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PROBLEM BASED LEARNING WITH GEOGEBRA SOFTWARE ON SELF CONFIDENCE OF JUNIOR HIGH SCHOOL STUDENTS

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Abstract

This research is motivated by the low level of confidence of junior high school students, so it is necessary to design learning that overcomes these problems. One of the alternative solutions is using problem-based learning approach with the help of GeoGebra software. In the process, this research uses an experimental design, where there is an experimental class that uses a problem-based learning approach and a control class using the usual approach. The population in this study were junior high school students in Cimahi city while the sample was in one of the junior high schools in Cimahi city. Data collection techniques using non-test instruments in the form of self-confidence questionnaire as many as 25 questions. Data processing techniques using two mean difference test. The results showed a significant 0.490 > 0.05. which means that there is no difference in mathematical self-confidence of junior high school students using a problem-based learning approach assisted by geogebra with those who learn using ordinary learning. This happens because of several factors such as time and learning environment that is less conducive, the use of methods, students such as lack of enthusiasm and concentration.

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INTRODUCTION

The Education is an important element that supports the development of a country and region by producing quality human resources. To be the driving force of development, everyone needs to improve their knowledge, abilities and life skills. The education process provides human resources for development. According to Buchori (Trianto, 2007), good education not only teaches learners to solve everyday problems, but also produces individuals who excel in knowledge, have strong principles and attitudes, the drive to solve problems, and creative attitudes.

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Mathematics is a basic science that helps today's technological advances and plays an important role in various disciplines, life activities at various levels of education (Nuriah et.al, 2023; Khoerunnisa et.al, 2023). In addition, mathematics has the ability to develop human thinking. All students should be taught mathematics so that they can learn to think logically, analytically, systematically, critically, creatively, and work well together. To survive in a dynamic and competitive environment, students must have the ability to collect, process, and utilize various information (Maxrizal, 2010).

The success of a student requires various supporting factors, one of which is the teacher. A good teacher will certainly produce good students too. Therefore, teachers who are creative, innovative and competent in managing and processing their learning outcomes are needed to produce high quality students. One of the subjects that gets a big spotlight in the world of education is mathematics. Mathematics is one of the most important disciplines, both in school as a field of study and in society as a support for other scientific fields. Teachers must choose and implement approaches that encourage students to actively participate in learning mathematics at school. Thus, students have the ability to observe, guess, experiment, try, answer questions, and talk about the things discussed (Suherman, 2003). Students should dominate math learning rather than teachers.

Media in the process of implementing a learning model, will certainly be more innovative- Computer media is one of the many types of media that can be used- "By using interactive computer learning, it can facilitate understanding of mathematics material for most students," said Krismiati (2011)- This is due to the fact that computer media can make the subject matter more interesting, interactive, There are many advantages of using computer media in learning- First, the material can be visualized with animations, simulations, or moving images, which can increase students' attractiveness and interest in learning- Second, students can interact directly with the media through interactive games, quizzes, or practice questions- Third, computer learning allows students to learn independently according to their own style.

Geogebra is a dynamic computer program that can combine and transform geometry, algebra, points, vectors, line segments, lines, calculus, cone wedges, and even functions. Markus Hohenwarter from Florida Atlantic University was the first to use this program to teach mathematics in schools (Purwanti, e.al, 2016). In addition, Geogebra can be used to draw and determine equations and coordinates directly. It can also connect variables with numbers, vectors, and points, find derivatives, integrate functions, and give commands to find roots or extreme points.

Not only cognitive abilities that need to be developed in learning mathematics, but it is important to develop affective abilities. One of the affective abilities that need to be developed is student self-confidence. Self-confidence, according to Lauster (Hendriana, 2017), is an attitude or feeling that is confident in one's own abilities so that a person is not too anxious in acting, free to do what they like, responsible for their actions, and recognizes their strengths and weaknesses. This belief in one's abilities will affect one's performance and achievements. In addition, self-confidence is also a person's belief in their abilities in all aspects. This includes a positive view of oneself, belief in their abilities, independence in making decisions, courage to express opinions, optimism, calmness, and unyielding (Herawati, 2017).

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Lauser (Hendriana, 2017) Self-confidence is a complex attitude that consists of several important elements. First, there is a belief in self-ability, which means that a person has a strong belief in himself and really knows what he can do. Second, an optimistic attitude, which is a positive view of what a person can do and their abilities. Third, an objective attitude, which means seeing the problem in the right way, not just according to one's own views. Fourth, being responsible is a person's willingness to take responsibility for everything they do. Fifth, using thinking that is acceptable to reason and in accordance with reality to analyze a problem, object, or event. These five characteristics are very important for someone who has high self-confidence in himself to face various situations and difficulties that will come in his life.

