in determining changes. Then, the experimental group was taught with RADEC (X), while the control group uses the conventional model (-). Then, both groups A post-test was given to each group to show the extent of the results treatment. Finally, the results obtained are compared to see the influence obtained from the model in the experiment, so that the influence in the experimental class can be known.

The research sample was all Class VIA elementary school students for the experimental group with 19 members, and Class VIB students with 20 members as the control class at SDN 34/IV Teratai. The instrument in the research is a pretest and posttest question sheet which is useful for seeing the extent of the influence of the RADEC model on the learning gains obtained by students on the theme of our friendly environment. The technique for collecting research data is the test technique. Collecting data using test techniques, namely answering test instruments in order to obtain data on students' mastery, especially in the knowledge section (Lestari & Yudhanegara, 2017).

The data acquisition analysis applied is the t-test which is applied if the prerequisites for the t-test analysis are met. The tests used as prerequisites for data analysis are the normality test and the homogeneity of variance test. The normality test applies the Kolmogorov – Smirnov test formula. Data can be called normal if the price $D_0 < D_{table}$ l. while the aim of the homogeneity test is to find out whether the group is a homogeneous group. The homogeneity of population variance test is used to test groups of data using the Bartlett test. Obtain homogeneous data if the $\text{calculated value of } \chi^2 < \chi^2_{table}$. After the analysis prerequisites have been met, the next stage is hypothesis testing using

t-test statistical analysis. Then an N-Gain test is carried out which is useful in order to find an increase in students' learning outcomes before and after studying.

3. RESULTS AND DISCUSSIONS

In this research, it was found that the results of research at SD Negeri 34/IV Teratai, namely where changes were obtained in students' critical thinking in the science and science learning process, especially in the material. Benefits of diversity and preserving cultural diversity in the experimental group class using the RADEC model with the participants' learning outcomes. control group class students by implementing conventional learning. From the t-test carried out, the $_{calculated}$ t value = 3.68 at a significance level of 0.05, then dk, namely = $n_1 + n_2 - 2 = 19 + 20 - 2 = 37$, obtained $t_{table} = 1.68709$. obtained Ha is accepted while Ho is rejected. The hypothesis conclusion (alleged) in this research is that there is a significant influence of the RADEC model on increasing students' critical thinking in science learning, especially in the material on the benefits of diversity and preserving cultural diversity at SD Negeri 34/IV Teratai.

In this research, data collection was carried out by carrying out a pretest in 2 sample classes in order to obtain descriptive (initial) data regarding students' mastery of the material in the eight subthemes, one lesson three and four. The number of questions that students must answer is 15 objective questions which are done in groups. Next, the RADEC model was given in the experimental sample and learning using conventional in the control sample, followed by the implementation of a posttest on students' learning gains after giving the treatment to each group.

Based on the results of data analysis in the pretest and posttest processes, learning gains in the experimental category and control category, there are different values from the scores obtained in each class. The experimental sample obtained a pretest average of 44.05 , the standard deviation was 11.37, the variance value was 129.27, the highest value was 63 and the lowest value was 27. Meanwhile, the control group's pre-test average was 44.15, the standard deviation was 12. .29, variance 151.08. The highest learning gain was 67 and the lowest learning gain was 27. The average post-test score for the experimental group was 82.47 . The standard deviation was 11.60, the variance was 134.60, the highest score was 90 and the lowest score was 60. The control class post-test average was 69.5 , standard deviation 10.73, variance 115.05, the highest score was 90 and the lowest score was 53. The increase in the learning outcomes of students in the experimental sample was significant compared to the control sample.

Before applying the hypothesis test, a normality test and a homogeneity test are carried out. The normality test for the data was in the pretest, posttest for the 2 samples applying the Kolmogorof-Smirnov formula test. The KolmogorofSmirnov test which was carried out on the pretest and posttest values of the experimental sample (VA) against the control sample (VIB), obtained a value of $D_0 < D_{Table}$, so the data is normal. Then, the homogeneity test used was the Bartlett test. In the pre-test of the experimental group, the control obtained $F_{calculated} < F_{table}$, namely 1.731 < 2.2171, so the pretest had a homogeneous (same) variance. For the posttest the experimental group and control group obtained $\chi^2_{count} < \chi^2_{table} = 0.113807 < 3.841$ then, the posttest has homogeneous (same) variance. Based on the homogeneity test for the 2 class groups, it can be summarized that the pre-test and post-test data obtained were homogeneous variances at a real level of 5%. After obtaining the post-test data from students, both sample groups were normally distributed and also had homogeneous (same) variance.

