PENGARUH MODEL PEMBELAJARAN BERBASIS MASALAH BERBANTUAN SOFTWARE CABRI 3D TERHADAP HASIL BELAJAR MAHASISWA PADA MASA PANDEMIC COVID

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Abstrak.
Tujuan dari penelitian ini adalah untuk mengetahui apakah peningkatan hasil belajar mahasiswa melalui model pembelajaran Penemuan berbasis masalah berbantuan Cabri 3D lebih tinggi daripada peningkatan hasil belajar mahasiswa yang tidak memperoleh model pembelajaran berbasis masalah tanpa Cabri 3D yang dilakukan dengan pembelajaran daring selama pandemic covid 19. Penelitian ini merupakan penelitian quasi eksperimen. Populasi dari penelitian ini adalah seluruh kelas prodi pendidikan matematika semester lima yang berjumlah kurang lebih 82 orang, Kemudian dipilih 2 kelas secara acak. Kelas eksperimen diberi perlakuan model pembelajaran berbasis masalah berbantuan Software Cabri 3D dan kelas control hanya diberi model pembelajaran berbasis masalah tanpa bantuan software Cabri 3D. Instrumen yang digunakan adalah tes. Analisis data dilakukan dengan analisis varians (ANAVA) dua jalur. Hasil penelitian menunjukkan bahwa peningkatan hasil belajar mahasiswa melalui model pembelajaran berbasis masalah berbantuan software Cabri 3D lebih tinggi daripada peningkatan hasil belajar pada mahasiswa yang tidak diberi perlakuan Cabri 3D (kelas kontrol).
Kata kunci: *Model Pembelajaran Berbasis Masalah; Cabri 3D, Hasil belajar*

Abstract
This study aimed to determine whether the increase in student learning outcomes of the problem-based learning model assisted by Cabri 3D was higher than the increase in student learning outcomes of the problem-based learning model without Cabri 3D, which was carried out by online learning during the COVID-19 pandemic. This research is quasi-experimental. This study's population was all classes of the fifth-semester mathematics education study program, totaling approximately 82 people, and then two categories select randomly. The experimental type was treated with a problem-based learning model with the help of Cabri 3D software, and the control class was only given a problem-based learning model without the help of Cabri 3D software. The instrument used was a test. Data analysis performed using a two-way analysis of variance (ANOVA). The results showed that the increase in student learning outcomes through problem-based learning models assisted by Cabri 3D software was higher than the increase in learning outcomes in students who did not give Cabri 3D treatment (control class).
Keywords: *Problem Based Learning Model; Cabri 3D; Learning Result*

1. INTRODUCTION

The planning of the teaching system program serves to provide direction for learning to become directed and efficient. Activities in carrying out the planning function include estimating demands and needs, determining goals, writing a syllabus of learning activities, determining topics to be studied, allocating time, and determining the required resources, especially in the era of the Covid 19 pandemic.

Law N0. 14 of 2005 Chapter IV Article 20 (a) concerning Teachers and Lecturers states that the standard of teacher work performance in carrying out their professional duties, the teacher is obliged to plan, carry out a quality learning process as well as assess and evaluate the learning outcomes of learning outcomes. From the above opinion, it can conclude that a professional teacher must be able to plan to learn, namely compiling their annual program syllabus, a semester program, and Learning Implementation Plan.

Guided by the law above under the profile of graduates of the Mathematics education study program at UMSU, graduates of Mathematics education must produce mathematics education graduates with pedagogical competence, social competence, personal competence, and professional competence. Producing bachelor of education and Mathematics educators who can perform community service to help create a quality society.

