Implementation of Culturally Responsive Teaching (CRT) Approach in Improving Critical Reasoning Ability and Collaboration of Grade IV Elementary School in Science Subject in Pagedongan District

Nurul Farida Istiqomah[1], Subuh Anggoro[2]
[1]SD Negeri Gentansari, Banjarnegara
[2]Magister Pendidikan Dasar, Universitas Muhammadiyah Purwokerto

ARTICLE INFO

ABSTRACT

This research aims to determine the implementation of culturally responsive teaching (CRT) approach on critical thinking and collaboration for class IV elementary school for the IPAS learning in Kecamatan Pagedongan. This type of research is quasi-experimental research with The pretest-posttest control group design. Data on critical thinking and collaboration was collected using an assessment instrument in the form of a questionnaire. Data was analyzed using analysis assisted by SPSS 23 for Windows. The results of the research show that: First, there is a significant influence of culturally responsive teaching (CRT) approach on the critical thinking IPAS of class IV students at elementary school Kecamatan Pagedongan. Second, there is a significant influence of culturally responsive teaching (CRT) approach on the collaboration IPAS of class IV students at elementary school Kecamatan Pagedongan. And third, there is a significant influence of culturally responsive teaching (CRT) approach on the critical thinking and collaboration IPAS of class IV students at elementary school Kecamatan Pagedongan.

Corresponding Author:
Nurul Farida Istiqomah
SD Negeri Gentansari, Banjarnegara
Semayun, Gentansari, Kec. Pagedongan, Kab. Banjarnegara, Jawa Tengah 53418
Email: ridaistiqomah18@gmail.com

1. INTRODUCTION

Currently we have entered the era of society 5.0 where human life is made easier by technology, such as the use of big data, robots, internet of things (IoT), to artificial intelligence (AI). The era of society 5.0 is considered to have an impact on all aspects of life, one of which is education. (Nasiti, 2020). The education sector is challenged to prepare a generation that can compete in the era of rapid development of artificial technology. Humans who cannot compete will be replaced by human-made technology. To answer this challenge, education in Indonesia is trying to improve its quality and quality to produce a generation that can compete in the era of society 5.0. According to Indarta (2022) ne way is through the implementation of the independent curriculum. In line with Nadiyah (2023) which states that the independent curriculum can improve the quality of human resources to be able to compete in accordance with the developments of the times.

The independent curriculum is a more flexible curriculum. Learning that implements the independent curriculum will focus on character development, student competencies, and essential materials. With the independent curriculum, students can develop their soft skills and character. This is supported by Jufriadi (2022)

which states that learning that implements the independent curriculum can improve 21st century skills, namely creativity, critical thinking, communication, and collaboration, citizenship, and character or known as the 6C 21st Century Skills. According to Fitri (2020) The application of 6C skills in learning can have a major impact on students to face the challenges of 21st century life. So these 21st century skills are very important to be trained in students, because graduates who only have high knowledge are not yet competitive enough globally so students must be equipped with 6C skills, one of which is critical thinking and collaboration skills. Therefore, good critical thinking is a key competency that must be possessed by every student. Critical thinking skills can help students analyze a problem, argue based on accurate information and data, provide assessments of problems with correct thinking, so that they are able to solve problems logically and provide solutions based on relevant facts and evidence (Rahmadani, 2022). Critical thinking skills are very important to face every challenge in the present and in the future. Because critical thinking is a high-level thinking process to make decisions based on the results of problem analysis, solve problems, conclude and evaluate the problem. So that students who think critically will not decide something without investigating and looking for the data first so that a proper and appropriate solution will be obtained. According to Ennis (2011), Critical thinking ability indicators are providing simple explanations, building basic skills, concluding, providing further explanations, setting strategies and tactics. Critical thinking is one of the skills that students need to have.

In addition to critical thinking, collaboration is also a 21st century skill that is no less important. Collaboration skills are defined as individual cooperation with other individuals to align differences in views, knowledge and actively participate in discussions by providing input, listening and providing support to each other (Greenstein, 2012). Greenstein (2012) mentions that there are 10 indicators of collaboration skills including: 1) Working productively; 2) Contributing actively; 3) Balanced in listening and speaking; 4) Committed to prioritizing group goals; 5) Demonstrating responsibility; 6) Appreciating the contribution of each group; 7) Controlling one's own emotions; 8) Participating respectfully in discussions, debates and differences of opinion; 9) Recognizing and trusting the strengths of each group member; 10) Making decisions that include the views of several members.

