THE INFLUENCE OF THE CONTEXTUAL TEACHING AND LEARNING APPROACH ON LEARNING OUTCOMES IN MULTIPLES AND FACTORS OF INTEGERS AMONG 5TH GRADE STUDENTS AT SDN BARU 06

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ABSTRACT

This study aims to examine the impact of the Contextual Teaching and Learning (CTL) approach using concrete media, specifically the Snakes and Ladders game, on the learning outcomes of fifth-grade students in the topic of multiples and factors of whole numbers at SDN Baru 06. The research employed a quasi-experimental method involving two groups: an experimental group using the Snakes and Ladders game and a control group using traditional methods. Data were collected through pre-tests and post-tests and then analyzed using normality tests, linear regression, T-tests, and F-tests. The results showed that the CTL approach with the Snakes and Ladders game significantly improved students' learning outcomes compared to traditional methods. The average score of the experimental class was higher than that of the control class, with statistical analysis indicating a significant impact between the scores and the students' grades. This study suggests that the use of CTL with concrete media can make mathematics learning more engaging and effective, helping students better understand the material and relate knowledge to real life.

KEYWORDS	*Mathematics Education, Contextual Teaching and Learning (CTL), Concrete Media*

INTRODUCTION

Mathematics education in Indonesia is currently undergoing a paradigm shift. The paradigm shift in school students must understand and learn in learning mathematics correctly, so the change in the learning paradigm in school must be appropriate. A strong paradigm shift in mathematics education, especially among

policy makers (Utami & Narayani, 2019). The goal is to make learning mathematics more enjoyable for students and enable the transfer of skills suitable for further study and for entering the professional world.

The level of success of student learning in primary schools depends almost entirely on the teacher's efforts in understanding student learning. When teachers conduct teaching and learning activities (KBM), what is expected is : Learning here means that students actively carry out targeted activities. (Yensy, 2020).

In the era of revolution 4.0, education highlights the significance of the role of technology and communication in improving the quality of learning. The rapidly growing use of technology in the education sector makes it easier for teachers to deliver information to students, as stated by (Codreanu et al., 2020).

Effective learning in a learning process can improve learning outcomes is the lack of motivation of students in the learning process. (Musa, 2018). Sometimes students feel bored, because the material cannot be understood or accepted properly, especially for learning mathematics, where some students have an understanding that mathematics is one of the difficult lessons because of its abstract nature, therefore teachers can utilize teaching aids in learning mathematics.

When teachers plan the learning process, they usually have to consider the following factors at the same time: learning objectives, learning materials, students, learning media, learning methods, and learning time. Without neglecting other factors, these factors together determine the outcome of the learning process. The quality and productivity of learning will be reflected in the extent to which students achieve the learning objectives that have been set. (Bachtiar, 1984). On the other hand, whether or not students can achieve the predetermined learning objectives is closely related to the effectiveness of the learning strategies developed by the teacher. Therefore, one of the teacher's tasks is to make effective learning more diverse, interesting and fun.

However, the reality on the ground shows that most teachers still find it difficult to implement effective learning, especially teaching mathematics in primary schools. The learning that takes place remains teacher-centered, and an abstract approach using the lecture method and assignments is very prevalent in all learning activities. Rarely do teachers plan math learning with an authentic approach that activates students. Because I think such classes are pointless, confusing and time-consuming. In addition, reality shows that the teaching of mathematical and factual skills by primary school teachers is still lacking.

Because in math class, students only get learning that takes place in the lecture method, students take notes and give assignments. Students then solve problems according to the examples given by the teacher. This shows that math learning is not very useful. Learning is still teacher-centered. As a result, students only listen to the teacher's explanation and become passive. Students are not involved in classroom learning and are not given the opportunity to rediscover and build their own mathematical ideas. The way teachers teach math can make math less interesting for students. Students consider math to be a difficult subject (Khotimah & As'ad, 2020). In addition, the concept of counting is not well understood in math classes, making it difficult for students to solve math problems. Therefore, students are less able to answer the exercise questions given by the teacher with enthusiasm.

Contextual math problems, in this case related to the material "Multiples" and "Factors of Numbers", are directly related to objects in the real world or in the mind, and cannot be solved as students are used to. These are math problems and problems that you can't do. Contextual math problems are also related math problems. Contextual problems used in learning are expected to prevent students from feeling abstract in mathematical problems, because these problems are based on reality and are easier to understand if they are close to the life situations around students.(Dwiprabowo, 2021).

