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Differences in Students Mathematics Learning Outcomes Using the Means-Ends Analysis Model and the Dooble-Loop Problem Solving Model

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Abstract

This study aims to determine whether or not there are differences in student learning outcomes taught by the Means-Ends Analysis (MEA) learning model and the Dooble-Loop Problem Solving (DLPS) learning model in Pythagorean Theorem material in class VIII of SMP PGRI 20 Jakarta. This study uses experimental research methods with a quasi-experimental approach. The research instrument used was a mathematics test with multiple-choice type questions consisting of 30 items with four (4) available answer choices (A, B, C, and D). The value or score for each question is 1 for the correct answer and 0 for the wrong answer. From the results of testing the hypothesis obtained for t_{count} = 3.721, it turns out that the price is greater than t_{table} = 2.002. The test criteria are that H_0 is rejected if tcount is greater than ttable. So it can be concluded that there are differences in the learning outcomes of students who are taught with the Means-Ends Analysis (MEA) learning model and students who are taught with the Dooble-Loop Problem Solving (DLPS) learning model.

Keywords: Dooble-Loop problem solving, Learning outcomes, Mathematics, Means-ends analysis.

1 INTRODUCTION

Education is a form of embodiment of dynamic human culture and development requirements. Education that is able to support development in the future is education that is able to develop the potential of students, so that those concerned are able to face and solve the problems of life they face.

This is in line with Law Number 20 of 2003, Chapter II, Article 3, Concerning the National Education System, which states that: National education functions to develop capabilities and shape national character and civilization that are useful in the context of educating the life of the nation, aiming at developing the potential of students to become human beings who believe and fear God Almighty, have noble character, are healthy, knowledgeable, creative, independent, and become democratic and responsible citizens."In the implementation of effective education, good and satisfying learning outcomes are the hopes of parents and all related parties. However, in reality, these expectations often do not materialize. This is caused by several factors, including the students themselves, the subject matter, teachers, and parents. Each subject matter has characteristics, as do students. The teacher's ability to understand material characteristics and student characteristics is one of the most important things in learning activities.

From the time of preparing a subject matter until the time of its implementation, the teacher must be selective in determining the learning strategy to be applied. This depends on the approach and model used in the teaching and learning process. So, the approach that needs to be developed as an alternative that is in accordance with the

characteristics of the material being taught so that the teaching and learning process is more effective and efficient is a model that really involves students actively during the teaching and learning process. A teacher is not only required to master the material but is also required to be able to process teaching well, which is closely related to the ability of a teacher to apply the right learning model to a material. The results of teacher teaching, by applying the right learning model to a material, affect student learning outcomes. By applying an appropriate learning model, it will arouse the enthusiasm and interest of students in mathematics.

2 RESEARCH METHODS

This study uses experimental research methods with a quasi-experimental approach. Quasi means pseudo. This method has a control group but cannot fully function to control external variables that affect the implementation of the experiment. The target population in this study was all students enrolled at SMP PGRI 20 Jakarta in the 2022/2023 school year, from class VII to class IX. The reachable population in this study were students of class VIII in the even semester of the 2022/2023 academic year. The sampling technique used in this study was cluster random sampling.

To obtain the data in this study, we used objective test instruments. An objective test is a test that, in its examination, can be carried out objectively. This test aims to assess the value of student learning outcomes with the use of multiple-choice questions, which consist of 30 items with four available answer choices (A, B, C, and D). The score for each question is 1 for the correct answer and 0 for the wrong answer. Research stages: (1) Researchers design classes that will be used as samples. (2) Researchers make research instruments that will be used for research. (3) Research conducts trials of research instruments, analyzes them, and defines them. (4) Researchers carry out learning on research samples; in this implementation, two learning models are determined, namely the Means-Ends Analysis learning model in experimental class 1 and the Dooble-Loop Problem Solving learning model in experimental class 2. (6) Researchers collect the data needed in research on samples with observations and tests of the Pythagorean Theorem material to measure learning outcomes.

