The Impact of Junior High School Students' Learning Interest and Problem-Solving Ability with the Problem-Based Learning Model Using Geogebra Software on SPLDV Material

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Abstract: One of the reasons students struggle to solve mathematical issues is that they are not interested in learning the subject because they believe there are too many formulae to master. Due to this, it is important to have media available when learning mathematics to encourage student's interest in the subject. This study aims to determine the effect of learning using Geogebra software on problem-solving abilities and interest in learning SPLDV material in class VIII MTs Darul 'Ulum Yogyakarta. The data collection technique used in this research is a questionnaire instrument and problem-solving ability test questions. Data analysis techniques in this study used normality tests, homogeneity tests, and hypothesis testing. The sample used in this study was class VIII MTs Darul 'Ulum Yogyakarta with a total of 20 students. The results of this study showed that learning using Geogebra software affected students' problem-solving abilities and interest in learning mathematics for class VIII students at MTs Darul 'Ulum Yogyakarta.

Keywords: Geogebra; Interest in learning; Problem-based learning; Problem-Solving skill; SPLDV

Introduction

The 21st century is undoubtedly different from the 20th century in that technology is more advanced and developing quickly, affecting all facets of existence, beginning with the worlds of education, the economy, and society (Ngafifi, 2014; Zubaidah, 2016). These people require 21st-century talents to live and solve current issues. One of the 21st century skills is learning and the capacity for innovation, which encompasses critical thinking, problem-solving, creativity, and the ability to come up with new solutions to problems. As a result, the capacity for innovation and creativity has become a fundamental skill that everyone in the 21st century must possess (Wijaya et al., 2016).

As a tool and in the evolution of mathematics, mathematics is a branch of science that plays a significant part in the advancement of science and technology (Prabowo et al., 2022). Permendiknas Number 58 of 2014, states that mathematics is a

universal subject that benefits human existence, forms the basis of contemporary technological advancement, plays a significant role in many fields, and develops human thought. The capacity to solve mathematical puzzles is one of the mathematical skills that pupils need to possess. One of the mathematical learning goals that students must attain according to the Regulation of the Minister of National Education No. 22 of 2006 is the ability to solve problems (Utami et al., 2017).

The ability to solve difficulties refers to an individual's attempts to accomplish objectives in the absence of automatic solutions that can immediately fix problems. According to Burton (1980). Problem-solving is an individual or small group activity that is most effective when done jointly with open possibilities for debate, according to the statement that every problem has a goal, or what the problem solver is trying to attain to achieve the goal.

One of the reasons students struggle to solve mathematical issues is that they are not interested in

learning the subject because they believe there are too many formulae to master (Kurnia et al., 2020). Interest in learning can be understood as a person's desire to devote all of his thoughts and attention to learning and obtaining a comprehension of the knowledge he demands without the use of force from other sources (Awaliyah et al., 2018) One of the key aspects influencing the knowledge of mathematical concepts when solving mathematical problems is interest in mathematics (Holidun et al., 2018).

Fadillah (2016) asserts that interest in learning is a choice and that activities will enhance the efficient operation of learning activities. But at the moment, pupils still view mathematics as a challenging subject, which makes them less interested in learning it (Firdaus et al., 2020; Fitriyana et al., 2022; Khodijah et al., 2020). An individual participating regularly in the learning process with positive emotions and free of outside pressure is said to have an interest in learning. According to Ricardo et al. (2017) there are several indications of learning interest, including feelings of pleasure, curiosity, attention, and student involvement.

A teacher must be able to give engaging lessons that will pique students' interest in the material being taught if they are to encourage their enthusiasm for learning. Due to this, it is important to have media available when learning mathematics to encourage student interest in the subject.

Of course, we will learn about the Two-Variable Linear Equation System while at school (SPLDV). SPLDV can be used to solve a variety of ordinary mathematics issues, such as figuring out an object's age or price, among other things.

In this study, researchers used assistive media, namely the Geogebra software, which was used to solve examples of cases related to everyday life. Geogebra was first developed in 2001 by Markus Hohemwarter until now the Geogebra software is still being used by teachers and researchers.