From the above problems will have an impact on students: A) students only receive and do not find out what material is given by the teacher. B) students have difficulty in receiving or understanding learning materials because the material is not related to everyday life. C) learners lack of developing ideas and ideas due to lack of active discussion in class. D) low learning outcomes of students.

To overcome this, we can make various efforts, one of which is to design an appropriate learning model that is attractive to the conditions of students in the classroom, one of the learning models that can be applied by teachers in the classroom learning process so that it makes students easy to understand the material provided by the teacher. The model that researchers can use in improving student learning outcomes is *Contextual Teaching and Learning (CTL)* using concrete media snakes *and* ladders game.

Contextual teaching and learning (CTL) is a learning concept that helps teachers link the material taught with the real world situation of students and encourage students to make connections between their knowledge and its application in everyday life. The purpose of applying the *contextual teaching and learning* model is so that the construction of students' knowledge can be easier if it is related to the real environment in everyday life. The connection between the material and the real environment will help students in imagining a concept. *Contextual Teaching and Learning is* learning that allows for a learning process where students use their understanding and thinking skills in various contexts within and outside of school to solve problems that are simulative or real, either alone or together. (Sakinah & Ningsih, 2022a).

This research is supported by several previous relevant studies. Suradi and Sumiati (2022) showed that the use of contextual teaching and learning (CTL) approach assisted by audio-visual media improved mathematics learning outcomes on the topic of addition and subtraction, with significant improvement in each learning cycle. Putri et al. (2021) also examined the effectiveness of the CTL approach in learning mathematics, finding that CTL increased the average student learning outcomes and received positive responses from students during the learning process. This study aims to test whether CTL can improve learning outcomes at SDN Baru 06.

The problems identified in this study include the low ability of students to improve learning outcomes on multiples and factors, and the use of inappropriate learning models that make it difficult for students to understand the material. This research is limited to two main problems, namely to determine the effect of the Contextual Teaching and Learning (CTL) learning model on improving the learning outcomes of multiples and factors of integers of grade V students of SDN Baru 06.

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The formulation of the problem proposed is whether CTL can affect student learning outcomes on the material. The benefits of this research are expected to improve student learning outcomes and relate them to everyday life, provide motivation and variations in learning methods for teachers, become a reference for schools in making policies related to the learning process, add researchers' insights into the application of CTL, and become a reference for future researchers in conducting similar research with different subjects.

Based on this problem, it can be concluded that by applying *contextual teaching and learning* using snakes and ladders game media in learning can provide a learning experience that relates the material to the real life of students. So that from this connection, it is sought that the construction of knowledge in students related to learning mathematics material multiples and factors can be increased and provide learning outcomes as expected. Thus, the research is interested in conducting research with the title "The Effect of *Contextual Teaching and Learning* Approach on Learning Outcomes on the Material of Multiples and Factors of Integers of Grade V Students of SDN Baru 06".

Research Hypothesis

Ho: There is no effect on the *contextual teaching and* learning approach using concrete media of snakes and ladders game on the learning outcomes of multiples and factors of class V at SDN Baru 06.

H1 : There is an influence on the contextual teaching and learning approach using concrete media of snakes and ladders game on the learning outcomes of multiples and factors of class V at SDN Baru 06.

RESEARCH METHOD

Research Objectives

This study aims to determine the effect of contextual teaching and learning approach using concrete media of snakes and ladders game on the learning outcomes of grade V students on the material of multiples and factors at SDN Baru 06.

Place and Time of Research

The research was conducted at SDN Baru 06, which is located at Jl. Puskesmas No.8 2, RT.2/RW.1, Baru, Kec. Ps. Rebo, East Jakarta City, Special Capital Region of Jakarta 13780, in the even semester of the 2023/2024 school year. Observations were conducted from October 2 to December 4, 2023, followed by the formulation of the problem background, preparation of instruments, data collection, data analysis, and drawing conclusions according to a predetermined schedule.

Research Methods

This study used quantitative method with Quasi Experimental Design. The research involved two homogeneous groups: the experimental group used snakes and ladders game media and the control group used book- and teacher-focused learning. The research pattern used was Posttest-Only Control Design.

Population and Sample

The study population was all fifth grade students of SDN Baru 06, totaling 56 students. The sample was taken using the Nonprobability Sampling technique, namely the entire population was sampled, consisting of class V-B as the control class and class V-C as the experimental class.