Collaborative skills are also relevant to the characteristics of the Merdeka Curriculum, namely the support for the development of soft skills and character through the Pancasila student profile. This is described in the elements of the Pancasila student profile in the mutual cooperation dimension. According to the dimensions, elements and sub-elements of the Pancasila student profile guide (2022), collaboration is defined as the ability to work together with others accompanied by a positive attitude and skilled at collaborating and coordinating joint efforts to achieve common goals by respecting the diversity of backgrounds of each individual involved. Based on the explanation that has been described, it can be concluded that collaboration skills are the ability to work together between individuals to achieve common goals and are skilled in the course of discussions or coordination by considering the background differences of each individual. Schools are formal educational institutions that are expected to be a comfortable place for students to develop these skills. To realize learning that can improve students' collaboration skills, teachers' abilities are needed in developing learning strategies so that they can run effectively and in accordance with the expected results.

One way to practice critical thinking and collaboration skills is during the science learning process (Solikhin, 2021). Science is one of the subjects taught in schools. Science learning aims to build critical thinking skills, scientific skills and also conceptual knowledge. In science material, students are required to find relationships between equations and connect concepts in everyday life (Rohmah & Nurita, 2017). Nugraha et al., (2017) explains to foster the ability to think, work, and behave scientifically in students, science learning is needed that trains critical thinking in order to solve problems in everyday life. Therefore, science learning in elementary schools/Islamic elementary schools must cultivate scientific thinking creatively, independently and critically. At the same time, it can collaborate with others.

Based on the description of the problem, the solution that can be provided is the use of a varied approach. The relevance of independent learning with the concept of an approach that integrates cultural and educational dimensions is a separate urgency in choosing an approach, considering that students have diverse or diverse characteristics. Gay (2000) describes Culturally Responsive Teaching (CRT) as an approach by collaborating knowledge, culture, experience and performance styles of diverse learners so that meaningful learning experiences are realized. The Culturally Responsive Teaching (CRT) approach is part of a contextual approach that internalizes local culture or local customs so that learning can be interesting and easy for learners to understand (Taher, 2023). The Culturally Responsive Teaching (CRT) approach is an approach that is relevant to the student's background or contextual because it contains cultural content, customs and the background of a region which aims to make it easier for students to understand the teaching material.

Based on the background explanation, the purpose of this study is to apply the Culturally Responsive Teaching (CRT) approach to improve critical reasoning and collaboration skills of 4th grade elementary school students.

2. METHOD OF THE RESEARCH

The type of research used in this study is quantitative research. According to Sugiyono (2019), quantitative research is also called traditional research because it has been used for a long time. Creswell in (Kusumastuti et al. 2020) stated that the quantitative research method is a method for testing certain theories by examining the relationship between variables. Sugiyono (2019) stated that the quantitative method is used in several things including:

If you want to know the effect of certain treatments on others. For this purpose, the experimental method is most suitable. For example, the effect of certain herbal medicines on health levels.

If the researcher intends to test the research hypothesis. The research hypothesis can be in the form of descriptive, comparative and associative hypotheses.

If the researcher wants to obtain accurate data, based on empirical and measurable phenomena. For example, if you want to know the IQ of children from a particular community, then measurements are taken with an IQ test

Based on the objectives of this study, a quantitative research method is used to support the research process. The quantitative approach is considered to be able to answer the problems that will be raised in this study.

The right method in this research is the quasi-experimental research method. Quasi-experimental design is a development of true experimental design which is difficult to implement (Sugiyono (2016: 77). The form of quasi-experimental design used is the pretest-posttest control group design. Sugiyono (2016: 72), explains that experimental research involves two groups. The first is the experimental group, which is the group that is given treatment using the Culturally Responsive Teaching (CRT) approach and the second group is the control group, which is the group that uses conventional methods (lectures). The following is a table in this study:

Table 3.1 Research Design pretest-posttest control group design

Group	Pre-test	Perlakuan	Post-test
E	O1	X1	O2
K	O1	X2	O2

Information:
E : Experimental Group
K : Control Group
O1   : pre-test Experimental Group
O1   : pre-test Control Group
X1   : treat with a Culturally Responsive Teaching (CRT) approach
X2   : did not receive treatment with the Culturally Responsive Teaching (CRT) approach
O2   : post-test Experimental Group
O2   : post-test Control Group

Based on the picture above, it can be explained as follows: from several equivalent classes, the class grouping was determined into 2 groups, namely the experimental group and the control group. Before this experimental research was conducted, a pre-test was first conducted, both in the experimental class (treatment) and the control class to determine critical reasoning skills before being given treatment. In the experimental class, learning was applied using the Culturally Responsive Teaching (CRT) approach. In the control group, learning was applied using the method that teachers usually use when teaching in class, namely lectures. After a certain period of time, a post-test was held to measure the acquisition of critical reasoning skills in science, both in the control class and the experimental class.

