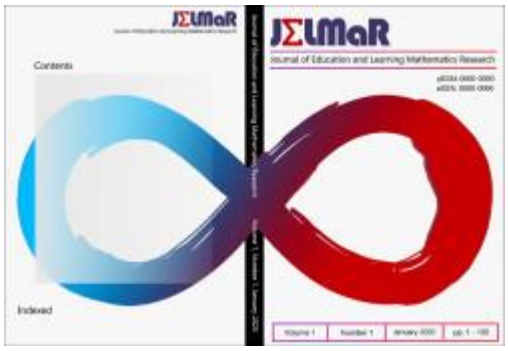

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Effect of *Conceptual Understanding Procedures* (Cups) Model on Mathematics Learning Results on SPLDV Materials

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***Abstract**: Improving student learning outcomes in mathematics is not only done through memorization of material, but also requires an understanding of concepts and problems so that laters student are able to solve problems. In overcoming these problems, the CUPs (Conceptual Understanding Procedures) model is needed as an innovative learning model to provide an increase in student learning outcomes. Providing a description of the effect of student learning outcomes through the application of CUPs (Conceptual Understanding Procedures) is the purpose of this study. Including quantitative research, with Pre-test Ppost-test Non-Equivalent Control Group Design. Class VIII SMP Negeri 12 Surabaya os the population in this study with respondents, namely students of class VIII-F as the experimental class and VIII-G as the control class, each totaling 32 students. Data collected through questions that have been fulfilled through analyzing. The analysis that underlies the acquisition t_{count} which is $t_{count} = 4{,}58$ and $t_{table} = 1{,}99$. Because $t_{count} > t_{table}$ in the sense that the teaching results experience differences in the experimental class after going through the application of CUPs (Conceptual Understanding Procedures) and control through conventional models. So it is concluded that teacing with CUPs (Conceptual Understanding Procedures) has an influence on the learning outcomes of junior high scholl mathematics students.*
Keyword: Conceptual Understanding Procedures model, learning results, SPLDV.

INTRODUCTION

Education is one of the most important aspects lf human life. Agustiana et al. (2018) revealed that education is an activity to provide lessons that can benefit humanity and aims to make humans better in the future. Through learning, every human being has the right to develop their abilities. In one of the quotes put forward by Octaviani & Rostika (2017) namely one of the teachings that can be used in term of developing abilities is mathematics. Mathematics is a science that is organized using deductive logic that goes hand in hand with everyday life (Surajiyo, 2022). The purpose of learning mathematics is for students to understand concepts correctly and carefully when facing a problem. In this study, researchers chose the material SPLDV because the material SPLDV matches the Conceptual Understanding Procedures (CUPs) learning model that contains problems in everyday life and requires an understanding of the concept of in solving existing problems. In addition, according to observations made by researchers, there are still many students who difficulties in solving problems related to SPLDV. For example, students have difficulty in understanding the given story problems, students also have difficulty in analyzing problem, and writing a mathematical model of the story problem that has been elaborated. Previous research conducted by Ardianti (2019) about the effect of the Conceptua Understanding Procedures (CUPs) learning model on the mathematics learning outcomes of SMP Negeri 1 Suruh. The results showed that there is a significant difference in the average student taught using the CUPs model and those taught using the Convensional model. The research show that there is an effect of the Conceptual Understanding Procedures (CUPs) model on student math learning outcomes. The

research conducted by researchers is different in terms of the material taught, namely SPLDV material. It is said that student learning outcomes are good by referring to the KKM at SMPN 12 Surabaya.

Some cases where students still tend to find it difficult to understand the question, resulting in low learning outcomes. Researchers conducted at SMPN 12 Surabaya and found low student learning outcomes, especially in SPLDV material because the methods used by teachers tend ti be monotonous. Learning outcomes are a measure of the evaluation of the learning process expressed in letters or sentences that reflect the achievement of results by each individual within a certain period of time (Sumoked et al., 2021). Low learning outcomes are due to teacher-dominated learning with the lecture method, where the teacher is more active that students so that is does not provide opportunities for students to built their knowledge (Pranata et al., 2021). Learning requires innovation, strategies, and a pleasant learning environment so that it can involve students to be active and can improve learning outcomes (Sulfemi & Minati, 2018). As an alternative solution, the CUPs (*Conceptual Understanding Procedures*) model can be applied. CUPs is a model that teaches students to conclude material and students can find difficult mathematics concepts (Lestari et al., 2019). Ibrahim et al. (2017) also argues that CUPs (*Conceptual Understanding Procedures*) means a model intended to make it easier for students to summarize the material learned.

