



The Impact of the Teaching at the Right Level Approach on Critical Reasoning in Mathematics Learning in Elementary Schools

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ABSTRAK

Pendidikan di sekolah saat ini memiliki permasalahan terutama dalam hal penyesuaian tingkat kemampuan siswa. Pendekatan yang padu perlu diterapkan untuk kondisi ini adalah pendekatan Teaching at the Right Level. Maka teaching at the right level berarti pengajaran yang diberikan kepada siswa sesuai tingkat kemampuannya. Penelitian ini bertujuan untuk menganalisis pengaruh dari Pendekatan Teaching at the Right Level terhadap kemampuan bernalar kritis dalam pelajaran matematika siswa kelas IV sekolah dasar. Jenis penelitian ini menggunakan jenis penelitian eksperimen semu. Rancangan penelitian ini merupakan non-equivalent control group design. Populasi penelitian ini adalah berjumlah 180 orang siswa. Sampel dalam penelitian ini berjumlah 71 orang siswa. Pemilihan sampel dalam penelitian ini menggunakan teknik cluster random sampling. Data kemampuan bernalar kritis dalam pelajaran matematika siswa dikumpulkan dengan menggunakan metode tes berbentuk uraian (essay) yang kemudian dianalisis menggunakan uji-t. Hasil analisis data diperoleh $t_{hitung} = 9,87$, sedangkan pada taraf signifikansi 5% dan $dk = 69$ diperoleh $t_{tabel} = 1,995$ sehingga $t_{hitung} = 9,87$ lebih besar dari $t_{tabel} = 1,995$ maka, H_0 ditolak dan H_a diterima yang berarti terdapat perbedaan kelompok siswa yang dibelajarkan melalui Pendekatan Teaching at the Right Level dengan kelompok siswa yang tidak dibelajarkan dengan Pendekatan Teaching at the Right Level pada siswa kelas IV sekolah dasar.

ABSTRACT

Education in schools currently has problems, especially in terms of adjusting students' ability levels. A unified approach that needs to be applied to this condition is the Teaching at the Right Level approach. So teaching at the right level means teaching given to students according to their level of ability. This research aims to analyze the influence of the Teaching at the Right Level approach on critical reasoning abilities in mathematics lessons for fourth grade elementary school students. This type of research uses quasi-experimental research. This research design is a non-equivalent control group design. The population of this study was 180 students. The sample in this research consisted of 71 students. The sample selection in this study used a cluster random sampling technique. Data on students' critical reasoning abilities in mathematics lessons was collected using an essay test method which was then analyzed using the t-test. The results of data analysis obtained $t_{count} = 9.87$, while at a significance level of 5% and $dk = 69$ it was obtained $t_{table} = 1.995$ so that $t_{count} = 9.87$ was greater than $t_{table} = 1.995$, so H_0 was rejected and H_a was accepted, which means there were differences in the groups of students being studied. Through the Teaching at the Right Level Approach with groups of students who are not taught using the Teaching at the Right Level Approach in fourth grade elementary school students.

1. INTRODUCTION

In the 21st century, learning is not only centered on cognitive abilities, which include 4 skills known as the 4Cs, namely the ability to think critically, creativity, collaboration, and communication as well as having HOTS (higher order thinking) skills) (Mitra & Purnawarman, 2019; Sitompul et al., 2019). These four skills or abilities are expected to produce individuals or students who will be ready to compete globally. Guidelines for Implementing Curriculum in the Context of Learning Recovery (Independent Curriculum) as

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a refinement of the previous curriculum. This century provides guidance for students to have skills in carrying out daily life, skills in learning and innovation, as well as skills in the fields of information, media, and technology (Armadani et al., 2023; Muslim, 2023). The 21st century national education aims to achieve the nation's ideals as a society capable of competing globally. This can be achieved by forming an independent and high-willed society (Hasibuan & Prastowo, 2019; Jannah & Atmojo, 2022).