The following is the research paradigm used, namely the dual paradigm with two dependent variables (Sugiyono, 2009). The picture is as follows.
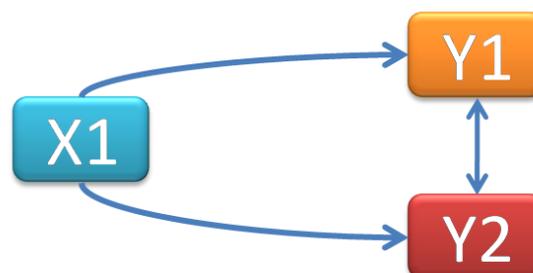

Figure 1. Dual Research Paradigm

Keterangan:
X_1 : Independent/free variable
Y_1 : Dependent variable 1
Y_2 : Dependent variable 2
r_1, r_2 : Simple correlation

This research was conducted on all fourth grade students of SD Negeri 1 Gentansari and SD Negeri 1 Twelagiri, Pagedongan District, Banjarnegara Regency, Central Java. The research was conducted in Semester 2, January-April 2024.

Research Instrument collaboration ability is measured through a questionnaire. The type of questionnaire that will be used is a closed questionnaire, where questions or statements already have alternative answers (options) that can only be selected by respondents. Respondents cannot provide other answers or responses except those that are available as alternative answers. The approach used in this questionnaire is the Likert scale. The Likert model scale proposed to select the answer category set by the researcher is an attitude range scale of 1 to 5. 1 if never, 2 if ever, 4 if often, 5 if always.

The making of this instrument went through 2 stages, namely the stage of making the grid and the stage of compiling the collaboration questionnaire. The researcher adjusted it to the indicators of the collaboration elements in the mutual cooperation dimension. The collaboration questionnaire was validated empirically and logically, to meet the validity of the preparation of questions preceded by the making of the questionnaire grid. In addition, interviews were also used to conduct direct questions and answers with grade IV students to obtain supporting data about the research and documentation obtained from related parties, to find out the history of the school, the number of students, and everything related to school administration in the form of archives or tables that the researcher obtained from TU and also the curriculum at SD Negeri 1 Gentansari and SD Negeri 1 Twelagiri.

Descriptive Analysis According to Sugiyono (2016, p. 147) "descriptive statistics are statistics used to analyze data by describing or depicting the collected data as it is without intending to draw conclusions that apply to the public or generalizations".

Validity is the result of a measurement that describes the measured aspect. A valid instrument is one that is able to measure what should be measured. It is then tested on a trial sample and measured using the Product Moment correlation coefficient formula.

The results of the r_xy calculation are then compared with the r table value with a significance level of 5% to determine whether the instrument used is valid or not. If the r_xy value is greater than or equal to the r table, then the instrument used is declared valid. If the r_xy value is smaller than the r table, then the instrument used is declared invalid. Invalid instruments are not used to collect research data.

The instrument validation process was carried out to determine the level of validity of an instrument in measuring what should be measured. Only valid instruments can be used for data collection in research. The instruments tested were questionnaire instruments for critical reasoning and collaboration skills, as well as the influence of the culturally responsive teaching (CRT) approach on critical reasoning and collaboration skills. Each questionnaire instrument contained 20 statements. The instrument was tested on 10 students who had the same criteria as the research sample. The results of the construct validity test used product moment correlation assisted by SPSS 23 for Windows software.

The concept of reliability in the sense of measuring instrument reliability is related to the problem of measurement error. Measurement error itself refers to the extent to which the consistency of measurement results occurs when measurements are repeated on the same group of subjects. The reliability test used is a test-retest technique using the Cronbach alpha formula.

The prerequisite in conducting a t-test is the normality test. The normality test is used to determine whether the sample used in this study comes from a normally distributed population or not. In this study, this normality test uses One-sample Kolmogorov-Smirnov on SPSS 23 for Windows software. Based on the normality test assisted by SPSS 23 for Windows, the data is declared normal.

