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Application of Geogebra-Assisted Problem-Based Learning Model to Strengthen the Learning Interest of Eighth Grade Junior High School Students

Willy Ruben Sihombing[1*], Kurnia Putri Sepdikasari Dirgantoro[2], Ebenezer Bonyah[3]

[1]Sekolah Dian Harapan Ranotana Manado, Indonesia
[2]Universitas Pelita Harapan, Indonesia
[3] Akenten Appiah Menka University of Skills Training and Entrepreneurial Development, Ghana

*Corresponding author: awillyrubensihombing04@gmail.com

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Abstract

Learning interest is a psychological drive that allows students to learn something consciously, calmly, and with discipline. A lack of learning interest was observed in one school in West Jakarta. This is a significant issue as learning interest directly impacts the quality of education. Therefore, the purpose of this study is to investigate the application of a GeoGebra-assisted problem-based learning (PBL) model to enhance the learning interest of eighth-grade junior high school students. Additionally, the paper will discuss the application of this GeoGebra-assisted PBL model from a Christian perspective. This research utilizes a descriptive qualitative method, with data collected through observation sheets, lesson plans, and teacher reflection sheets. The analysis of the research data demonstrates the positive effect of the GeoGebra-assisted PBL model on learning interest. This is evidenced by observed changes in student behavior that align with the indicators of learning interest. Thus, it can be concluded that the application of the GeoGebra-assisted PBL model can foster and strengthen students' learning interest. The PBL model offers a platform for student exploration, with GeoGebra acting as a supportive tool. The diverse features of GeoGebra facilitate the learning process, thereby fostering a sense of enjoyment and interest. However, due to certain limitations in its application, educators must guide students in its use.

Keywords: GeoGebra; Problem-based learning; Students' interest in learning

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1. Introduction

The success of the learning process in the classroom is the responsibility of the teacher as a facilitator. In addition to providing knowledge, teachers can also involve students so they are active by using active learning methods. According to Santosa (Surtikanti, 2008), quality learning is learning that involves students in actively listening, doing assignments, responding to the teacher's questions, and giving opinions to peers or the teacher. In addition, students' learning interest is also an important component in improving the quality of learning (Zainar, Fitria, & Eddy, 2021). Therefore, teachers must think of strategies to increase learning interest in order to achieve quality learning.

Mathematics is a discipline that plays a crucial role in developing students' cognitive and thinking skills. One of its topics, relations and functions, is a fundamental mathematical concept that can be applied in other areas of mathematics as well as in daily life, such as in computer science, economics, social sciences, and other fields. However, not every student necessarily has an interest in a particular subject, including mathematics. Learning interest is a drive that emerges from an internal desire to actively and deliberately pay attention to and participate in the learning process (Setiani & Priansa, 2015). Because learning interest can influence the success of learning objectives, it is necessary to take action to face this challenge (Putra, Syahri, Indrawan, & Abadi, 2023).

A class is expected to have a high level of interest in learning. Indications of problems with interest in learning can be seen by comparing them with indicators. The indicators of interest in learning are 1) level of attention; 2) curiosity; 3) interest; 4) optimism; and 5) students' enthusiasm for participating in the teaching and learning process (Soffer & Cohen, 2019). Meanwhile, Ricardo and Rini (2017) mention that indicators of learning interest include 1) feeling interested; 2) feeling happy; 3) participation; 4) concentration in learning; and 5) a continuously increasing willingness to learn. In this study, the indicators of interest that will be examined are 1) feelings of pleasure in learning; 2) student interest in learning; 3) student attention during learning; 4) student willingness (initiative) to explore knowledge; and 5) active student involvement in learning. If a class does not meet these indicators, it can be said that the students in that class have problems with learning interest.

The problem of low learning interest was identified during an observation at a school in West Jakarta. The observation results showed that many students still had little interest in learning. This lack of interest was found in almost all eighth-grade classes, although the level of interest varied. This was attributed to the fact that each class had a different learning atmosphere. For example, in one class, approximately 25% of students were highly engaged in learning, actively giving opinions and asking questions. In contrast, other students did not pay attention and had to be repeatedly prompted to participate. There were also students who chatted with their friends about topics unrelated to the lesson. Therefore, overall, many students still had issues with learning interest.

Every human being is unique because they receive their identity from the creator. This is the task of a teacher: to guide students in using their uniqueness. Students are active learners who carry out the task of managing the earth. However, with their own uniqueness, students also have different learning interests. Therefore, a teacher needs to provide education that includes activities

such as reasoning, questioning, investigating and discovering, as well as serving, loving, producing and creating (Puspitawati, 2016). Thus, active students will be able to enjoy the diversity that exists.