After carrying out the calculations, the $t_{value\ calculated} = 3.68$, the significance level is 0.05, then $dk = n1 + n2 - 2 = 19 + 20 - 2 = 37$, obtained $t_{table} = 1.68709$. It is found that $t_{count} > t_{table}$, then H_0 is rejected then Ha_{is} accepted. In conclusion, there is a positive influence of the RADEC model on increasing students' critical thinking. in class IV at SD Negeri 34/IV Teratai. To estimate the increase in learning outcomes for students before and after learning is carried out, the N-Gain test is given. From the N-Gain test, data was obtained for the experimental class, there were 11 students who obtained the high N-Gain score criteria and 8 students who obtained the medium N-Gain score criteria. In the control class there were 20 students with moderate N-Gain scores.

Learning in the control class that uses conventional learning creates a relatively passive learning atmosphere for students, which can be seen when the teacher's learning is more active because students only listen to the material explained by the teacher. During PBM there is a lack of relationship between teachers and students which makes students not interested in teachers because they are busy with themselves and their classmates. Students are passive, then they only get knowledge from the teacher who teaches (Hasnan, Rusdinal, & Fitria, 2020). Learning in the control class which applies conventional learning makes students passive. Students in the control group were less active than students in the experimental group in ongoing learning, resulting in a learning impact that made the results in the control group class smaller than the learning outcomes of students in the experimental group class.

From data processing of the pretest results in the experimental class, the research data was obtained in table 1.

Table 1 Recapitulation of Pretest Results Data for Experimental Class and Control Class

Variable	Pretest	
	Experiment Class	Control Class
N	19	20
The highest score	63	67
Lowest Value	27	27
Mean	44,053	44.15
Standard Deviation	11,369	12,292
Variance	129,275	151,081

Based on table 1. above , in the experimental class with 19 students, the highest score was 63 and the lowest score was 27. From the experimental class scores, the average score was 44.053, the standard deviation was 11.369 and the variance value was 129.275. Meanwhile, the control class with 20 children received the highest score of 67 and the lowest score of 27. From the control class scores, an average score of 44.15 was obtained , a standard deviation of 12.292 and a variance value of 151.081. Then, from data processing of the posttest results in the control class, the research data in table 2 was obtained below:

Table 2. Recapitulation of Posttest Results Data for Experimental Class and Control Class

Variable	Pretest	
	Experiment Class	Control Class
N	19	20
The highest score	90	93
Lowest Value	60	53
Mean	82.47	69.5
Standard Deviation	11.60157	10,726
Variance	134,595	115,053

Based on table 2 above, in the experimental class with 19 students the highest score was 93 and the lowest score was 60. From the experimental class scores, the average score was 82.47 , standard deviation 11.60157 and variance value 134.5965. Meanwhile, the control class with 20 children received the highest score of 90 and the lowest score of 53. From the control class scores, the average score was 69.5 , the standard deviation was 10.72626 and the variance value was 115.0526.

The normality test aims to see whether the learning outcomes data from the two sample classes are normally distributed or not. So analysis can be used using the t-test. The data used for this normality test are the pretest and posttest scores in the experimental class and control class. To calculate the normality test, use the Kolmogorov-Smirnov test. After calculating the normality of blood using the Kolmogorov-Smirnov test on both sample classes, the Do and Dt values were obtained with a real level of 0.05 as shown in the table as follows:

Table 3. Normality Test Calculation Results with Kolmogorov- (Pretest)

No	Class	N	A	D_0	D_{table}	Information
1.	Experiment	19	0.05	0 .165558	0.301	$D_0 < D_t$ (Normal)
2.	Control	20	0.05	0.187271	0.294	$D_0 < D_t$ (Normal)