Hypothesis testing conducted in this study used the t-test. The data obtained were then analyzed. The researcher used simple linear regression analysis to determine the influence between the independent variables and the dependent variables. The selection of simple regression because the researcher wanted to identify the influence of the culturally responsive teaching (CRT) Learning approach (X) on learning interest (Y1) and the influence of Learning Videos (X) on learning outcomes (Y2). The simple linear regression formula used in this study is:

Y = a + bx
Information:
Y   : dependent variable
X   : free variable
a dan b   : constant

$$a = \frac{\sum y \sum x^2 - \sum x \sum xy}{N \sum x^2 - (\sum x)^2}$$

$$b = \frac{N \sum xy - \sum x \sum y}{N \sum x^2 - (\sum x)^2}$$

To find the prices of a and b, use the following formula:

However, in this study, the calculation of simple linear regression test was analyzed using SPSS 23 for windows. The criteria for accepting and rejecting the hypothesis if:

The provisions are the level of significance (α) = 0,05 or 5% and The criteria used in the t-test are. Ho accepted if Sig > 0,05, or $-t_{tabel} \leq t_{hitung} \leq t_{tabel}$. Ho rejected if Sig < 0,05, or $t_{hitung} > t_{tabel}$.

3.   RESULT AND DISCUSSION
A.   Data Description

The research entitled "Implementation of Culturally Responsive Teaching Approach to Improve Students' Critical Reasoning and Collaboration Skills" was conducted at SD Negeri 1 Gentansari as an experimental class and SD Negeri 1 Twelagiri as a control class in the 2023/2024 academic year, starting from March 6, 2024 to May 24, 2024. The population in this test included all grade IV students.

The type of research used is field research with quantitative studies. There are three variables in this test, namely variable X, variable Y1 and variable Y2. The data collection technique used is a critical reasoning and collaborative questionnaire instrument with 20 statements. Based on the results of the validity test, all statements or supporting questions from the two instruments are valid as a whole, so they can be used in experimental and control classes. The purpose of administering the questionnaire to the experimental class is to uncover facts about the implementation of the Culturally Responsive Teaching approach during learning. This can certainly be used as an option for teachers to improve students' critical reasoning and collaboration skills. The next test is a hypothesis test using the t-test, but first a prerequisite test must be carried out. The prerequisite test includes a normality test and a homogeneity test. If both tests pass, the T-test and Anova test will continue.

B.   Data Analysis

In this test, the instrument to be tested for validity is a questionnaire instrument. The researcher tested it on students consisting of 18 fourth grade students. Based on the validity test of the instrument, the value of each questionnaire item for the variables of learning science using the Culturally Responsive Teaching (CRT) approach, critical reasoning and collaboration rhitung > rtabel, as well as value sig. (2 tailed) worth 0,010 < 0,05 in each question item so that it is declared valid.

Instrument reliability test is a test to reveal facts about whether data can be suspended/relied on/trusted or not. The continuity of the reliability test is to compare the level of significance used with the Cronbach's Alpha value. 4 The level of significance used in this test is 0.6 and with the test criteria, namely:
- If value Cronbach's Alpha > 0,6, the meaning of reliable instruments
- If value Cronbach's Alpha < 0,6, meaning the instrument is not reliable. In this test, the reliability test on the questionnaire or test instrument was carried out using SPSS.

The normality test used in this study is the One-Sample Kolmogrov-Smirnov test using a significance level of 0.05. Data is declared normally distributed if the significance is greater than 5% or 0.05. The critical thinking and collaboration skills variables have a significance value of 0.200. So in this study, both variables can be said to be normally distributed.

Linearity test (Test for Linearity) with the basis of decision making using ANOVA output at a significance level of 0.05. If sign> 0.05 then the relationship between the two variables is linear and if sign <0.05 then the relationship is not linear. The results of the linearity test calculation in this study showed a product significance value> 0.05 which means that the IPAS learning variable uses the Culturally Responsive Teaching (CRT) Approach and critical reasoning and collaboration are linear.

Hypothesis testing in this study uses simple linear regression to determine the influence of independent variables on the dependent variable with the following equation Y = a + bx. The criteria for accepting the

hypothesis are if ttable < tcount, or significant ≤ 0.05 then the null hypothesis (H0) is rejected and the alternative hypothesis (Ha) is accepted. This means that there is a significant influence between one independent variable on the dependent variable.

1. Analisis Hipotesis 1

Hypothesis 1 in this study is as follows.

- H_0: $\mu_1 = \mu_2$ There is no influence of the Culturally Responsive Teaching (CRT) Approach and critical reasoning in grade IV elementary school on science learning.
- H_1: $\mu_1 \neq \mu_2$ Ada significant influence of the Culturally Responsive Teaching (CRT) approach and critical reasoning of grade IV elementary school students on science learning.
- Through a simple linear test, the results obtained are as presented in tables 4 and 5 below.

Table 4. *Output* Regression Test (Model Summary)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.590ᵃ	.348	.308	6.975

a. Predictors: (Constant), Pendekatan Culturally Respnsive Teaching

The table above shows the magnitude of the correlation / relationship value (R) which is 0.590. From the output, the coefficient of determination (R Square) is obtained as much as 0.348 which means that the influence of the independent variable Culturally Responsive Teaching (CRT) Approach on the dependent variable of critical reasoning is 34.8%, and the influence of other factors is 65.2%.