One of the learning media that can represent a mathematical model or represent a linear equation of two variables in graphical form is by using the media software Geogebra. According to Wulandari (2015) geogebra is mathematical software that is easy to use, in geometry, algebra, and calculus material. This leads to the conclusion that teaching with Geogebra can influence and enhance students' capacity for problem-solving as well as their motivation in learning.

This study aims to determine the effect of learning using Geogebra software on problem-solving abilities and interest in learning SPLDV material in class VIII MTs Darul 'Ulum Yogyakarta.

Method

An associative research design was used in this study. According to Sugiyono (2018), associative research-often referred to as correlational research-is research done to examine the relationship between variables or the influence of one variable on other variables. The population of this study consisted of 20 students from class VIII of MTs Darul Ulum Yogyakarta. The sampling strategy used in this study was random sampling or random sampling with equal opportunity for all population members.

In this study, exams and questionnaires were used to collect data. Students' aptitudes for solving mathematical problems are tested, and their enthusiasm for learning is gauged through surveys.

Result and Discussion

Result

After receiving SPLDV material utilizing Geogebra software, class VIII students at MTs Darul Ulum Yogyakarta were tested on their ability to solve math problems. The outcomes of this study include the cumulative interest in the learning attitude scale and those results. With the material from the two variable linear equation system, the researcher implemented the problem-based learning (PBL) learning approach (SPLDV). For four meetings, class VIII's instruction and learning take place offline (3 hours of lessons). Here are the findings from data analysis and discussion based on class VIII pupils at MTs Darul Ulum Yogyakarta's post-test results.

Students' Ability Indicators in Understanding the Problem

By locating the relevant details, students are expected to correctly understand the problem in the offered questions. According to observational findings, 11 out of 20 students were aware that they had grasped the questions' explanations entirely and accurately. The average percentage of students' ability to solve mathematical problems in the indicator of understanding the problem was 71.25%, according to the post-test findings.

Students' Ability in Indicators to Make Plans

Students are asked to create a plan for how to solve a problem as part of this indicator. According to the findings of the observation, 12 out of 20 pupils were able to create a plan for tackling a problem. A small portion still doesn't seem to have a notion on which to base plans. The average proportion of students' ability to solve mathematical problems in the indicator of creating a problem-solving plan was found to be 78.40% from the post-test findings.

The Ability of Students in Indicators to Perform Calculations

This indication is put to the test by having students calculate problem-solving from an accurately created problem-solving strategy. Observational findings reveal that while 10 out of 20 pupils properly answer the questions and employ mathematical principles, a small proportion of students continue to provide incorrect responses. The average proportion of students' ability to solve mathematical problems in the indications of doing calculations was 56.75%, according to the post-test results.

Students' Ability in Indicators Re-Examines the Results

The final indicator in this study is the indicator of re-examination, in which students are asked to verify the accuracy of the calculations made in response to the problems given. According to the observational findings, 13 out of 20 pupils successfully answered the problems, but they did not apply mathematical principles correctly. The average percentage of problem-solving skills on the re-examining indicator was 81.34%, according to the post-test data.

As can be seen from the summary above, using the PBL learning model while using the Geogebra software during the learning process can positively affect students' ability to solve mathematical problems, especially on the second and fourth indicators, namely the ability to make plans and the ability to re-check results. While the first and third indicators, namely the ability to understand problems and the ability to perform calculations also have an effect, but not as big as the second and fourth indicators.

Normality Test

Before testing the average difference in students' mathematical problem-solving abilities and students' interest in learning mathematics, it is necessary to have a normality test first. Data from the calculation results of the normality test of students' mathematical problem-solving abilities and students' interest in learning mathematics are presented in Table 1.

Table 1. The Result of the Normality Test

	Students Learning Interest	Students Problem-Solving Skills
Chi-Square	13.42	7.83
Df	8	8
Asymp.Sig.	0.092	0.578

The results of the normality test with Chi-Square analysis at a significance level of 0.05 show that the score data from the application of the PBL model assisted by Geogebra software on students' problem-solving abilities are normally distributed. It can be seen from 0.578>0.05.