This independent curriculum is a curriculum that focuses on basic learning so that students can deepen concepts and later strengthen their competencies. An independent curriculum is a curriculum that focuses on deepening essential concepts so that students have enough time to deepen concepts and strengthen competencies (Aditama et al., 2022; Suryaman, 2020). The independent curriculum is quite different from the previous curriculum, namely the 2013 curriculum. Basic Competencies (KD) and Core Competencies (KI) are used as references in assessment. This is different from the independent curriculum which prioritizes student achievement stages. Independent learning is a learning system that emphasizes learning processes that can foster creativity and high-level thinking through the applied learning approaches and methods (Ainia, 2020; Haris, 2022). So how do you combine knowledge, attitudes and skills then carry out strengthening if there are gaps and the final stage is to achieve these competencies. The concept of this independent curriculum is to create a pleasant learning atmosphere without the burden of having to achieve certain grades or scores. In the learning process, students are required to achieve predetermined competencies without paying attention to the abilities of each student. The abilities of every human being are actually different, both cognitive abilities and skills. This cannot be generalized by a standard. So education needs to provide an understanding of this, and this has been stated in the independent curriculum currently being implemented. And each child has a standard curriculum to suit their needs and abilities (Alfitri, PAA, & Dahlan, 2022; Rahelly, 2018). So student development in learning is no longer measured based on existing standards, but still follows how the student proceeds and there is no coercion in terms of cognitive or skill achievement, and remains in accordance with the teacher's direction so as not to deviate too much from what is expected and the goals to be achieved. Each student makes their own expression and shows it, which makes the student unique as a unique person, because each student has different abilities.

Education in schools is grouped based on age, even though increasing age is not parallel to learning development. Each level of student development requires a different approach (Ariyanti, 2016; Mubarokah, 2022). So that this is in accordance with the implementation of the independent curriculum, educators are expected to be able to choose a relevant approach in accordance with the applicable curriculum and adapted to the child's development stage regardless of age. According to previous research, the learning approach is the starting point that is used as a guide for carrying out the learning process (Wahyuningsi, 2019). The learning approach can also be interpreted as the way educators solve problems in the learning process. After carrying out observations of elementary schools, problems were found, namely that students were slow in understanding the material and some already understood the material, so there was an inequality in students' abilities. This is because when students are deemed to understand, other students are also deemed to have understood. If we look at it in real terms, the stages of development or understanding of each student are different and cannot be generalized by a standard. In line with the explanation according to previous research which states that each child has a process of behavior that is different according to the influence of the age period or the environment in which he grows up (Mawarni Purnamasari & Na'imah, 2020). A unified approach that is expected to be applied to this condition is the Teaching at the Right Level approach. The term teaching at the right level was first applied by the Indian learning innovation organization. If translated into Indonesian, teaching means teaching, while at the right level means at the right level. So teaching at the right level means teaching given to students according to their level of ability (Abdul-Majied et al., 2022; Paris et al., 2021). The TaRL approach is a learning approach that focuses on the level or stage of student development and is not based on class level. This is what differentiates the TaRL approach from other approaches and this can be the answer to various gaps in students' understanding in the classroom during the learning process where there are times when one of the students is slow in receiving learning material (Angrist et al., 2020; Peto, 2022). During its application, the first component is that students are assessed or judged on the extent of their abilities, then students are grouped according to their respective abilities by emphasizing fundamental concepts, then the teacher provides reinforcement regarding gaps in understanding of the material.

The Pancasila student profile is an embodiment of Pancasila students, namely lifelong students who have global competence and have attitudes taken from Pancasila values. The Pancasila student profile has six dimensions including: (1) faith, devotion to God Almighty, and noble character, (2) global diversity, (3) working together, (4) independence, (5) critical reasoning, and (6) creative (Iis et al., 2022; Indah Junia & Sujana, 2023). With these six dimensions, it is hoped that Indonesian students will be able to develop critical reasoning skills to improve their self-competence. The critical reasoning dimension can be the foundation

for solving concrete problems encountered by students. Problems that are often encountered in life are related to mathematics subjects. Because students' development of understanding is different, they cannot be generalized to one another. And one of the reasons is that the learning approach applied is still common, namely teacher centered. The teacher-centered approach tends to be that learning is determined entirely by the teacher without giving students the opportunity to demonstrate the way they want to learn (Karakaita Putri et al., 2019; Prasetyono et al., 2021).