Stages of analysis and interpretation: (1) Processing the data obtained from the Pythagorean Theorem material test in the experimental class (2) Draw research conclusions so that the proposed hypothesis is accepted or not.

3 RESULT AND DISCUSSION

The data to be analyzed in this study are differences in students' mathematics learning outcomes in the Pythagorean Theorem material. The data was obtained from 3 classes: 1 instrument trial class (in the form of an objective test) and 2 experimental classes with two different learning models, namely: Means-Ends Analysis and Dooble-Loop Problem Solving. The data that has been collected through this research will be tabulated according to the purposes of data analysis, which aims to show an overview of the distribution of data. Description of the research data will be presented as follows:

3.1 Description of Research Results Data

The data presented in this section is data on student mathematics learning outcomes for the Pythagoras theorem using the Means-Ends Analysis learning model.

3.1.1 Mathematics Learning Outcomes Using Means-Ends Analysis

Based on the test results given to experimental class students who were taught with the Means-Ends Analysis learning model with a sample of 30 people, a maximum score of 100 and a minimum score of 60 were obtained with an average value of 84.70, a median

of 88.14, a mode of 91.7, a variance of 105.94, and a standard deviation of 10.29. From the data obtained, a frequency distribution (Table 1) can be made for the Means-Ends Analysis model.

Tabel 1. Frequency Distribution of Learning Outcomes Using Means-Ends Analysis Learning Model

Class Intervals	Mid Point	Frequency	Real Boundary
60-66	63	1	59,5 – 66,5
67-73	70	4	66,5 – 73,5
74-80	77	7	73,5 – 80,5
81-87	84	2	80,5 – 87,5
88-94	91	11	87,5 – 94,5
95-101	98	5	94,5 – 101,5
Total		30	

3.1.2 Mathematics Learning Outcomes Using the Dooble-Loop Problem Solving

Based on the results of tests given to experimental class students who were taught with the Dooble-Loop Problem Solving learning model with a sample size of 30 people, a maximum score of 96 was obtained and a minimum score of 56, with an average value of 74.63, a median of 73.50, a mode of 85 and 80, a variance of 113.83, and a standard deviation of 10.67. From the data obtained, a frequency distribution (Table 2) can be made using the Dooble-Loop Problem Solving model.

Tabel 2. Frequency Distribution of Learning Outcomes Using Dooble-Loop Problem Solving Learning Model

Class Intervals	Mid Point	Frequency	Real Boundary
56-62	59	4	55,5 – 62,5
63-69	66	7	62,5 – 69,5
70-76	73	7	69,5 – 76,5
77-83	80	4	76,5 – 83,5
84-90	87	6	83,5 – 90,5
91-97	94	2	90,5 – 97,5
Total		30	

3.2 Data Analysis Techniques

From the results of the calculation of the normality test in the group using the Means-Ends Analysis model, it is obtained that $L_{count}=0.126<L_{table}=0.161$ at a significant level of $\alpha=0.05$ for $n=30$. Meanwhile, the results of the calculation of the normality test in the group using the Dooble-Loop Problem Solving model obtained $L_{count}=0.123<L_{table}=0.161$ at a significant level $\alpha=0.05$ for $n=30$. Because L_{count} in both groups is less than L_{table}, it can be concluded that the data in the group using the Means-Ends Analysis model and the group using the Dooble-Loop Problem Solving is normally distributed. Homogeneity testing was carried out using Fisher's test, with the test criteria being that H_0 is accepted if $F_{count}<F_{table}$ at a significant level of $\alpha = 0.05$. From the test results obtained, $F_{count}=1.07$ and $F_{table}=1.85$, because $F_{count}=1.07<F_{table}=1.85$ then H_0 is accepted at $\alpha=0.05$, so it can be concluded that the variances of the two groups are the same or homogeneous.