Treatment Design

The research focused on multiples and factors of whole numbers. The learning strategy used snakes and ladders game to attract students' interest. The experimental class was taught with the snakes and ladders game, while the control class used the traditional method. Learning was conducted through pre-test and post-test for both groups.

Data Collection Technique

Data were collected through written tests in the form of 10 essay questions on the pre-test and post-test. The research instrument has been tested for validity and reliability using product moment correlation coefficient and Alfa Cronbach testing.

Data Analysis

Data were analyzed using normality test (Lilliefors and Kolmogorov-Smirnov) and homogeneity test (Fisher and Lavane). Hypothesis testing was conducted using t-test to determine significant differences between the learning outcomes of the experimental and control groups.

Statistical Hypothesis

The hypotheses proposed are H0: There is no effect of using snakes and ladders media on math learning outcomes, and H1: There is an effect of using snakes and ladders media on math learning outcomes. Hypothesis testing was conducted using independent sample t-test with IBM SPSS program.

RESULT AND DISCUSSION

A. **Analysis Requirements Testing**
   1. **Normality Test**
      a. **Control class 5B students**

Table 4.16 Normality test of students 5B Control class

One-Sample Kolmogorov-Smirnov Test

			Unstandardized Residual
N			28
Normal Parameters[a,b]	Mean		.0000000
	Std. Deviation		3.15403167
Most Extreme Differences	Absolute		.146
	Positive		.117
	Negative		-.146
Test Statistic			.146
Asymp. Sig. (2-tailed)[c]			.130
Monte Carlo Sig. (2-tailed)[d]	Sig.		.132
	99% Confidence Interval	Lower Bound	.123
		Upper Bound	.140

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

d. Lilliefors' method based on 10000 Monte Carlo samples with starting seed 926214481.

Interpretation:

Basis for Decision Making

- If the Significance Value> 0.05 then the data distribution is Normal, otherwise if the Significance Value <0.05 then the data distribution is Not Normal.
- It is known that the Significance Value in Table 4.16 is 0.130> 0.05, so it can be concluded that the data distribution in class 5B students in the Control class is Normal.

    b. Student 5C of Experiment class

Table 4.17 Student normality test 5C Experiment class

One-Sample Kolmogorov-Smirnov Test			Unstandardized Residual
N			28
Normal Parameters[a,b]	Mean		.0000000
	Std. Deviation		7.67688230
Most Extreme Differences	Absolute		.109
	Positive		.109
	Negative		-.069
Test Statistic			.109
Asymp. Sig. (2-tailed)[c]			.200[d]
Monte Carlo Sig. (2-tailed)[e]	Sig.		.531
	99% Confidence Interval	Lower Bound	.518
		Upper Bound	.543

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.
d. This is a lower bound of the true significance.
e. Lilliefors' method based on 10000 Monte Carlo samples with starting seed 1314643744.

Interpretation:

Basis for Conclusions

- If the Significance Value> 0.05 then the data distribution is Normal, otherwise if the Significance Value <0.05 then the data distribution is Not Normal.
- It is known that the Significance Value in Table 4.17 is 0.200> 0.05, so it can be concluded that the data distribution in student 5C Experimental class is Normal.

2. **Simple Linear Regression Test**

Table 4.18 Linear Regression Test for control class using SPSS

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4296.835	1	4296.835	415.936	<,001^b
	Residual	268.594	26	10.331		
	Total	4565.429	27			
a. Dependent Variable: SKOR_SISWA_5BKONTROL						
b. Predictors: (Constant), NILAI_SISWA_5BKONTROL						

Interpretation:

Basis for Decision Making

If the Significance Value <0.05 then variable X has an effect on variable Y, otherwise if the Significance Value> 0.05 then variable X has no effect on variable Y. From the Output above, it is known that the F value = 415.936 with a Significance Value of <0.001 <0.05, it can be concluded that variable X has an effect on variable Y.

Table 4.19 Linear Regression Test of experimental class using SPSS

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5004.808	1	5004.808	125.446	<,001^b
	Residual	1037.300	26	39.896		
	Total	6042.107	27			
a. Dependent Variable: NILAI_SISWA_5CEKSPERIMEN						
b. Predictors: (Constant), SKOR_SISWA_5CEKSPERIMEN						

Interpretation:

Basis for Decision Making

If the Significance Value <0.05 then variable X has an effect on variable Y, otherwise if the Significance Value> 0.05 then variable X has no effect on variable Y. From the output above, it is known that the value of F = 125.446 with a Significance Value of <0.001 <0.05, it can be concluded that variable X has an effect on variable Y.