The student-centered approach is to provide students with a stimulus to be able to solve problems based on practical experience and build meaning from the experience they gain. And what students need is an approach that focuses on students' abilities in learning or is student centered. Based on this exposure Theoretically, the teaching at the right level approach is thought to have an effect on students' critical reasoning abilities in mathematics lessons, but empirically it needs to be proven through research which aims to analyze the significant influence of the teaching at the right level approach on critical reasoning abilities in elementary school students' mathematics lessons.

2. METHOD

The type of research carried out in this research is quantitative research with an experimental design, namely quasi-experiment. The experimental design used was "Non-equivalent control group design". This experimental design is most often used in the world of education because researchers do not have to randomize between experimental groups and control groups because they are still part of the same experimental design (Yulianto et al., 2020).

This research used two classes that received special treatment or an experimental group that applied the teaching at the right level approach and a control group that did not receive special treatment. The implementation of this research consisted of three stages, namely the preparation stage, the implementation stage and the final experimental stage. Population is the number of objects studied, where the research results are generalized. The population of this study was all students in class IV (four) of SD Gugus V Sukawati for the 2022/2023 academic year, consisting of 6 classes in 6 elementary schools. These include SD Negeri 1 Ketewel, SD Negeri 2 Ketewel, SD Negeri 3 Ketewel, SD Negeri 4 Ketewel, SD Negeri 5 Ketewel, and SD Negeri 6 Ketewel. The population in this study was 180 students.

The entire population is given a pre-test first. Then the values or scores from the pre-test results are equalized. Sample equality was tested using the one-way ANOVA test. The entire population that has been equalized will then be drawn and only two samples will be selected. The sample group that comes out first will be used as the experimental class, while the sample group that comes out second will be used as the control class (Firmansyah & Dede, 2022; Nurdin et al., 2018). The conclusion from the results of the one-way analysis of variance test (one-way ANOVA) where the results are compared with the F table, to determine the conclusion is that if $F_{count} > F_{table}$ at the 5% significance level then H_a is accepted, and H_0 is rejected. Meanwhile, if $F_{count} \leq F_{table}$ at the 5% significance level then H_a is rejected, and H_0 is accepted, and based on the analysis of the equality test of the research sample for all class IV elementary schools in Gugus V Sukawati, it was obtained that $F_{count} = 1.92 < F_{table} = 2.27$. Thus, it can be concluded that all research samples are equivalent. A recapitulation of the results of the Class IV Elementary School Equivalency test in Cluster V Sukawati is presented in Table 1.

Table 1. The Recapitulation of Class IV Elementary School Equivalency Test Results in Cluster V Sukawati

No.	Population Members	Source Variance	JK	Db	RJK	Fcount	Ftable	Information
1	All class IV in Cluster V Sukawati	Between	379.8	5	75.90	1.92	2.27	Equivalent
		In	6885.28	174	39.57	-	-	-
		Total	7264.77	179		-	-	-

To be able to collect data regarding students' critical reasoning abilities in mathematics lessons, a test method was used in the form of essay questions totaling 10 questions. The validity of a question item shows the quality and how precisely it measures or how valid the variable you want to measure is. The content validity test used in this research is the instrument grid. The results of content validity testing are obtained from testing by judges or expert questions. To be able to measure the validity of test items for mathematical critical reasoning abilities in tests in the form of essay questions or essays, the "product moment correlation" formula formulated by Karl Person is used. By using the formula *product moment correlation*, The calculation was obtained with the number of respondents being 29 class V students at SD Negeri 3 Ketewel, with a significance level of 5%. Obtained r_{table} value = 0.367. Based on the calculation of the 10 questions, only 1 question was invalid, but 8 questions were used in the pre-test and post-test so that

the number of questions was round. These calculations were used with the help of the Microsoft Excel 2013 program. And continued with the reliability test with the Cronbach's alpha formula using the Microsoft Excel application (Amanda et al., 2019). The validity criteria for each question item are declared valid if $r_{count} \geq r_{table}$. Meanwhile, the value of the r_{table} is determined with a significance level of 5% and degrees of freedom (dk), namely the number of samples minus 1 ($n-1$). Based on this statement, the results of the calculation of the critical reasoning ability test in mathematics lessons were obtained, namely with $r_{table} = 0.798$, so it was concluded that it was classified as reliable. Because the basis for decision making is if the r_{table} value or Cronbach's alpha value is > 0.70 it is declared reliable, and if the r_{table} value or Cronbach's alpha value is < 0.70 it is declared unreliable.