In other words, a Mathematics education graduate must be able to compile an advanced syllabus and design a syllabus following the principles of syllabus development. The importance of this is inversely proportional to the condition of students who are already in the upper semester. The number of students who do not

master the principles in developing syllabus and making advanced syllabus, confused in determining indicators and learning objectives, and the habits that often occur in creating and developing advanced syllabus and syllabus, evaluation and so on are urgent. To be completed. (Batubara 2018) and (Santika, Parwati, and ... 2020) explains that these students' inability to learn some material in learning indicates that the student concerned lacks understanding concepts. Many factors contributed to the student's failure to develop an advanced syllabus and syllabus. (Batubara 2019b) and (Soekisno 2015) One of the causes is the lack of understanding of concepts, and critical thinking is lessened of learning models and learning media used by educators in the classroom. Besides, learning mathematics in the school is not meaningful, structured, and does not emphasize Besideserstanding, so that students' understanding of concepts is feeble. Anticipate the above problems, and educators must look for and find a way to foster students' motivation to learn. This definition implies that educators are expected to develop a learning model that can improve student learning outcomes, create, investigate and express students' ideas.

The Problem Based Learning (PBL) model is one solution to the many problems that arise above. Researchers (Batubara 2017b) and (Ananggih, Yuwono, and Sulandra 2019) Explain that this PBL model is perfect to use when combined with technology because this can help develop creativity and improve students' thinking skills. Furthermore (Batubara 2017a) explains that with PBL, students can also think critically and help enhance cooperation between students through the investigations they carry out so that students' understanding of mathematics learning can increase, especially in the course of developing a mathematics learning syllabus. From this opinion, the researchers tried to formulate a problem-based learning model with Cabri 3D software. Cabri 3D software itself is a mathematical software that can help teachers and lecturers describe or visualize building spaces such as cubes, blocks, and so on so that they are easy to explain, precise and beautiful to see (Batubara, Nasution, and Afifah 2020), (Trisnawati, Pratiwi, and Waziana 2018).

The term Problem Based Learning (PBM) was adopted from the English term Problem Based Instruction (PBI). This problem-based learning model has been known since John Dewey's (Surya, Syahpurta, and Juniati 2018) The PBM or Problem Based Instruction (PBI) model is also known by other names such as Project Based Teaching, Experience-Based Instruction, Authentic Learning, and Anchored Instruction (learning meaningful or rooted in life)

According to (Batubara and Ammy 2018) PBM is an innovation in learning because, in PBM, students' thinking abilities are optimized through systematic group or teamwork processes to empower, hone, test, and develop their thinking skills. According to the researcher (Batubara 2019a) explains that problem-based learning is the experts above; the conclusion is that the turning model is a learning model that uses problems as the starting point of learning. From the opinion of several experts above, the writer concludes that problem-based learning is a learning model that can be used as a learning tool and problems that meet the real-world context, ich is familiar with students' daily lives.

Learning outcomes are related to students' abilities in the understanding lecture material. According to the expert (Hamalik 2010) states, "the results of learning patterns of actions, values, understandings, attitudes, appreciation, abilities and skills." Meanwhile, according to researchers (Wahyuni 2017), Students are also defined as the results obtained by students after completing a particular learning package, which can be achieved in various forms through the evaluation process. Learning outcomes appear as changes in student behavior that can be observed and measured in changes in knowledge, attitudes, and skills. This change can be interpreted as an increase and better development than before, for example, from not knowing to know, being impolite to being polite and so on.

2. METHOD

This study's population was all classes of the fifth semester Mathematics Education study program, totaling approximately 82 people. Meanwhile, the samples in this study were randomly selected courses in the fifth-semester mathematics education study program, faculty of the Teacher Training and Education, University of Muhammadiyah Sumatera Utara for the 2019/2020 academic year.

This research is quasi-experimental. This research was conducted with an online problem-based learning model. It can conclude that this research carried out in the following stages: (1) The background of the preparation of learning tools and research instruments, which included preliminary tests and so on (2) The implementation stage of the experiment in the form of providing learning treatment through online, and (3) the analysis stage of the research results. Each step is designed, so that valid data obtained according to the characteristics of the variables and research objectives. The data collected in this study are data related to student learning outcomes which took using tests. The test was carried out by providing description

questions (essay). The test given is in the form of pretest and posttest questions.