Tabel 5. *Output* Regression Test (Coefficients)

Coefficientsᵃ

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	37.925	12.255		3.095	.007
	Pendekatan Culturally Respnsive Teaching	.549	.188	.590	2.925	.010

a. Dependent Variable: Bernalar Kritis

Based on the significance value from the Coefficients table, a significance value of 0.010 < 0.05 was obtained, so it can be concluded that the Culturally Responsive Teaching (CRT) Approach variable (X) HAS AN INFLUENCE on the Critical Reasoning variable (Y_1).

Based on the t value of the value t_{hitung} sebesar 2.925 > t_{tabel} 2.036 so it can be concluded that the Culturally Responsive Teaching (CRT) Approach variable (X) HAS AN INFLUENCE on the Critical Reasoning variable (Y_1).

Based on the Constant value and the regression equation on the influence of the Culturally Responsive Teaching (CRT) Approach on Critical Reasoning is Y = a + bX, namely Y = 37.925 + (0.549X), which means that every additional one value of the Culturally Responsive Teaching (CRT) Approach on critical reasoning skills in science learning is 0.549.

2. Analisis Hipotesis 2

Hypothesis 1 in this study is as follows.

- H_0: $\mu_1 = \mu_2$ There is no influence of the Culturally Responsive Teaching (CRT) approach and collaboration of grade IV elementary school students on science learning.
- H_1: $\mu_1 \neq \mu_2$ there is a significant influence of the Culturally Responsive Teaching (CRT) approach and collaboration of grade IV elementary school students on science learning.
  Through a simple linear test, the results were obtained as presented in tables 6 and 7 below.

Tabel 6. *Output* Regression Test (Model Summary)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.631ᵃ	.399	.361	7.663

a. Predictors: (Constant), Pendekatan Culturally Respnsive

The table above shows the magnitude of the correlation / relationship value (R) which is 0.631. From the output, the coefficient of determination (R Square) is obtained as much as 0.399 which means that the influence of the independent variable Culturally Responsive Teaching (CRT) Approach on the dependent variable collaboration is 39.9%, and the influence of other factors is 60.1%.

Tabel 7. *Output* Uji Regresi (Coefficients)

Coefficientsᵃ

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	33.093	13.464		2.458	.026
	Pendekatan Culturally Respnsive Teaching	.672	.206	.631	3.257	.005

a. Dependent Variable: Kolaborasi

Based on the significance value from the Coefficients table, a significance value of 0.005 < 0.05 was obtained, so it can be concluded that the Culturally Responsive Teaching (CRT) Approach variable (X) HAS AN INFLUENCE on the Collaboration variable (Y_2).

Based on the t value of the value t_{hitung} sebesar 3.257 > t_{tabel} 2.036 so it can be concluded that the Culturally Responsive Teaching (CRT) Approach variable (X) HAS AN INFLUENCE on the Collaboration variable (Y_2).

Based on the Constant value and the regression equation on the influence of the Culturally Responsive Teaching (CRT) Approach on Collaboration is Y = a + bX yaitu Y = 33,093 + (0,672X), which means that every additional one value of the Culturally Responsive Teaching (CRT) Approach to collaboration skills in science learning is 0,672.

C. Implementation of Learning Using the Culturally Responsive Teaching (CRT) Approach

The implementation of the use of the Culturally Responsive Teaching (CRT) Approach in the learning of Science for grade IV on the material of Fulfilling Daily Needs is carried out according to the learning flow that has been designed by the teacher. Based on the assessment carried out by the grade IV teacher, it was stated that the implementation of the learning process obtained a score of 64.7% at the meetings that had been carried out, where each stage of learning was carried out well by students and researchers. The implementation of the learning process with the Culturally Responsive Teaching (CRT) Approach is presented in Figure 2 below.
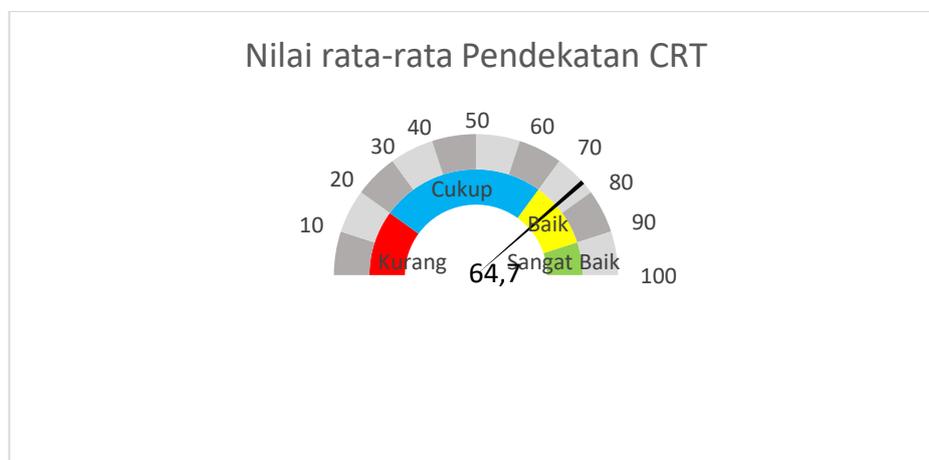