Then the entire population is given a pre-test first. Then the values or scores from the pre-test results are equalized. Sample equality was tested using the one-way ANOVA test with the help of the Microsoft Excel application. Then in this research the collected data was analyzed for inferential statistics (t-test). Inferential analysis includes assumptions and hypothesis testing. Before carrying out the hypothesis test (t-test), an assumption test is carried out, namely the normality test of data distribution using the chi-square formula and the homogeneity of variance test using the F-test. Data that is normally distributed and homogeneous is followed by parametric analysis using the t-test with the pooled variance formula. With the criteria that if the t_{count} price is smaller than the t_{table} price, then H_0 is accepted and H_a is rejected, and if the t_{count} price is greater than the t_{table} price then H_0 is rejected and H_a is accepted. At a significance level of 5% with $dk = n_1 + n_2 - 2$.

3. RESULT AND DISCUSSION

Result

The inferential statistical analysis method is a method of processing data that is carried out by applying inferential statistical formulas to test a research hypothesis proposed by the researcher, and conclusions are drawn based on the results of testing the hypothesis. The data analysis technique used was hypothesis testing, using the t-test. The analysis requirements were first carried out which included testing for normality of data distribution and homogeneity of variance as a prerequisite test for the experimental group and control group data.

The statistic that can be used to test descriptive hypotheses when the data is interval or ratio is the 1 sample t-test. The normality test is intended to later find out whether the data distribution of students' critical mathematical reasoning ability scores for each group is normally distributed or not, so that they can determine the data analysis technique. The normality test for data distribution in this study used Chi-square. A recapitulation of the results of the normality test for the distribution of data from the experimental group and the control group is presented in Table 2.

Table 2. The Recapitulation of Normality Test Results for Distribution of Research Sample Data

No.	Mathematics Knowledge Competency Data Group	χ^2_{count}	χ^2_{table}	Conclusion
1	Group Experiment	2.55	11.07	Distribute Normal
2	Group Control	10.23	11.07	Distribute Normal

Based on Table 2 the results of the normality test for the distribution of data on students' critical reasoning abilities in the experimental group mathematics lessons, obtained a calculated Chi Square ($\chi^2_{count} = 2.55$) then this value was compared with the Chi Square table ($\chi^2_{table} = 11.07$). This shows that $\chi^2_{count} < \chi^2_{table}$ means that the data on students' critical reasoning abilities in mathematics lessons in the experimental group is normally distributed. And based on the results of the normality test on the distribution of data on students' critical reasoning abilities in the control group mathematics lesson, the calculated Chi Square was obtained ($\chi^2_{count} = 10.23$) then this value was compared with the Chi Square table ($\chi^2_{table} = 11.07$). This shows that $\chi^2_{count} < \chi^2_{table}$ means that the data on students' critical reasoning abilities in mathematics lessons in the control group is normally distributed.

The Homogeneity Test is carried out to show that the differences that occur in hypothesis testing really occur due to differences in variance between groups, not as a result of differences within groups. The homogeneity of variance test is carried out if the data group on students' critical reasoning abilities in mathematics lessons is normally distributed. The homogeneity of variance test was carried out using the F test or Fisher test. With the test criteria, if $F_{hit} < F_{table}$ then the sample is homogeneous. Testing was carried out at a significance level of 5% with degrees of freedom for the numerator $n_1 - 1$ and degrees of freedom

for the denominator n_2-1 . A recapitulation of the results of the homogeneity of variance test between the experimental group and the control group is presented in Table 3.

Table 3. The Recapitulation of Research Sample Variance Homogeneity Test Results

No.	Sample	S_1^2	S_2^2	Fcount	Ftable	Conclusion
1	Group Experiment	86.49				
2	Group Control		32.48	2.66	3.98	Homogeneous

From both analyses Table 3, obtained Fcount results of students' critical reasoning ability data in mathematics = 2.66, with Ftable in dbnumerator = $k-1=2-1=1$, dbdenominator = $nk=71-2=69$, and The 5% significance level is 3.98. This means that $F_{count} = 2.66 < F_{table} = 3.98$, so that the data for both groups have homogeneous variance. Based on the results of the prerequisite tests consisting of the normality test and the variance homogeneity test, it was concluded that the data for the two sample groups were normally distributed and had homogeneous variances. Thus, hypothesis testing using the t-test can be carried out.