3.3 Research Hypothesis Testing

Hypothesis testing can be done by using the similarity of the two average students with the proposed hypothesis, so this test is a one-party average similarity test using the *t-test*. From the calculation results obtained, $t_{count}=3.721$ and t_{table} at the real level $\alpha=0.05$ and $dk=58$ of 2.002. The criteria for testing the hypothesis are to reject H_0 if t_{count} is greater than t_{table}, while from the calculation above it can be obtained that $3.721>2.002$, thus meaning that the null hypothesis is rejected, which means that there is a significant

difference between the learning outcomes of students who are taught using the Means-Ends Analysis and using the Dooble-Loop Problem Solving.

4 CONCLUSION

This study aims to explain the differences in mathematics learning outcomes between students who are taught using the Means-Ends Analysis model and the Dooble-Loop Problem Solving model. The instrument used is in the form of a multiple-choice questionnaire with 25 valid questions. By rejecting H_0, or the null hypothesis, from the results of hypothesis testing using the t-test interpolation at a significant level α=0.05, it can be concluded that there are differences in the learning outcomes of students using the Means-Ends Analysis model using Dooble-Loop Problem Solving.The results of this study prove the truth of the hypothesis, so it can be said that the average value of the mathematics learning outcomes of students who use Means-Ends Analysis is higher than the average learning outcomes of students who use Dooble-Loop Problem Solving at SMP PGRI 20 Jakarta.

5 REFERENCES

Clay-Lindgren, H. (1976). *Educational Psychology in the Classroom*. John Wiley & Sons, Inc.

Heinich, R. (1996). *Instructional Media and Technologies for Learning*. Prentice Hall.

Huda, M. (2014). *Model-model Pengajaran dan Pembelajaran*. Pustaka Pelajar.

Isrok'atun, I., & Rosmala, A. (2018). *Model-model Pembelajaran Matematika*. Bumi Aksara.

Istikharoh, I., Nurimani, N., & Kurniawan, B. (2019). Perbedaan Hasil Belajar Matematika Siswa melalui Pendekatan Open-Ended dan Contextual Teaching and Learning di SMK Bina Nusa Mandiri Jakarta. *In Prosiding Seminar Nasional Pendidikan STKIP Kusuma Negara.*

Kasyadi, S., Achdiat, M., & Barata, S. (2014). *Strategi Belajar dan Pembelajaran*. Pustaka Mandiri.

Kusuma, A. P., & Maskuroh, M. (2018). The differences of mathematics learning outcomes between think pair share (TPS) and Number Heads Together (NHT). *Al-Jabar: Jurnal Pendidikan Matematika, 9*(1), 19-24.

Kusuma, A. P., Rahmawati, N. K., & Ayuningrum, L. (2022). Pengaruh Model Pembelajaran Rms Terhadap Kemampuan Berpikir Aljabar Ditinjau Dari Kemampuan Penalaran Matematis. *Delta: Jurnal Ilmiah Pendidikan Matematika*, *10*(2), 329-338.

Nurdin, S, A. (2016). *Kurikulum dan Pembelajaran*. Raja Grafindo Persada.

Rahmawati, N. K., Kusuma, A. P., & Nurrahmah, A. (2023). Kemampuan Pemecahan Masalah Mahasiswa Pada Aplikasi Turunan (Maksimum Dan Minimum) Berbantuan Geogebra. *Delta: Jurnal Ilmiah Pendidikan Matematika*, *11*(1), 13-28.

Shoimin, A. (2017). *68 Model Pembelajaran Inovatif dalam Kurikulum 2013*. Ar-Ruzz Media.

Sudjana, N. (2016). *Penilaian Hasil Proses Belajar Mengajar*. Ramaja Rosdakarya.

Sugiyono. (2015). *Metode Penelitian Pendidikan*. Alfabeta.

Supardi. *Aplikasi Statistika Dalam Penelitian*. Jakarta: Change Publication, 2016.

Suriasumantri, J. S. (2016). *Filsafat Ilmu Sebuah Pengantar Populer*. Pustaka Sinar.