Based on the explanation above, researchers are interested in using Geogebra with a problem-based learning approach on triangle and quadrilateral material which is expected to improve students' self-confidence abilities. Therefore, researchers are interested in conducting research with the title: "Application of Geogebra-assisted Problem Based Learning Approach to increase Self Confidence of junior high school students"

METHOD

The research method used by researchers is the experimental method, where random sampling of classes and two classes are selected for the experimental class and control class. This research was conducted using two treatments for two classes. In the experimental class, a lesson using a problem-based learning approach was carried out, the purpose of this study was to find out whether learning with the Problem Based Learning approach could improve students' problem solving skills. while in the control class a lesson was carried out which was usually used by the school. The research design according to Ruseffendi, (2010):

A X O

A O

Description:
A: Random sampling
O: Posttest
X: Learning by using Problem Based Learning approach.

This study involved all public junior high school students in Cimahi City, and the sample came from 2 seventh grade students from one of the public junior high schools in Cimahi City. The attitude scale used consisted of twenty-five questions with a modified Likert scale and answer options such as strongly agree (SS), agree (S), disagree (TS), and strongly disagree (STS). The data processing technique uses the t-test difference test by first ensuring that the data is normally distributed and the variance is homogeneous.

RESULTS AND DISCUSSION

Analysis of questionnaire data was carried out to determine the achievement of self confidence in learning mathematics students before and after being given different treatments in the two classes. In data processing, the normality test, homogeneity test,

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and two mean difference test will be analysed. Normality test is conducted to determine whether the data comes from a normally distributed population or not. In this normality test using Shapiro-Wilk test statistics with a significant $\propto = 0.05$.

The following criteria: Sig value> 0.05 indicates that the tested data sample has a normal distribution, while Sig value <0.05 indicates that the data sample does not have a normal distribution. In other words, a Sig value> 0.05 indicates that the data sample does not have a normal distribution. The following are the results of normality test data processing on the gain scores of experimental and control classes presented in Table 1:

Table 1. Normality Test of Self Confidence

Category by Class		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	Df	Sig.	Statistic	Df	Sig.
Pretest	Experiment	0,129	32	0,193	0,954	32	0,187
	Control	0,126	32	0,200*	0,953	32	0,179

(*Source :Output* IBM SPSS *Statistics* 21)

Based on Table 4.8, it can be seen that the experimental class is significant at 0.187 and the control class is 0,179. The significant value in the experimental class and control class significant value meets the test criteria, namely Sig> 0,05, so in this case, it means that the sample is normally distributed.

Furthermore, the variance homogeneity test aims to determine whether the two samples have the same variance. The homogeneity test of the two samples was carried out using the help of IBM SPSS Statistic 21.
H_0 : Both groups have the same variance (homogeneous)
H_1 : The two groups have different variances (not homogeneous)
The test criteria are,
if Sig> 0,05 then H_0 is accepted and,
if Sig <0,05 then H_0 is rejected.

Table 2. Self Confidence Homogeneity Test

		Levene Statistic	df1	df2	Sig.
Postest	Based on Mean	0,095	1	62	0,760
	Based on Median	0,131	1	62	0,718
	Based on Median and with adjusted df	0,131	1	58,773	0,718
	Based on trimmed mean	0,129	1	62	0,721

(*Source: Output* IBM SPSS *Statistics* 21)

The Sig value is 0,760, according to the testing criteria listed in Table 4.9, which indicates that Sig is more than 0,05, or that the data variances in the two class groups are homogeneous. Therefore, the t-test was used for further testing.

There are two types of two mean difference tests, namely parametric tests if the data of both samples are normally distributed and non-parametric tests if at least one sample is

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not normally distributed. Then next for the self-confidence data, the t test was used. The t test was carried out using the help of IBM SPSS Statistic 21.
$H_0 : \mu_1 = \mu_2$: There is no difference in self-confidence between those whose learning uses a problem-based learning approach and those who use ordinary learning.
$H_A : \mu_1 \neq \mu_2$: There is a difference in self-confidence between those whose learning uses a problem-based learning approach and those who use ordinary learning.

The test criteria, if Sig > 0,05 then H_0 is accepted and if Sig ≤ 0.05 then H_0 is rejected. The following are the results of data processing of the two mean difference significance tests on the post-test scores of the experimental and control classes presented in Table 3:

Table 3. Self Confidence Data t test

		t-test for Equality of Means					
		t	df	Sig. (2-tailed)	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Postest	Equal variances assumed	0,024	62	0,981	1,307	-2,582	2,645
	Equal variances not assumed	0,024	61,900	0,981	1,307	-2,582	2,645

(*Source :Output* IBM SPSS *Statistics* 21)

Based on Table 4.10, to obtain a significant value, it can be seen on the display in the IBM SPSS Statistic 21 software by looking at Sig, which is 0,981. According to Uyanto (Karela, 2016) that the significant display of SPSS is for a two-party test (2-tailed), because we will conduct a one-sided hypothesis test (onetailed), the Significant value (2-tailed) must be divided by two. So that the Significant becomes $\frac{0,981}{2} = 0,490$. This value meets the sig> 0,05 criteria, then H_0 is accepted, which means that there is no difference in mathematical self-confidence of junior high school students using a problem-based learning approach assisted by geogebra with those learning using ordinary learning at a significant level α = 0,05.