Figure 2. Implementation of Learning Using the Culturally Responsive Teaching (CRT) Approach

D. Critical Reasoning

The assessment of students' critical reasoning was carried out at the end of learning using the Culturally Responsive Teaching (CRT) Approach. Data collection was carried out by providing a questionnaire containing statements related to critical reasoning as many as 20 statements where the scoring was in the range of 1, 2, 4, and 5. For positive statements, the scoring was always = 5, often = 4, sometimes = 2, never = 1. The acquisition of students' critical reasoning scores was calculated using the following formula:

$$Rata - rata = \frac{\text{Skor yang diperoleh}}{\text{Skor total}}$$

From the results of data collection, the average critical reasoning value was 72.53.
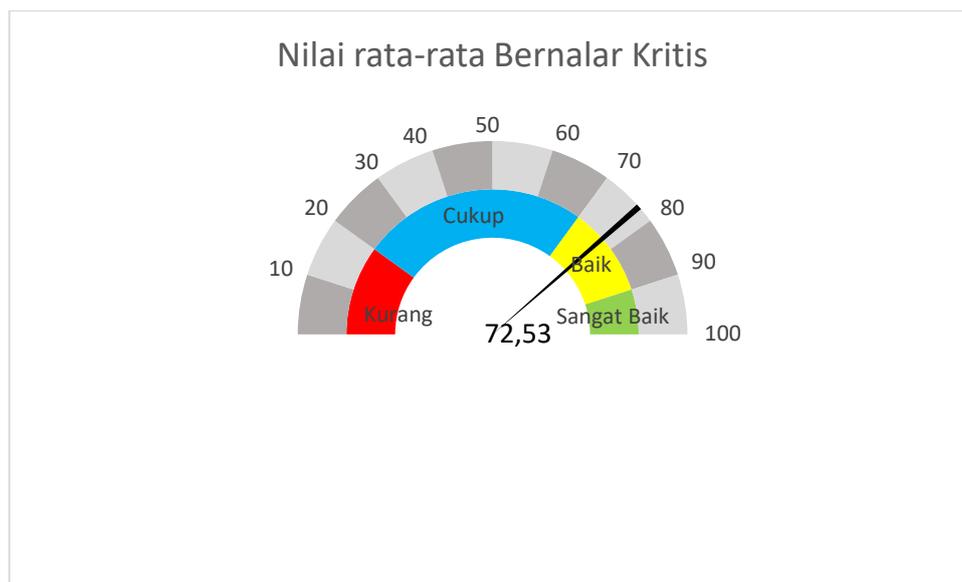The average value obtained of 72.53 is presented in Figure 3 below.

Figure 3. Average Critical Reasoning Score Obtained

After obtaining the average value, the value can be categorized according to the following table 8.

Table 8. Critical Reasoning Criteria

Kategori	Interval (%)
Very High	81 – 100
High	61 – 80
Enough	41 – 60
Not enough	21 – 40
Very Less	≤ 20

Source: Adaptation of Suyitno (2004:73)

Based on the criteria for critical reasoning, the average value obtained shows that the critical reasoning ability of grade IV elementary school students in science learning is in the high category.

E. Collaboration

Student collaboration assessment is conducted at the end of learning using the Culturally Responsive Teaching (CRT) Approach. Data collection is done by providing a questionnaire containing statements related to critical reasoning as many as 20 statements where the scoring is in the range of 1, 2, 4, and 5. For positive statements, the scoring is always = 5, often = 4, sometimes = 2, never = 1.

The achievement of student collaboration scores is calculated using the following formula:

$$Rata-rata = \frac{\text{Skor yang diperoleh}}{\text{Skor total}}$$

From the results of data collection, the average collaboration value was 76.56. The average value obtained of 76.56 is presented in Figure 4 below.

Figure 4. Average Collaboration Value Obtained

After obtaining the average value, the value can be categorized according to the following table 8.