Data processing begins with testing the statistical requirements needed as a basis for testing hypotheses, including the data normality test and the variance homogeneity test. Furthermore, the t-test, regression, and correlation were carried out according to the problem. All statistical calculations in this study use the help of the SPSS 22 computer program.

Hypothesis 1: To test the improvement of student learning outcomes

$H_0 : \mu_x = \mu_y$

$H_a : \mu_x \neq \mu_y$

Information:

μ_x : Improved student learning outcomes taught by problem-based learning model assisted by Cabri 3D

μ_y : Improved student learning outcomes that taught with problem-based learning models without Cabri 3D

. The t-test formula used with SPSS 22, with the testing criteria, rejects H0 if $t_{table} < t_{count}$ and accepts H0 for other conditions with a predetermined significance level.

3. DISCUSSION and RESULTS

Discussion and Results contain the results of research findings and their scientific debate. Write down the scientific findings (scientific findings) obtained from the effects of research that has been carried out but must e supported by adequate data. The scientific conclusions referred to here are not the research data obtained. Scientific findings must be explained scientifically include: Are scientific results obtained? Why did that happen?

The analysis prerequisite test results, namely the normality and homogeneity test, show that students' N-gain data are normally distributed. The variance of each data group is the same, so to analyze it using the parametric statistical test, namely using the t-test with statistical hypotheses that must be tested for learning outcomes, is formulated as follows:

$H_0 : \mu_x = \mu_y$

$H_a : \mu_x \neq \mu_y$

Information:

μ_x : Improved student mathematical learning outcomes in the experimental class

μ_y : Improved learning outcomes of control class students

The following shows the results of the N-gain test for the two-sample classes using SPSS 22:

Table 1: T-test results of student learning outcomes improvement

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Value	Equal variances assumed	2.081	.26	2.316	80	.021	.13258	.01655	.04428	.24706
	Equal variances not assumed			2.057	44.129	.021	.13258	.01655	.02835	.24706

The table shows that the t-count is 2.316, and the significance value is 0.021, taken from both the N-gain of the experimental class and the control class.

Based on the results of the calculations in table 1 above, using the t-test at the significance level of 0,05, the t count is 2.316 with a significance value of 0.21 while the t table is 1.99. Because t-count (2.316)> t-table (1.99) and a significance value (0.021) < (0,05), so H0 is rejected. So it can be concluded that the increase in student learning outcomes taught through problem-based learning models is higher than those who do not use learning methods (control class).

The research results that have been stated above show that the problem-based learning model is significantly better at improving student learning outcomes than without using a learning model at all. In this learning activity, students have the opportunity to interact with their community. Students will share ideas to propose solutions both in groups and o present the final results in front of the class. So that students can easily find errors in solving problems that are made. Meanwhile, students with high abilities can practice conveying ideas and ideas to others and respect the opinions of others so that it is possible to increase their knowledge.

Based on the above findings, it can be concluded that the use of the Problem Based Learning model is better than the conventional learning model. These findings are in line with research conducted by Batubara, IH (2020: 103), which states that the increase in students' mathematical critical thinking skills taught through autograph-assisted problem-based learning is higher than that taught through Cabri 3D-assisted problem-based learning and control class.

4. CONCLUSION

Based on the results of the data analysis above, several conclusions were obtained, which were the answers to the questions in the formulation of the problem, including:

1. The increase in student learning outcomes taught through problem-based learning (Experiment) is higher than the increase in learning outcomes introduced without problem-based learning (Control)
2. To improve student learning outcomes, educators can use problem-based learning models as an alternative.
3. In every learning process, educators must create a learning atmosphere that provides opportunities for students to express mathematical ideas in their language and way. In learning mathematics, students become courageous in arguing, more confident, and creative.

REFERENCES

Ananggih, Gutomo Wibi, Ipung Yuwono, and I. Made Sulandra. 2019. "Pembelajaran Berbasis Masalah Untuk Meningkatkan Pemahaman Matematika." *Jurnal Pendidikan* 1(1):18–23.