Furthermore, the results of the normality test with Chi-Square analysis at a significance level of 0.05 show that the score data from the application of the PBL model assisted by Geogebra software on students' interest in learning is normally distributed, it can be seen from 0.092> 0.05.

Homogeneity Test

The homogeneity test of the two dependent variables using the SPSS program is the following prerequisite test. The test's results are as follows:

Table 2. The Result of the Homogeneity Test

		Levene's test for Equality of Variances	
		F	Sig.
Value	Equal Variances Assumed	3.92	0.093

The application of the PBL model, assisted by the Geogebra software, on students' mathematical problem-solving skills and students' interest in learning mathematics resulted in score data that was homogeneous at the 0.05 level of significance, according to the results of the homogeneity test. It is evident from the fact that 0.093 > 0.05.

Hypothesis Testing

After obtaining and knowing that the two variables of problem-solving ability and student learning interest are normally distributed and also homogeneous, then proceed to test the hypothesis to test the difference between the two average variables. After the hypothesis test is carried out with a significance level of 5%, a significant difference is obtained between the average application of the PBL model assisted by Geogebra software on problem-solving abilities on student learning interest, it can be concluded that H_0 is rejected, which means that the average application of learning using the PBL model assisted by Geogebra software on students' problem-solving abilities is higher than students' interest in learning mathematics.

Discussion

The findings demonstrated that, in contrast to an increase in students' enthusiasm for learning mathematics, the problem-based learning model with Geogebra software was able to improve students' mathematical problem-solving skills. This is in line with research (Sitorus et al., 2022) which found that there e was an increase in students' ability to solve problems after taking action in the form of implementing a problem-based learning model assisted by Geogebra during the

learning process. This study proved that the average score on the first test was 1.50, the average score on the problem-solving ability test in the first cycle was 2.24, and the average score on the problem-solving ability test in cycle II was 2.85. In addition, research Hidayatsyah (2021) states that students' Mathematical Problem-Solving abilities in applying problem-based learning models assisted by Geogebra software are higher than indirect learning. This can be seen from the results of the statistical analysis of the regression equation of mathematical problem-solving ability also illustrates the value of the regression constant for the Geogebra software-assisted PBL model, which is 43.31 greater than the linear regression line equation constant for the control class, namely 37.96, so geometrically the regression line for the experimental class is above the control class regression line. This indicates that there is a significant difference in increase, due to the difference in height of the two regression lines which are affected by the regression constant.

The researcher encourages students to actively participate in the chosen problem-solving activity in the first stage of the PBL model by outlining the learning objectives and the model of instruction that will be used in class. Students were then shown a problem and a solution using Geogebra assistive media on an LCD screen. The researcher then asked students to review their understanding of the problem and to consider any prior knowledge they may have about it.

The next step is to set up the students for study; during this phase, they are divided into groups and given the chance to have talks. Researchers are attempting to inspire the students so that they are all actively participating in the discussions. At this point, the researcher distributed worksheets to the students that had questions about the two-variable linear equation system content.

The four indications of problem-solving ability the capacity to comprehend problems, formulate plans to address difficulties, carry out computations, and verify the accuracy of the results is increased by using the PBL model of instruction. The four indicators used to identify the instrument questions for the mathematical problem-solving ability test were derived based on operational definitions that have been made.

Conclusion

The following can be said about the research's findings in light of the findings of the analysis and discussion. The PBL approach with Geogebra software has an impact on the problem-solving skills of MTs Darul Ulum Yogyakarta's class VIII pupils. The PBL approach using Geogebra software has an impact on the class VIII MTs Darul Ulum Yogyakarta's motivation in

learning. The average value of students' problem-solving skills using the PBL model is 71.93%, and the fourth indicator, re-examining the outcomes, is the best gauge of students' mathematical problem-solving skills. Students' enthusiasm for studying mathematics is strong when the PBL approach is used, as evidenced by high ratings for like, interest, attention, and involvement. Researchers can research other factors that can improve students' abilities to represent mathematical ideas, and this research is rated as weak because it only uses pre-experiment. Teachers can use Geogebra software in learning in other learning models besides PBL and two-variable linear equation system material (SPLDV), and researchers can research other factors that can improve students' mathematical representation abilities.

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