B. Hypothesis Testing

    1. T test

Table 4.20 Hypothesis testing of control class T test of variable X on Y

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-17.120	2.668		-6.418	<,001		
	NILAI_SISWA_5BKONTROL	.843	.041	.970	20.395	<,001	1.000	1.000

a. Dependent Variable: SKOR_SISWA_5BKONTROL

Interpretation:
Basis for Decision Making
  Significance Value < 0.05
  T value > T table
  T Table = t (a/2; n - k - 1)
  a = 5% = t (0.05/2; 28 - 2 - 1)
    = 0,025 ; 25
    = 2,059
  Unknown:
  From the output in Table 4.20, the Significance Value is <0.001 <0.05 and the T Count Value is 20.395> 2.059 then Ho1 is Rejected and Ha1 is Accepted. Which means that there is a significant effect of Score on Value in the Control class.

Table 4.21 Experimental class hypothesis testing T test of variable X on Y

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	29.397	3.214		9.146	<,001		
	SKOR_SISWA_5CEKSPERIMEN	.904	.081	.910	11.200	<,001	1.000	1.000

a. Dependent Variable: NILAI_SISWA_5CEKSPERIMEN

Interpretation:
  Basis for Decision Making
  Significance Value < 0.05
  T value > T table
  T Table = t (a/2; n - k - 1)
  a = 5% = t (0.05/2; 28 - 2 - 1)
    = 0,025 ; 25
    = 2,059

  Unknown:
  From the output in Table 4.20, the Significance Value is <0.001 <0.05 and the T Count Value is 11.200> 2.059 then Ho1 is Rejected and Ha1 is Accepted.

Which means that there is a significant effect of Score on Value in the Experimental class.

2. **F test**

Table 4.22 Hypothesis Testing of control class F test of variable X to Y

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4296.835	1	4296.835	415.936	<,001[b]
	Residual	268.594	26	10.331		
	Total	4565.429	27			

a. Dependent Variable: SKOR_SISWA_5BKONTROL

b. Predictors: (Constant), NILAI_SISWA_5BKONTROL

Interpretation:

Basis for Decision Making

Significance Value < 0.05

F value > F table

F table value = 3.39

Unknown:

From the output of Table 4.15, it can be seen that the Significance Value is <0.001> 0.05 and the F Count Value is 415.936 < 3.39. This proves that there is a significant influence.

Table 4.23 Hypothesis Testing of experimental class F test of variable X on Y

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5004.808	1	5004.808	125.446	<,001[b]
	Residual	1037.300	26	39.896		
	Total	6042.107	27			

a. Dependent Variable: NILAI_SISWA_5CEKSPERIMEN

b. Predictors: (Constant), SKOR_SISWA_5CEKSPERIMEN

Interpretation:

Basis for Decision Making

Significance Value < 0.05

F value > F table

F table value = 3.39

Unknown:

From the output of Table 4.15, it can be seen that the Significance Value is <0.001> 0.05 and the F Count Value is 125.446 < 3.39. This proves that there is a significant influence.

C. Discussion of Research Results

Based on the research results that have been described, several important points can be identified and discussed to provide a more in-depth picture of the effect of teaching methods on student learning outcomes on multiples and factors of integers in class V of SDN Baru 06. This study involved 28 students from two different classes, namely class 5B as the control class and class 5C as the experimental class. The instruments used were pre-test and post-test to measure students' learning outcomes on the topic of multiples and factors of whole numbers, with data processing using SPSS to ensure the validity and reliability of the data.

In the data description section, pre-test and post-test data for both classes were tabulated. From the results obtained, the control class 5B had a minimum score of 2 and a maximum of 12, with an average score of 7.14. Student scores in the control class had a minimum score range of 10 and a maximum of 60, with an average score of 35.71. The frequency of scores showed that the highest score was 8 obtained by 16 students (57.1%). The histogram and box plot confirmed that the distribution of scores in the control class tended to be normal.

In contrast, experimental class 5C showed higher results with a minimum score of 10 and a maximum of 16, and an average score of 13.57. The scores in the experimental class had a minimum score range of 50 and a maximum of 80, with an average score of 67.86. The frequency of the highest score was 14 which was obtained by 11 students (39.3%). The histogram and box plot also show a normal distribution of values and scores.

Testing the requirements of the analysis with the normality test showed that the data from both classes were normally distributed, with a significance value of 0.130 for the control class and 0.200 for the experimental class, both greater than 0.05. This allows for further statistical analysis such as linear regression and hypothesis testing.