Batubara, Ismail Hanif. 2017a. "219-568-1-SM (1)." *MES: Journal of Mathematics Education and Science* 3(1):47–54. doi: https://doi.org/10.30743/mes.v3i1.219.

Batubara, Ismail Hanif. 2017b. "Peningkatan Kemampuan Berpikir Kritis Matematis Melalui Model Pembelajaran Berbasis Masalah Berbantuan Autograph Dan Geogebra Di SMA Free Methodist Medan." *Kumpulan Jurnal Dosen UMSU: Wahana Inovasi* 6(1):97–104.

Batubara, Ismail Hanif. 2018. "Peningkatan Kemampuan Pemahaman Konsep Melalui Metode Penemuan Terbimbing Berbantuan Software Autograph Pada Mata Kuliah Kalkulus Peubah Banyak Di Fkip Umsu." *MES: Journal of Mathematics Education and Science* 4(1):51–58. doi: 10.30743/mes.v4i1.869.

Batubara, Ismail Hanif. 2019a. "Improving Student's Critical Thinking Ability Through Guided Discovery Learning Methods Assisted by Geogebra." *International Journal for Educational and Vocational Studies* 1(2):116–19. doi: 10.29103/ijevs.v1i2.1371.

Batubara, Ismail Hanif. 2019b. "Peningkatan Kemampuan Berpikir Kritis Mahasiswa Melalui Metode Penemuan Terbimbing Berbantuan Software Geogebra Pada Mata Kuliah Kalkulus Peubah Banyak Di Fkip Umsu." *MES: Journal of Mathematics Education and Science* 4(2):152–59. doi: 10.30743/mes.v4i2.1291.

Batubara, Ismail Hanif, and Putri Maisarah Ammy. 2018. "Pengaruh Model Pembelajaran Berbasis Masalah Terhadap Hasil Belajar Mahasiswa." *Biblio Couns : Jurnal Kajian Konseling Dan Pendidikan* 1(2):43–53. doi: 10.30596/bibliocouns.v1i2.2077.

Batubara, Ismail Hanif, Ismail Saleh Nasution, and Nur Afifah. 2020. "Peningkatan Kualitas Pengajaran Melalui Software Cabri 3D Pendahuluan." *PROKMAS: Jurnal Hasil Pengabidian Kepada Masyarakat* 4(2):1–6.

Hamalik, Oemar. 2010. "Kurikulum Dan Pembelajaran." in *Kurikulum dan Pembelajaran*. Jakarta: Bumi Aksara.

Santika, I. W. D., N. N. Parwati, and ... 2020. "Pengaruh Model Pembelajaran Berbasis Masalah Dalam Setting Pembelajaran Daring Terhadap Prestasi Belajar Matematika Dan Kemampuan Pemecahan Masalah …." *... Pembelajaran ...* X:105–17.

Soekisno, R. Bambang Aryan. 2015. "Pembelajaran Berbasis Masalah Untuk Meningkatkan Kemampuan Argumentasi Matematis Mahasiswa." *Infinity Journal* 4(2):120. doi: 10.22460/infinity.v4i2.77.

Surya, Edy, Edi Syahpurta, and Nova Juniati. 2018. "Effect of Problem Based Learning toward Mathematical Communication Ability and Self-Regulated Learning." *Journal of Education and Practice* 9(6):14–23.

Trisnawati, Trisnawati, Rani Pratiwi, and Winia Waziana. 2018. "The Effect of Realistic Mathematics Education on Student's Mathematical Communication Ability." *Malikussaleh Journal of Mathematics Learning (MJML)* 1(1):31. doi: 10.29103/mjml.v1i1.741.

Wahyuni, S. R. I. 2017. "Perbedaan Hasil Belajar Matematika Siswa Menggunakan Strategi Student Led Review Session Dengan Metode Konvensional." *Kumpulan Jurnal Dosen UMSU: Wahana Inovasi* 6(1).

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