The importance of learning interest lies in its ability to create a positive teaching and learning atmosphere, characterized by serious study, focused attention on the material, and so on (Alam, 2018). This will lead to better student learning outcomes (Prihatini, 2017). Support for learning interest is necessary because students may not naturally be interested in the subjects they are studying. For instance, a student who struggles with mathematics will strive to catch up on unmastered lessons if they have a high level of learning interest. The implication of this is the importance of finding better ways to strengthen students' learning interest.

Technology is one of the solutions to problems in various fields, including education. The purpose of developing technology is to make human work easier, more effective, and more efficient while considering user comfort (KBBI and Kremer, 2022). One such technology is the GeoGebra application. GeoGebra is a mathematics software that can be used for problems in geometry, algebra, statistics, and even calculus.

The problem-based learning model is an instructional (and curricular) approach centered on learners that empowers them to conduct research, combine theory and practice, and apply knowledge and skills to develop viable solutions to specified problems (Walker, Leary, Hmelo-Silver, & Ertmer, 2015). Research conducted by Eko (Saputro, 2021) shows that the PBL model can gradually increase students' interest in learning. The problem-based learning model focuses on students' direct experience in investigating a problem. Therefore, a medium is needed to help students do this. This can be done by using GeoGebra as a medium for independent exploration of a problem. The application of GeoGebra can foster and even develop students' interest in learning, especially in mathematics. Research conducted by Mona (Lisa, 2023) shows that GeoGebra technology can increase students' interest in learning. Based on the previous explanation, learning that uses the problem-based learning model can be integrated with the GeoGebra application.

Based on the background described above, the research question is "How does the application of the GeoGebra-assisted problem-based learning model strengthen the learning interest of eighth-grade junior high school students?" Therefore, the purpose of this study is to determine the application of the GeoGebra-assisted problem-based learning model to strengthen the learning interest of eighth-grade junior high school students.

2. Methods

The research method used is a descriptive qualitative method. This method is designed to systematically and accurately collect data on the status of a phenomenon, facts, or events, specifically concerning the characteristics of a particular population or area (Hardani et al., 2020). This method can describe existing conditions in the field in a specific, transparent, and in-depth manner. The subjects of this study were eighth-grade junior high school students from a school in West Jakarta. The research sample was taken from one class, class VIII.1, using a random sampling technique. The total sample size for this study was 28 students. The research was conducted over 10 learning sessions, comprising four observation sessions and six sessions for the application of the solution. The research period spanned five weeks, from July 31, 2023, to September 1, 2023.

The data used in this study were derived from observation sheets and teaching reflection sheets. An observation sheet is a data collection tool containing indicators for conducting observations (Sukendra & Atmaja, 2020). Through observation, data can be obtained by directly studying and understanding behavior (Hikmawati, 2017). Observation was carried out in three stages: 1) descriptive observation, where the researcher enters the social situation, namely the classroom; 2) focused observation, where the observation is narrowed to focus on specific aspects;

and 3) selected observation, where the researcher has elaborated on the focus found, resulting in more detailed data. Based on the previous explanation, it can be said that the observation sheet will be used to observe a person's behavior based on the provided indicators. Based on the application of the solution variable, data on changes in student behavior, according to the indicators of learning interest, can be identified through teaching reflections. Reflection is a critical review of the changes that occur in students, the classroom atmosphere, or the teacher (Hikmawati, 2017). However, this study focuses on reflections that review changes in students based on the indicators of learning interest.

3. Results and Discussion

3.1 Results

The research data show that there is a problem with students' learning interest among eighth-grade junior high school students. The results of the research observation sheets are presented as follows:

Table 1 - Results of the GeoGebra-assisted PBL model application

No.	Description of the problem	Unmet Indicators
1.	Some students remain silent from the beginning to the end of the lesson	Student's active engagement in the lesson
2.	Some students often chat outside the context of the lesson	Student's attention while learning / Student's interest in the lesson
3.	There is one student who sleeps in class	The student's interest in the lesson
4.	Several students do not want to take notes or read	Student's willingness (initiative) to explore knowledge
5.	Some of the students do not like learning mathematics. One student even said, "Why is mathematics so difficult? I don't like it."	Feeling of enjoyment in the lesson

Source: (Researcher, 2023)

The researcher attempted to apply the GeoGebra-assisted problem-based learning model in the classroom to foster and strengthen students' learning interest. As a solution to the problem, the steps of applying GeoGebra and the results of its implementation are presented as follows:

Table 2 - Results of the GeoGebra-assisted PBL model application

No.	Indicators of Learning Interest	Reflections on Teaching with GeoGebra Assistance
1.	Enjoyment of learning (indicator 1)	Most students enjoyed GeoGebra technology and said that they had just learned about and become familiar with GeoGebra
2.	Student interest in learning (indicator 2)	Most students were interested and immediately tried it out. Example: Asking about each feature in GeoGebra
3.	Student attention during learning (indicator 3)	Each student paid close attention to the instructions and carried out each instruction independently or with their friends. However, there were students who opened social media during the exploration

No.	Indicators of Learning Interest	Reflections on Teaching with GeoGebra Assistance
4.	Student willingness (initiative) to explore knowledge (indicator 4)	Most students were busy exploring, but there were still some students who needed to be encouraged to do so
5.	Active student involvement in learning (indicator 5).	Each student was able to actively engage in the exploration.

Source: (Researcher, 2023)

Based on the data in Table 2, it can be concluded that most students have an interest in learning when it is integrated with GeoGebra technology. This is evident from the fulfillment of the learning interest indicators. Although the application was carried out throughout the learning process with different learning topics, the emerging characteristic patterns remained almost the same. The data from Table 2 also show that not all students were able to fulfill all learning interest indicators.

3.2 Discussion

The learning process for relations and functions was conducted with the assistance of GeoGebra technology. Previously, students were only familiar with using books or paper to manually draw graphs or Cartesian coordinates. The application of GeoGebra then simplified the work for both teachers and students. Based on the observation results and the data in Table 2, it was evident that students were still unfamiliar with GeoGebra technology. Students felt pleased (Indicator 1) because the tool helped them draw function graphs, Cartesian coordinates, and so on. This is one of the characteristics of learning interest, which suggests that the use of GeoGebra can fulfill this particular indicator.

On the student attention indicator (indicator 2), each student paid attention to the instructions given by the teacher, including the use of each feature in the GeoGebra application. This shows that students were able to pay attention to the teacher's instructions in learning and exploring GeoGebra. Then, on the student interest indicator (3), it shows that most students showed interest by asking questions and trying out various features. Student interest is also triggered by the ease of use of the application and time savings. Thus, it can be concluded that the attention indicator (indicator 2) and the student interest indicator (indicator 3) are fulfilled.

The majority of students also showed willingness (Indicator 4) and engagement (Indicator 5) in their learning. This was evident from students who were willing to follow instructions independently or in groups. Students were also observed cooperating with their friends to complete the given tasks. As a result, the involvement of all students in the learning process was visible. It can be concluded that the willingness (Indicator 4) and engagement (Indicator 5) indicators were fulfilled.

Although the implementation was carried out based on predetermined and different steps, the results of this research data analysis can be said to be consistent with previous studies. However, there are still very real challenges in the classroom. First, there are still some students who do not meet the learning interest indicators. This can be proven by the fact that there are students who use devices (e.g., smartphones) to access social media during exploration. Second, the classroom becomes less conducive (noisy). These weaknesses and shortcomings can occur because the classroom is so complex and influenced by various factors, such as the weaknesses (negative impacts) of technology and resources.

From the previous explanation, it is clear that humans, as creations of God, are given various abilities. GeoGebra technology, as a form of scientific development, also originates from God Himself. However, the various weaknesses and shortcomings that arise from it show how fragile humanity is. Even the solutions offered by humans can create other problems. Therefore, upon re-analysis, the GeoGebra-assisted PBL model still has flaws that lead to its weaknesses and shortcomings. God has made it clear that He desires a form of learning that is based on His will. Thus, a teacher, as an agent of transformation, needs to understand every diverse student to restore them to their original image (Brummelen, 2009).

4. Conclusions

Based on the results of observations and problem-solving efforts, it can be concluded that the problem-based learning model assisted by GeoGebra technology has a positive effect on students' learning interest. The application of the problem-based learning model can follow these steps: 1) orient students to the problem, 2) organize students for learning, 3) guide problem investigation, 4) develop and present learning outcomes, and 5) evaluate the problem-solving process and results. GeoGebra provides convenience for both teachers and students and offers an opportunity for students to conduct explorations independently or in groups. Although there are still many weaknesses due to other influencing factors, the use of GeoGebra technology provides convenience and can foster and even strengthen students' learning interest. This conclusion is based on observations, lesson plans (RPP), and teaching reflection results.Acknowledgments
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Conflict of Interest

The authors declare no conflicts of interest.

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