A simple linear regression test was conducted to determine the effect of scores on student grades in both classes. The results of the linear regression test for the control class showed that the score variable (X) had a significant effect on the score (Y) with a value of F = 415.936 and a significance value <0.001, which means highly significant. Similarly, the results of the linear regression test for the experimental class showed that the score variable (X) had a significant effect on the score (Y) with a value of F = 125.446 and a significance value <0.001.

Hypothesis testing was done with T test and F test for both classes. The T-test results for the control class showed that there was a significant effect between the scores and the students' grades with a T-count of 20.395, which was much greater than the T-table of 2.059, and a significance value of <0.001. This means that Ho1 is rejected and Ha1 is accepted, indicating that scores have a significant

effect on grades in the control class. Similar results were obtained for the experimental class with a T-count value of 11.200 and a significance value <0.001, which also indicates a significant influence between scores and student grades.

The F test results also support this finding. For the control class, the F Calculated value of 415.936 is much greater than the F Table of 3.39, and the significance value is <0.001, indicating a highly significant effect. For the experimental class, the F Calculated value of 125.446 was also much greater than the F Table of 3.39, with a significance value of <0.001, confirming the significant effect of the score on student grades.

Overall, the results showed that the teaching method applied in the experimental class successfully improved students' learning outcomes significantly compared to the control class. This is reflected in the higher scores and grades in the experimental class, as well as the statistical analysis that showed a significant influence between the students' scores and grades. Thus, it can be concluded that the use of different teaching methods has a positive impact on student learning outcomes on multiples and factors of whole numbers at SDN Baru 06.

D. Research Limitations

This study has a number of limitations both in terms of content and technicalities that need to be acknowledged to provide a more thorough understanding of the results obtained. First, in terms of content, the study focused on only one mathematics topic, namely multiples and factors of integers, so the results obtained may not be generalizable to other mathematics topics or subjects outside mathematics. Effective teaching methods for this topic may not yield the same results on more complex or different topics. Secondly, this study was conducted in one school with a limited sample size of 28 students from two classes, which may limit the external validity of the results. Therefore, the results of this study may not be fully representative of the wider student population, either in a regional or national context.

In addition, this study used a quasi-experimental design with pre-test and post-test without full randomization, so there is a possibility of uncontrolled confounding variables that may affect the results of the study. For example, differences in students' socio-economic background, family support, or intrinsic motivation cannot be completely eliminated as possible factors affecting learning outcomes. From a technical perspective, the use of measurement instruments in the form of written tests may not fully capture students' ability to understand the concept of multiples and factors of whole numbers in depth. Written tests may only measure simple recall or application skills without testing more complex conceptual understanding.

Furthermore, other technical limitations include the potential for bias in the assessment, despite validity and reliability tests using SPSS. The assessment process conducted by teachers or researchers may still contain an element of subjectivity. The use of SPSS for data analysis also has its own limitations,

especially if there are data input errors or unmet assumptions in the statistical analysis used. In addition, this study did not consider time variables and the long-term effects of the teaching methods applied. The effect of the teaching method may not only be limited to the improvement of short-term learning outcomes measured through the post-test, but also on long-term comprehension and retention which was not evaluated in this study.

Thus, while this study provides useful insights into the effectiveness of teaching methods on specific topics, the results should be carefully considered in the context of existing limitations. Further research with more robust designs, larger samples, and a wider variety of topics and teaching methods is needed to confirm and extend these findings.

CONCLUSION

Based on the results of the study, the following conclusions can be drawn. Effective teaching methods for this topic may not yield the same results on more complex topics, with the quasi-experiment design suggesting the presence of confounding variables such as socio-economic background, family support, or student motivation that might affect learning outcomes. On the subject of Multiples and Factors of Integers, students in control class 5B had an average score of 7.14, while experimental class 5C showed a higher average score of 13.57. The T-test and F-test showed a significant influence between students' scores and grades, with the experimental class showing better results. Normality and linear regression tests also supported that scores had a significant effect on students' grades in both classes.

This study implies that the contextual teaching and learning (CTL) approach has a significant effect on the mathematics learning outcomes of grade V students, and its application can utilize modern learning technology for better results. However, materials may need further development, and teaching methods need to be adapted to students' individual learning styles.

This study suggests that students are more active when teachers apply CTL, teachers develop active and innovative lesson plans, schools provide learning support facilities, and researchers continue research for better results and become a reference for further research.

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