Researchers chose the junior high school level as the research lovation because the success of students in mathematics is relatively weak, especially in the discussion of SPLDV. According to researcher observations, many students experience problems related to problem solving. This is based on what was stated by Khairunnisa & Aini (2019) that students who understand SPLDV material reach 39,71%, meaning that students understanding is still weak, resulting in low learning outcomes. In addition, the use of the lecture method used in the teaching process is always the same. Ardianti (2019) in her research mentioned the effect of learning outcomes when applying CUPs (*Conceptual Understanding Procedures*).

This research is intended to identify whether CUPs affects how well students succeed in junior high school mathematics lessons on SPLDV material. Research Alfiyah et al. (2022) also supports this research to see if CUPs (*Conceptual Understanding Procedures*) affects students success. Seen from the studies that have been mentioned, it is suspected that there is an influence of the CUPs model on students success. Therefore, research with the tittle he Effect Of *Conceptual Understanding Procedures* (CUPs) Learning Model on Mathematics Learning Outcomes of Junior High School Students on SPLDV Material" must be carried out by researchers.

METHOD

Including a quasi-experiment that uses a *pre-test post-test non-equivalent control group design* with a quantitative research type.

Table 1. ***Pre-test Post-test Non-Equivalent Control Group Design***

Class	*Pre-test*	Treatment	*Post-test*
Experiment	O_1	X_1	O_3
Control	O_2	X_2	O_4

Explanation:

X_1 : CUPs model treatment in the experimental class

X_2 : Conventional model treatment in control class

O_1 : Giving *pre-test* in experimental class

O_2 : Giving *pre-test* in control class
O_3 : Giving *post-test* in experimental class
O_4 : Giving *post-test* n control class

Research Hypothesis *Pre-test*:

- $H_0 : \mu_1 = \mu_2$ means that there is no difference in the average *pre-test* scores of students before being treated using the Conceptual Understanding Procedures (CUPs) learning model in the experimental class and the convensional kearning model in the control class.
- $H_1 : \mu_1 \neq \mu_2$ means that there is a difference in the average *pre-test* scores of students before being treated using the Conceptual Understanding Procedures (CUPs) learning model in the experimenta class and the conventional learning model in the control class.

Research Hypothesis *Post-test*:

- $H_0 : \mu_1 = \mu_2$ means that there is no difference average student learning outcomes after being given treatment using the learning model on the experimental class and conventional model in the control class.
- $H_1 : \mu_1 \neq \mu_2$ means that there is a difference in the average student learning outcomes after being treated using the learning model Conceptual Understanding Procedures (CUPs) learning model in the experimental class and the conventional model in the control class.

Class VIII of SMP Negeri 12 Surabaya included the population in the study and used respondents selected through the average of students UTS scores by looking at the two highest scores where class VIII-F as the experimental applied the CUPs model and VIII-G as the control applied the convensional model. Each class consisted of 32 students for an average of 65,19 for VIII-F and 64,38 for VIII-G.

The first thing to do when starting research is that researchers first conduct instrument validity tests which include expert validity and empirical validity. Where from these test the result obtained state that the questions for each *pre-test* and *post-test* item are feasible to use and also valid with several categories. Furtheremore, instrument reliability testing was also applied. The reliability test results proved to be reliable. The initial test is commonly called the *pre-test* and the final test is commonly called the *post-test* in the form of a written test, each of which contains 4 description test items used as a research data collection tool. Then instrument testing is carried out in 2 categories, namely validity and reliability testing where results can be obtained that have met the validity test (expert and empirical) and reliability with valid evidence as well as reliability.

There are three categories that must be achieved in conducting data analysis, namely: 1) Normality testing, 2) Homogeneity testing and 3) Hypothesis testing. In normality testing, the chi-square formula is used and homogeinity testing uses the F formula as the testing instrument. Furthermore, in hypothesis testing, *The Pooled Variance Model T-test* formula is used when the data is proven normal and homogeneus.

RESULT AND DISCUSSION

Experimental and control were the two different levels used by the researcher. CUPs (*Conceptual Understanding Procedures*) teaching was applied for the experimental level and conventional teaching was applied for the control level. What was taken into account and analyzed in this study was the students learning success in mathematics. Then an analysis was carried out which included prerequisite testing and also hypothesis testing. In prerequisite testing there are 2 tests, namely normality and homogeneity testing. The following is the average student learning success:

Table 2. Average Learning Success

Class	*Pre-test*	*Post-test*
Experiment	66,16	84,75
Control	65,47	78,03

When testing data sourced from a normal population or not, normality testing is used. The chi-squared formula was used b researchers to conduct the test with steps according to Astutik & Fitriaten (2016) the data is said to be normal if $\chi^2_{count} < \chi^2_{table}$ otherwise the data is said to be abnormal if $\chi^2_{count} > \chi^2_{table}$. The following is a table that summarizes the calculation of the normality test carried out:

Table. 3 Calculation Results of Data Normality Testing

Class	*Pre-test* Data			*Post-test* Data		
	χ^2_{hitung}	χ^2_{tabel}	Description	χ^2_{hitung}	χ^2_{tabel}	Description
Experiment	8,67	11,07	Nomal	5,13	11,07	Normal
Control	7,19			8,59		

As shown is the results of the calculation of normality testing above with a significance level of 5% obtained $\chi^2_{count} < \chi^2_{table}$. So, both are normally distributed.

After that, to test the data of both level have homogeneous variance, homogeneity testing was used (Astutik & Fitriaten, 2016). Data is said to be homogeneous if $F_{count} \leq F_{table}$ otherwise the data is said to be inhomogeneous if $F_{count} > F_{table}$. The following table summarizes the calculation of homogeneity testing performed:

Table 4. Calculation Results of Data Homogeneity Testing

Pre-test Data			*Post-test* Data		
F_{hitung}	F_{tabel}	Description	F_{hitung}	F_{tabel}	Description
1,06	1,82	Homogeneous	1,73	1,82	Homogeneous

As shown in the results of the calculation of data homogeneity testing above, it is evident that both data have homogeneous variances where $F_{count} < F_{table}$.

Hypothesis testing is carried out after it can be proven that all data are normally distributed and homogeneous. In hypothesis testing, *The Pooled Variance Model T-test* formula is used. Astutik & Fitriaten (2016) states that there are criteria in hypothesis testing, namely H_0 rejected if $t_{count} > t_{table}$ otherwise H_0 accepted if $t_{count} < t_{table}$. The following table summarizes the hypothesis testing calculations carried out:

Table 5. Calculation Results of Hypothesis Testing Data

Pre-test Data			*Post-test* Data		
t_{hitung}	t_{tabel}	Description	t_{hitung}	t_{tabel}	Description
0,37	1,99	H_0 accepted (There is no difference in the average *pre-test* scores of students before being treated).	4,58	1,99	H_0 rejected (There is a difference in the average *post-test* scores of students after being treated).

Based on the results of the calculation of data hypothesis testing above, for the *pre-test* data obtained that $t_{count} < t_{table}$ with a significant level of $\alpha = 0{,}05$ then H_0 accepted in the sense that there is no difference in the average *pre-test* results of students before the application of CUPs at the experimental level and conventional application at the control level. Conversely, the *post-test* data obtained $t_{count} > t_{table}$ then H_0 rejected in other words, there is a difference in the average student *post-test* results after the application of CUPs at the experimental level and conventional application at the control level.

From the results of the *pre-test* data analysis, it shows that there is no difference in the average results of students *pre-test* before given treatment using the CUPs learning model in experimental class and conventional learning model in the control class. Otherwise the results of *post-test* data analysis show that there is a difference in average student *post-test* results after being treated using the CUPs learning model in the experimental class and the conventional learning model in the control class on the material SPLDV. These results in accordance with the research of Husna & Mukhni (2022) which conclude that there was a difference between the learning outcomes of the two groups. Conclude that there was a difference between the learning outcomes of students who get the treatment of the learning model CUPs learning model with the learning outcomes of students who get a direct learning model, where the math learning outcomes that get the treatment learning model CUPs is better that the learning outcomes of mathematics who get the direct learning model treatment. So what makes it different is the treatment learning model given. Can it can be concluded that there is an effect of the learning model CUPs on the learning outcomes of junior high school students in SPLDV. These results are in accordance with research of Alfiyah et al. (2022) which concluded that there is an effect of the Conceptual Understanding Procedures (CUPs) learning model on student learning outcomes.

CONCLUSION

Based on the *pre-test* data analysis shows that the average *pre-test* score on SPLDV material before being given the CUPs (Conceptual Understanding Procedures) model treatment in the experimental class and the conventional model in the control class there is no difference in the average *pre-test* score. Conversely, the analysis of *post-test* data shows that the average *post-test* score on SPLDV material after being treated with the CUPs model in the experimental class and the conventional model in the control class there is a difference in the average learning success. Therefore, it is concluded that the use of the CUPs (Conceptual Understanding Procedures) learning model has an influence on students mathematics learning outcomes in SPLDV material.

With the existence of a number of teaching models, one of the many models, the CUPs (Conceptual Understanding Procedures) learning model, it is hoped that teachers and instructors can use it as an alternative teaching to increase student learning success, especially in mathematics.

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