From table 3. It was found that for both sample classes the price $D_0 < D_{table}$. This means the data is normally distributed. Meanwhile, the posttest can be seen in table 4. as follows:

Table 4. Normality Test Calculation Results with Kolmogorov- (Pretest)

No	Class	N	A	D_0	D_{table}	Information
1.	Experiment	19	0.05	0.129488	0.301	$D_0 < D_t$ (Normal)
2.	Control	20	0.05	0.02799	0.294	$D_0 < D_t$ (Normal)

From table 4. It can be seen that the normality test calculation for the experimental class with a $D_{\text{calculated value}}$ of 0.129488 is smaller than the $D_{\text{table of}}$ 0.301 for the 0.05 level. Meanwhile, for the control class, the $D_{\text{calculated}}$ value was 0.02799 , which was smaller than the $D_{\text{table of}}$ 0.294 for the 0.05 level. Based on these data, it can be concluded that the posttest for the experimental class and control class came from normally distributed data. The second prerequisite test is homogeneity testing using the Bartlett Test. This test aims to determine if the learning outcomes data from the two sample classes have homogeneous variance or not. Calculation of the $\chi^{2\,\text{value}}$ with a significance level of $\alpha = 0.05$ from the Chi Square table (χ^2). The results of the homogeneity test calculation can be seen in table 5 below:

Table 5. Homogeneity Test Calculation Results with Bartlett (Pretest)

No	Class	α	χ^2_{count}	χ^2_{table}	Information
1.	Experiment	0.05	0.112027	3,841	Homogeneous
2.	Control				

From table 5. above , it can be concluded that the results of the calculations for the two classes in Prettest show that $\chi^2_{counts} < \chi^2_{tables}$, so the data is homogeneous. Meanwhile, the Posttest can be seen in table 6. below this:

Table 6. Results of Homogeneity Test Calculations with Bartlett (Posttest)

No	Class	α	χ^2_{count}	χ^2_{table}	Information
1.	Experiment	0.05	0.113807	3,841	Homogeneous
2.	Control				

Based on table 6. above , it can be concluded that the results of the two experimental class groups and the control class in the Posttest had homogeneous variance $\chi^2_{count} < \chi^2_{table}$, so the data is homogeneous. Based on the two tables above, it can be concluded that the two experimental class groups and the control class have homogeneous variances.

Based on the results of the prerequisite tests, it was found that the learning outcomes were normally distributed and homogeneous, so a hypothesis test was carried out using the t test. The results of hypothesis testing using the t-test can be seen in table 7. below this:

Table 7. Test results with t-test

No	Class	T_{count}	T_{table}	Average value
1.	Experiment	3.68	1.68709	82.47
2.	Control			69.5

Look at the t table with dk ($n_1 + n_2 - 2$) = 37. So what is guided by the table is that with a real level of 0.05, the t_{table} value is 1.68709. So it can be concluded that the increase in students' critical thinking in science learning material on energy transformation using the RADEC model in learning is higher than the learning outcomes of students in conventional learning and there is an influence on students' critical thinking skills in learning science and technology material on energy transformation between classes. experiments using the RADEC model compared with a control class with conventional learning.

Next, the N-Gain Test is carried out. The N-Gain test was carried out to determine whether there was an increase in students' critical thinking after being given treatment. This increase is taken from the pretest and posttest scores obtained by students in groups.

Table 8. Pretest-Posttest N-Gain Results in the Experimental Class and Control Class

	Experiment			Control		
	Pretest	Posttest	N-Gain	Pretest	Posttest	N-Gain
$\sum$	837	1567	13.52	857	1480	11.24
$\bar{X}$	44.0526	82.4737	0.71	42.85	74	0.56

Based on the data above, it can be analyzed that the difference between the pretest score and the posttest score produces the N-Gain value. For the experimental class the average pretest score was 44.0526 and the average posttest score was 86.36 with an average N-Gain score of 0.78 and in the high category. Then for the control class the average pretest score was 42.85 and the average posttest score was 74 with an

average N-Gain score of 0.56 and was in the medium category. It can be concluded that these two classes have differences in student learning outcomes in science learning.