If the data obtained meets the prerequisites for normality and homogeneity tests, the analysis used is parametric statistics. The statistical analysis used to test this research hypothesis is the mean difference test (t test). Hypothesis testing uses the t-test with the pooled variance formula. The t-test formula with the pooled variance formula is used if the number of sample members is the same $n_1=n_2$ and the variance is homogeneous. Then, if the samples are correlated/paired, comparing the control group with the experimental group, the sample t-test formula is related to the pooled variance formula. With the criteria that if the tcount price is smaller than the ttable price, then H_0 is accepted and H_a is rejected, and if the tcount price is greater than the ttable price then H_0 is rejected and H_a is accepted. At a significance level of 5% with $dk = n_1+n_2-2$. The results of the t-test calculation using pooled variance are presented in Table 4.

Table 4. The Research Hypothesis Test Results

No.	Sample	Variance	N	tcount	ttable	Conclusion
1	Group Experiment	86.49	34			H_0
2	Group Control	32.48	37	9.87	1,995	Rejected

Based on the results of the t-test calculation, at Table 4 obtained tcount = 9.87 and for a significance level of 5% with $dk = (34+37-2=69)$ obtained ttable = 1.995. Thus, the value of tcount = $9.87 > t_{table} = 1.995$, so H_0 is rejected. So, there is a significant difference in critical reasoning abilities in mathematics lessons between groups of students who were taught using the Teaching at the Right Level approach and groups of students who were not taught using the Teaching at the Right Level approach in class IV of SD Gugus V Sukawati in the 2022/2023 academic year.

This means that there is a significant difference in critical reasoning abilities in mathematics lessons between fourth grade students at SD Gugus V Sukawati, who take part in learning that uses the Teaching at the Right Level Approach and students who do not take part in learning that uses the Teaching at the Right Level Approach. Thus, the Teaching at the Right Level approach has an influence on critical reasoning in mathematics lessons for class IV students at SD Gugus V Sukawati in the 2022/2023 academic year.

Discussion

Based on the hypothesis test, tcount = 9.87 and for a significance level of 5% with $dk = (34+37-2=69)$ ttable = 1.995. Thus, the value of tcount = $9.87 > t_{table} = 1.995$, so H_0 is rejected. This means that there is a significant difference in critical reasoning abilities in mathematics lessons between fourth grade students at SD Gugus V Sukawati, who take part in learning that uses the Teaching at the Right Level Approach and students who do not take part in learning that uses the Teaching at the Right Level Approach. The Teaching at the Right Level approach has learning components that have a positive impact so that there is a change in competence before being given treatment and after being given treatment. The results of the data analysis calculations carried out show that the average score for the group of students who took lessons using the Teaching at the Right Level approach was 83.47. Meanwhile, the group of students who did not take part in learning using the Teaching at the Right Level approach was 68.47. So with this, it is stated that there is an influence of critical reasoning abilities in mathematics lessons between class IV students at SD Gugus V Sukawati, who take part in learning that uses the Teaching at the Right Level Approach and students who do not take part in learning that uses the Teaching at the Right Level Approach.

Because the average score of students in the experimental group is higher than the average score of students in the control group.

The findings in this research have similarities with previous research which are relevant and strengthen the research results obtained. This is supported by relevant research, namely research which states that learning or approaches are appropriate to students' conditions, the assignments or learning given must also be appropriate (Zahrudin et al., 2021). In this way enthusiasm for learning is maintained. Boredom due to challenges or assignments that are too simple or feelings of despair due to assignments that are too difficult, beyond the student's reach can be avoided. Namely by applying an approach *Teaching at the Right Level*. Meanwhile, the difference is in the target of the analysis or in the dependent variable. Other researchers stated that the Teaching at the Right Level (TaRL) approach resulted in an increase in reading ability in 91 students or 58% (Fitriani, 2022). This indicates that the TaRL approach is quite effective in improving students' abilities in a lesson and if we look at the similarities in this research, students' critical reasoning abilities influenced by the TaRL approach show that the average score tends to be high, namely 83.47. Meanwhile, the difference lies in the research target or in the dependent variable which measures students' reading ability.