Table 8. Collaboration Criteria

Kategori	Interval (%)
Very High	81 – 100
High	61 – 80
Enough	41 – 60
Not Enough	21 – 40
Very Less	≤ 20

Source: Adaptation of Suyitno (2004:73)

Based on the collaboration criteria, the average value obtained shows that the collaboration ability of grade IV elementary school students in science learning is in the high category.

F. Discussion

The research discussion discusses the influence of the Culturally Responsive Teaching (CRT) Approach Variable on the critical reasoning and collaboration skills of fourth grade students in science learning.

1. The Influence of the Culturally Responsive Teaching (CRT) Approach on Critical Reasoning Skills

The results of statistical testing between the Culturally Responsive Teaching (CRT) Approach indicator (X) on the Critical Reasoning variable (Y1) have a Regression of 0.590 (moderate), while the magnitude of the influence is 34.8%, and the influence of other factors is 65.2%. From the data, it is also obtained tcount (2.925) ≥ ttable (2.036). So the results of the hypothesis test that have been carried out can be seen that H0 is rejected and Ha is accepted, meaning that there is a significant influence of the Culturally Responsive Teaching (CRT) Approach (X) on the Critical Reasoning variable (Y1).

Students' critical reasoning is generated from the questionnaire scores at the end of learning. The statement items on the questionnaire given measure it, according to the critical reasoning indicators, while the

statements on the questionnaire are adjusted to the learning activities of students who apply the Culturally Responsive Teaching (CRT) Approach.

After the implementation of the Culturally Responsive Teaching (CRT) Approach, students' critical reasoning scores increased by 54.9% compared to before the implementation of the Culturally Responsive Teaching (CRT) Approach. This is in accordance with the research of Nugraha, Arief Juang et al. (2017). "Analysis of Critical Reasoning Ability Reviewed from Science Process Skills and Learning Motivation through the PBL Model". Journal of Primary Education Vol. 6 No. 1 p-ISSN 2252-6404 e-ISSN 2502-4515 concluded that critical reasoning ability was 76%. collaboration variable, namely Analysis of junior high school students' collaboration skills in science learning during the Covid-19 pandemic conducted by Damarjati Sufajar and Ahmad Qosyim in 2022. The conclusion of this study is the average percentage of collaboration skill indicators of 66%.

2.   The Influence of the Culturally Responsive Teaching (CRT) Approach on Collaboration Skills

The results of statistical testing between the indicators of the implementation of the culturally responsive teaching (CRT) approach (X) on the Collaboration variable (Y2) have a regression of 0.631 (Strong), while the magnitude of the influence is 39.9%, and the influence of other factors is 60.1%. From the data, it was also obtained tcount (3.257) > ttable (2.036). So the results of the hypothesis test that have been carried out can be seen that H0 is rejected and Ha is accepted, meaning that there is a significant influence of the variable of the implementation of the culturally responsive teaching (CRT) approach, (X) on the collaboration variabl (Y_2).

Student collaboration is generated from a questionnaire in the experimental class that was carried out after the science learning process using the application of the culturally responsive teaching (CRT) approach. Each questionnaire item is adjusted to the indicator variable of student collaboration in science learning in the material Fulfilling Daily Needs.

After the application of the culturally responsive teaching (CRT) approach, the collaboration value in the experimental group of students increased, from the poor category to good, compared to before the implementation of the culturally responsive teaching (CRT) approach. This is in accordance with previous research, namely the Analysis of junior high school students' collaboration skills in science learning during the Covid-19 pandemic conducted by Damarjati Sufajar and Ahmad Qosyim in 2022. The conclusion of this study is the average percentage of collaboration skills indicators of 66%.

4.   CONCLUSION

Based on the results of the research and data analysis using simple linear regression techniques that have been carried out in this study, it can be concluded that: first, there is a significant influence of the application of the culturally responsive teaching (CRT) approach in science on critical reasoning skills in grade IV of elementary school. The magnitude of the influence of the culturally responsive teaching (CRT) approach in science on critical reasoning is 34.8%, and the influence of other factors is 65.2%.

Then second, there is a significant influence of the culturally responsive teaching (CRT) approach in science on collaboration skills in grade VI of elementary school. The magnitude of the influence of the application of the culturally responsive teaching (CRT) approach in science on collaboration is 39.9%, and the influence of other factors is 60.1%.

This is because the culturally responsive teaching (CRT) approach in science together can be a learning innovation that can improve students' critical reasoning and collaboration skills, making it easier to solve a problem together. Therefore, it is highly recommended for educators to use the culturally responsive teaching (CRT) approach in science as a learning innovation in schools.

REFERENCES

Airasian, Peter and L. R. Gay. (2000). Educational Research: Competencies for Analysis And Application. Boston: prentice-Hall.