This study aims to determine the extent of self confidence of students whose learning uses Problem Based Learning. The attitude/self-confidence embedded in students is very influential in the learning process, this will greatly encourage students to express their curiosity when learning. Although initially in the field, students seemed shy and reluctant to express the understanding and knowledge they knew. Over time due to frequent direction, motivation and self-confidence by researchers, students slowly began to be encouraged and dared to ask questions, express opinions, come forward to fill in questions and explain the results they got to their friends in front of the class.

When the learning process takes place in both experimental and control classes, the level of student confidence in mathematics is very dynamic depending on student understanding during the learning process. When students understand the ongoing material the level of student self confidence is very good and in the next lesson if students do not understand the material their motivation and self confidence drastically decreases. This proves that confidence in mathematics is very influential on students' self-confidence

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abilities. This is in line with Margono's opinion (Martyanti, 2013) which reveals that students' self-confidence in learning mathematics has several aspects, one of which is students' confidence in mathematics itself.

Problem-based learning with the help of Geogebra was used in the experimental class. Students were not familiar with the problem-based learning approach at the first meeting because this approach was new (Lusiana, 2023). Problem-based learning allows students to increase their own confidence, seen from the learning steps. The initial activities, core activities, and final activities are the main components of the Geogebra-assisted problem-based learning approach.

The core activities involve students studying the given problem without teacher assistance either individually or in groups. This flexibility allows students to increase their own confidence (Hendriana, 2014). When students work individually, they also learn to take responsibility for what they do. This shows that "this responsibility is one of the very important aspects in building student confidence", according to Lauster (Ghufron & Risnawati, 2012). Students are required to convey their ideas and opinions to classmates and friends in groups. The activity of presenting or expressing ideas in the fourth stage of the problem-based learning approach can increase students' self-confidence. However, due to limited time, not all students can come forward to present the work. The dominant students to present the results are high ability students in the group and for other students tend to represent themselves to high ability students. As a result, not all students are active in their learning so that the increase in students' self-confidence is not optimal.

Researchers used a questionnaire in the study to determine the level of self-confidence. Based on the results of statistical processing, it is found that H_0 is accepted, which indicates that the mathematical self-confidence of junior high school students who use a problem-based learning approach is not better or the same as students who use a conventional learning approach. The results of the analysis of the overall self-confidence questionnaire show that there is no difference. This is in line with Yulia's research (2016), which found that students with problem-based learning had lower self-confidence than students with conventional learning.

This happened when the learning process took place, the experimental class was more active and more confident in asking questions and expressing opinions than the control class which seemed passive. But it was only some students, and when advancing only students who acted as group leaders or who were more courageous to express and answer questions, the rest just listened and listened. Even though motivation and the appropriate learning process have been given, the conditions and atmosphere of student learning in the field do not support the experimental class when viewed from class hours.

There are many factors that affect students' conditions when learning math. Whether it is internal factors during learning or other factors outside of learning as revealed by Rumini et.al, (Martyanti, 2013) External factors are factors that come from outside the student, such as: facilities and infrastructure, environment, teachers, curriculum, and teaching methods. Some of the things described above will greatly affect the atmosphere of student learning which has implications for student self-confidence. This happens to experimental class students in the learning process carried out at noon, namely at 11.20-11.50 then

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break 11.50-12.10 then enter at 12.50-13.40. The conditions in the experimental class are less supportive for the teaching and learning process of mathematics which requires more concentration and during this afternoon hour students tend to be limp and less enthusiastic in learning because the students' energy has been drained in the previous lesson. In addition, when carrying out the problem-based learning process at several stages, it is cut off by recess. Then the learning atmosphere before the break is less conducive and when starting learning many students are late entering because the time given for rest, prayer and eating is not enough. In the end, the learning process was less than optimal with the existing conditions which resulted in less than optimal learning enthusiasm and student self-confidence. In contrast to the control class that received learning in the morning, the learning atmosphere was more conducive and the enthusiasm for learning was more optimal.

In addition, this happened most likely because the learning meetings in this study were only conducted in 8 meetings so that the time was not enough. This is in line with TIMSS research (Yulia, 2016) The learning process as outlined in Permendiknas No.41 of 2007 is not easy to implement. This is evidenced by the TIMSS results, which show that Indonesian students' self-confidence is still low, which is below 30%.

CONCLUSION

Based on the results and discussion above, the researcher concludes that there is no difference in self-confidence of junior high school students whose learning uses a problem-based learning approach assisted by geogera with students who use ordinary learning. This happens because of the time and learning environment that is less conducive, learning approaches that are less appropriate, limited meeting time, less optimal learning methods, internal student factors such as lack of enthusiasm and concentration, and low student confidence in general. Suggestions for future research researchers need to consider time, research subjects and student readiness.

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