Students are invited to be active, critical, and have a conceptual understanding of the learning material. This is in accordance with Sopandi's opinion in (Sopandi & Handayani, 2019) encouraging students to be active, think critically in learning, think creatively, and provide students with opportunities to learn material through pre-learning assignments. The implementation of the RADEC model in learning applies the five steps proposed by Kaharuddin (2020) RADEC, namely: (1) Read, students read in a book that is appropriate to the lesson that will take place in class, (2) Answer, students respond to pre-learning questions before learning process in the classroom. This activity is implemented independently at home. At this stage, the teacher can also find out concepts that are not well understood by students, then they can be discussed with students in class together, (3) Discuss, students learn to form groups of two to four individuals to discuss pre-learning answers, teachers can recognize anything. students' needs, (4) Explain, presenting material that has been discussed, resource persons are appointed from their representatives, (5) Create, students produce creative ideas such as formulating research questions, or problem solving/solutions. The creative ideas are related to the material that has been mastered.

Nowadays, developments in everything are very rapid, including in the field of knowledge, for example there are many new learning models developed by experts such as the RADEC model. The impact in the field of knowledge can encourage changes in teaching from just remembering facts through lectures to encouraging critical thinking skills (Fitria, 2017). In the learning process, it is necessary to consider the principles and achieve the goals designed in the learning process to update students' knowledge (Kiska, 2021). Learning involves mental processes, touching feelings, experiencing and active thinking (Fitria, 2020). In the process, when an individual learns, he will feel changes in behavior and display learning results as a benchmark that he is able to understand the lessons he receives.

The results of this research are supported by research conducted by Lutfhi et al (2021) PPG Students at PGRI University Semarang with the title Application of the RADEC Learning Model to Improve Students' Learning Communication Skills in Class V Thematic Learning Theme 8 at SD Negeri 1 Selo, Grobogan Regency, Central Java. The results of this research show that there is an increase in students' communication and critical thinking skills as evidenced by the results of student observations which increase

in each cycle. This research is also relevant or in line with research conducted by Iswara, Basic Education Study Program, Postgraduate School, Indonesian Education University with the title "Application of the RADEC model with image media to improve the poetry writing ability of class II students at SDN 67 Magelang" The results of this research shows that the application of the RADEC learning model increases students' learning activities, this shows a very good category. This can be seen from cycle I getting an average ability to write poetry of 68.87% with classical learning completeness of 67.74%, (II) cycle II the average of writing poetry is 77.41%. This is also reinforced by the opinion of the Journal of Rahmi, S., & Fitria, Y. (2020) with the title "The Influence of the RADEC Model in Thematic Learning on Student Learning Outcomes in Elementary Schools." The results of research conducted by this researcher show that the use of the RADEC learning model can improve the critical thinking skills and learning activeness of class V students at SDN 01 Maninjau, Tanjung Raya District, Padang City for the 2020 academic year.

Based on this, there is renewal in the use of the RADEC learning model, especially in science and science learning regarding material on the benefits of diversity and preserving cultural diversity so that it has a positive impact on students' communication and critical thinking skills in the learning process. So, by implementing the RADEC learning model, it can help to introduce the culture or local wisdom that exists around students. This is reinforced by the opinion of Kurniawan, Kiska & Damayanti (2022) who say that integrating the cultural diversity around students can provide good benefits for students to increase their knowledge, insight, character and other positive things, one of which can also be preserving the cultural diversity that exists around students.

4. CONCLUSION

Based on the research results that have been presented, it can be concluded that the RADEC learning model can develop students' potential for use in the 21st century (critical thinking, solutions to problems, critical thinking, relationships and creativity). In conclusion, because tcount < ttable the initial hypothesis is rejected, there is an influence of the RADEC learning model on the learning outcomes of elementary school students, especially in the field of knowledge. Increased critical thinking in students after implementing the *RADEC learning model* in science and science learning material on the benefits of diversity and preserving cultural diversity . Increased critical thinking is

characterized by students' ability to work together , show a sense of responsibility in carrying out assigned tasks with group friends, compromise and communicate well with colleagues. So by implementing the RADEC learning model, it can help students to know and even help in preserving the cultural diversity that exists around students.

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