Badan Standar, Kurikulum, dan Asesmen Pendidikan (BSKAP). (2022). Dimensi, Elemen, Subelemen Profil Pelajar Pancasila pada Kurikulum Merdeka. Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Republik Indonesia.

Badan Standar, Kurikulum, dan Asesmen Pendidikan (BSKAP). (2022). Capaian Pembelajaran Mata Pelajaran Ilmu Pengetahuan Alam dan Sosial (IPAS) Fase A-Fase C untuk SD/MI/Program Paket A. Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Republik Indonesia.

Bender, William, N. (2012). *Project Based Learning: Differentiating Instruction for the 21st Century*. California: Corwin.

Educational Technology Division. 2016. *Project-Based Learning Handbook*. Malaysia: Communications and Training Sector Smart Educational Development Educational Technology Division Ministry of Education.

Ennis, R. H. (2011). *The Nature Of Critical Thinking: An Outline Of Critical Thinking Disposition And Abilities*. University of Illinios

Greenstein, L. (2012). *Assessing 21st Century Skills: A Guide to Evaluating Mastery and Authentic Learning*. California: Corwin.

Indarta, Y., Jalinus, N., Waskito, W., Samala, A. D., Riyanda, A. R., & Adi, N. H. (2022). Relevansi Kurikulum Merdeka Belajar dengan Model Pembelajaran Abad 21 dalam Perkembangan Era Society 5.0. Edukatif: Jurnal Ilmu Pendidikan, 4(2), 3011–3024.

Jufriadi, A., Huda, C., Aji, S. D., Pratiwi, H. Y., & Ayu, H. D. (2022). Analisis Keterampilan Abad 21 Melalui Implementasi Kurikulum Merdeka Belajar Kampus Merdeka. Jurnal Pendidikan Dan Kebudayaan, 7(1), 39–53. https://doi.org/10.24832/jpnk.v7i1.2482

Khanifah, L. N. (2019). Pengaruh penggunaan *model project based learning* dan keterampilan kolaborasi terhadap hasil belajar siswa kelas IV sekolah dasar pada tema cita-citaku. Jurnal Review Pendidikan Dasar : Jurnal Kajian Pendidikan dan Hasil Penelitian, 5(1), 900–908.

Nadiyah, . (2023) Pengembangan *Wordless Picture Book berbasis Pendidikan Multikultural pada Pembelajaran PPKN kelas III sekolah dasar.* Sarjana thesis, Universitas Negeri Jakarta.

Nastiti, Faulinda Ely, dan Aghni Rizqi Ni'mal 'Abdu. 2020. "Kesiapan Pendidikan Indonesia Menghadapi Era Society 5.0." Edcomtech Jurnal Kajian Teknologi Pendidikan 5(1):61–66. doi: 10.17977/um039v5i12020p061.

Nugraha, Arief Juang dkk. (2017). "Analisis Kemampuan Bernalar Kritis Ditinjau dari Ketrampilan Proses Sains dan Motivasi Belajar melalui Model PBL". Journal of Primary Education Vol. 6 No. 1 p-ISSN 2252-6404 e-ISSN 2502-4515.

Nurotun Mumtahanah, "Meningkatkan Kemampuan Berpikir Kritis Siswa melalui Metode Cooperative Learning dalam Pembelajaran PAI," Al-Hikmah Jurnal Studi Keislaman 3, no. 1 (2013): 51

Rahmawati, Y., Ridwan, A. & Nurbaity. 2017. Should We Learn Culture inChemistry Classroom? Integration Ethnochemistry in Culturally ResponsiveTeaching. AIP Conference Proceedings : 1-11

Ridwan Abdullah Sani, Pembelajaran Berbasis HOTS (Highr Order Thinking Skills) (Tangerang: Tira Smart, 2019), 25.

Saputro, O. A., & Rahayu, T. S. (2020). Perbedaan Pengaruh Penerapan Model Pembelajaran Project Based Learning (PJBL) dan Problem Based Learning (PBL) Berbantuan Media Monopoli terhadap Kemampuan Berpikir Kritis Siswa. Jurnal Imiah Pendidikan Dan Pembelajaran, 4(1), 185–193.

Sugiyono. (2014). Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, dan R&D. Bandung: Alfabeta.

Solikhin Much, Nuril Maulida Fauziah. (2021). Analisis Kemampuan Bernalar Kritis Siswa SMP pada pelajaran IPA saat Pembelajaran Daring selama Pandemi Covid-19. Pensa E-jurnal: Pendidikan Sains. Vol. 9, No. 2 Hal. 188-192 Juli 2021