Next is a study that is relevant to previous research which states that what was obtained from this research is that the use of the Teaching at Right Level model, assignment method, can increase character strengthening and student learning outcomes (Peto, 2022). Meanwhile, the difference is that students are divided into three ability level groups. Research relevant to this research was conducted by other researchers who stated that reasoning ability is one of the mathematical competencies to be achieved in mathematics learning (Wulandari, 2011). The mathematical reasoning process includes analysis, development and integration. In learning mathematics, mathematical reasoning abilities play a good role in understanding concepts and problem solving. The relevance of this research is in accordance with the research conducted, namely the dependent variable which lies in measuring students' critical mathematical reasoning abilities. That mathematical reasoning ability is very necessary to understand the concept of mathematical material. Meanwhile, the difference lies in the independent variable which uses a problem based learning model to stimulate students' reasoning abilities. Finally, research that is relevant to research states that the results of the research found that teachers' perceptions of the implementation of literacy and numeracy learning using the Teaching at the Right Level approach were quite good (Rosyidah et al., 2022). Teachers feel very helped by the new approach in learning literacy and numeracy, especially in dealing with the diversity of students' abilities. The relevance of this research is in accordance with the research carried out, that the Teaching at the Right Level approach is very relevant to be applied to learning. Because in learning, one student's level of understanding of mathematical concepts is not the same as other students. Meanwhile, the difference is measuring the teacher's perception of the implementation of literacy and numeracy learning, which is the dependent variable.

The results of this research can be used as an alternative for teachers in mathematics learning so that students' mathematical knowledge competencies are as expected and can equalize the abilities of each student in mathematics learning. The Teaching at the Right Level approach can be applied by teachers because it has been proven to be able to influence students' critical reasoning abilities in mathematics lessons for the better. This research has proven that the Teaching at the Right Level approach has an effect on students' critical reasoning abilities in mathematics lessons. By applying this approach, it can be used as a reference or guideline to create a different learning atmosphere and attract students to be challenged in order to achieve higher abilities. However, in relation to this, there are efforts to improve in providing the Teaching at the Right Level approach, namely, preparing learning media that supports learning to make it more interesting and is also packaged by adding exciting games so that students do not get bored during learning.

Based on the results of this research, suggestions can be made by the parties as follows. (1) School principals should provide complete learning facilities so that students can take advantage of these facilities and teachers can teach students with more innovative approaches such as the Teaching at the Right Level approach and later it can also be developed with more innovative media as appropriate. with the development of time. This is to optimize students' critical reasoning abilities in mathematics or other subjects. (2) Teachers should use the results of this research as material for consideration in preparing learning plans because the results of this research show that there is a significant influence of the Teaching at the Right Level approach on students' critical reasoning abilities in mathematics lessons. (3) It is hoped that other researchers will carry out further research regarding the influence of the Teaching at the Right Level approach on other learning materials or on subjects other than mathematics as well as on different samples so that the results of this research can truly describe the actual situation that occurs in the field.

4. CONCLUSION

Based on the research that has been carried out, a conclusion can be drawn, namely, critical reasoning abilities in students' mathematics lessons taught using the Teaching at the Right Level approach in class IV students at SD Gugus V Sukawati for the 2022/2023 academic year have a high category, namely an average score of 83, 47 and the value tends to be high which is expressed in the polygon graph of the negative squint curve. Critical reasoning abilities in mathematics lessons for students who are not taught using the Teaching at the Right Level approach in class IV students at SD Gugus V Sukawati for the 2022/2023 academic year are in the medium category and tend to be low scores as expressed in the positive squint curve polygon graph. This critical reasoning ability is proven from the results of the hypothesis test which can be concluded that H_a is accepted and H_o is rejected. Based on the results of t-test calculations, it shows that there is a significant difference between critical reasoning abilities in mathematics lessons for students who are taught using the Teaching at the Right Level approach and students who do not take learning using the Teaching at the Right Level approach.

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