GALLERY OF LEARNING WITH GEOGEBRA: DOES IT AFFECT STUDENTS' LEARNING MOTIVATION?

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Article Info	ABSTRACT
	This study aimed to determine the effect of Gallery of Learning with Geogebra as active learning strategies on students' learning motivation. This research was a quantitative study with the one grup pretest-posttest design. The population of this study was all eight-grade students of SMP Negeri 27 Kerinci. The sample consisted of 27 students which selected by saturated sampling techniques. Student motivation data were obtained from motivation questionnaires that given before and after the application of the Gallery of Learning with Geogebra as active learning strategy. Data processing of student motivation was done by comparing students' motivation scores before and after treatmen by, using the t-test. The t-test results indicated that there was influence on the implementation of the active learning strategy of Gallery of Learning with Geogebra on students' learning motivation.

GALLERY OF LEARNING DENGAN GEOGEBRA: APAKAH DAPAT MEMPENGARUHI MOTIVASI BELAJAR SISWA?

Kata Kunci:	ABSTRAK
	Penelitian ini bertujuan untuk mengetahui pengaruh strategi belajar aktif tipe *Gallery of Learning* dengan Geogebra terhadap motivasi belajar siswa. Penelitian ini merupakan penelitian kuasi ekspreimen dengan *one grup pretest-posttest design*. Populasi penelitian ini adalah seluruh siswa kelas VIII SMP Negeri 27 Kerinci. Sampel terdiri dari 27 orang siswa yang dipilih dengan teknik sampling jenuh. Data motivasi siswa diperoleh dari angket motivasi yang diberikan sebelum dan setelah diterapkan strategi belajar aktif tipe *Gallery of Learning* berbantuan Geogebra. Pengolahan data motivasi siswa dilakukan dengan membandingkan motivasi sebelum dan sesudah perlakuan dengan menggunakan uji-t. Hasil uji-t menunjukkan bahwa terdapat pengaruh penerapan strategi belajar aktif tipe *Gallery of Learning* berbantuan Geogebra terhadap motivasi belajar siswa.

1. INTRODUCTION

Low mathematics learning outcomes are not only caused by mathematical concepts that are difficult to understand, but also due to several factors which include the inner factors of students, teachers, learning strategies, and learning environments that are

interrelated with each other. Psychological aspects also contribute to students' success in understanding mathematics well, one of which is motivation [1].

Motivation to learn is a process that provides enthusiasm, direction and persistence in learning. So, motivated behavior is behaviour that is full of energy, directed, and persistent [2]. In addition, motivation is a driving factor within a person to do something based on a desire or need [3]. Motivation to learn is characterized by (a) the level of student attention to learning, (b) the level of relevance of learning to student needs, (c) the level of student confidence in their ability to do learning tasks, (d) the level of student satisfaction with the learning process that has been implemented [4].

Based on preliminary observation and interview with several students at SMP Negeri 27 Kerinci especially in grade VII, it was found that teachers tend to apply the lecture method in learning. In the learning process the teacher did not use innovative learning methods, teacher-centered learning, teachers also do not use tools or media in teaching. This kind of learning caused low mastery of concepts, students became lazy in participating in learning, students felt bored, and students were less interested in participating in learning activities because they felt less involved. In addition, homework that was given to students was rarely done well. This indicated that the learning motivation of students at SMP Negeri 27 Kerinci was low.

The lower the student's motivation, the lower the student's effort in learning, which then affects student learning outcomes. Conversely, with high motivation, students become more eager to achieve maximum learning outcomes [5]. To increase student learning motivation, teachers are required to be able to choose, implement, and develop various strategies, methods, models, media and learning resources, to make learning more varied and enjoyable [6]. If the mathematics learning process is fun, students will not feel bored in learning, so that, it can increase student interest and motivation in learning [7].

The learning process is a process that contains a series of teacher and student activities on the basis of a reciprocal relationship that takes place in an educational situation to achieve certain goals [8]. In the learning process there must be interactions between teachers and students, such as question and answer activities that can arouse student motivation in learning. In this case, the use of appropriate learning strategies or methods will trigger student activity and increase student understanding in learning mathematics [9], [10].

One of the strategies that can be used to increase students' motivation to learn mathematics is active learning strategy [11], especially active learning strategy type Gallery of Learning. Gallery of Learning is group learning where each group member gets the same opportunity to contribute in the form of providing ideas and thoughts. Activities in the Gallery of Learning are also a way to assess student learning outcomes [12].

Previous research stated that the Gallery of Learning model (also known as the Gallery Walk) was effective in increasing learning motivation and student activity in the learning process, all students became directly involved without distinguishing between students who were usually active and inactive, students developed different ways of thinking, so that students were motivated to learn more deeply, both individually and in groups, and this strategy also increased student self-confidence [13]–[15]. Gallery of Learning also encouraged students to think creatively in learning mathematics.

Previous research also stated that motivation to learn greatly affected student achievement. To increase learning motivation, it required not only the right learning strategy, but also interesting learning media that could make students more interested in learning mathematics [16]. Learning media that can be an option is Geogebra. Geogebra is a computer program that can be used as a media for learning mathematics. Geogebra is

very easy to operate because it uses very simple commands. [13]. By utilizing Geogebra, teachers can easily demonstrate and visualize certain mathematical concepts [17]. This can foster students' interest in learning, because they do not only imagine the concept but also see the visualization of its application [18].

Many studies have implemented the Gallery of Learning, but these studies focused on student learning outcomes [1], [3], [19]. There are no studies that collaborate the Gallery of Learning with the use of Geogebra software to increase learning motivation. In addition, other studies have proven that the use of varied media greatly affected student learning motivation [20]. The use of varied media, both print and technology-based, can reduce student boredom in learning and make learning more memorable [21]–[23].

This study used active learning strategy type Gallery of Learning and used the Geogebra application as a tool to increase student motivation. Geogebra is used to describe the sequence of construction of certain mathematical concepts. In this case, Geogebra was used as a tool for students to find a mathematical concept, for example the position of the points or the characteristics of a parabola [24]. Thus, the learning atmosphere became more active so that students' learning motivation in learning mathematics increased.

2. METHOD

This research was a quasi-experimental research with one group pre test and post test design. This study involved all eighth grade students of SMP Negeri 27 Kerinci as a population as well as a sample. The sampling technique used was saturated samples, so that all members of the population were selected as samples [25]. The population and sample involved were 18 male students and 9 female students. Before the treatment was applied, students were given a pre-test in the form of a learning motivation questionnaire. After the treatment was applied, students were given a post-test in the form of a learning motivation questionnaire. The results of questionnaires before and after treatment were compared to determine differences in student motivation. The research flow is presented in Figure 1.
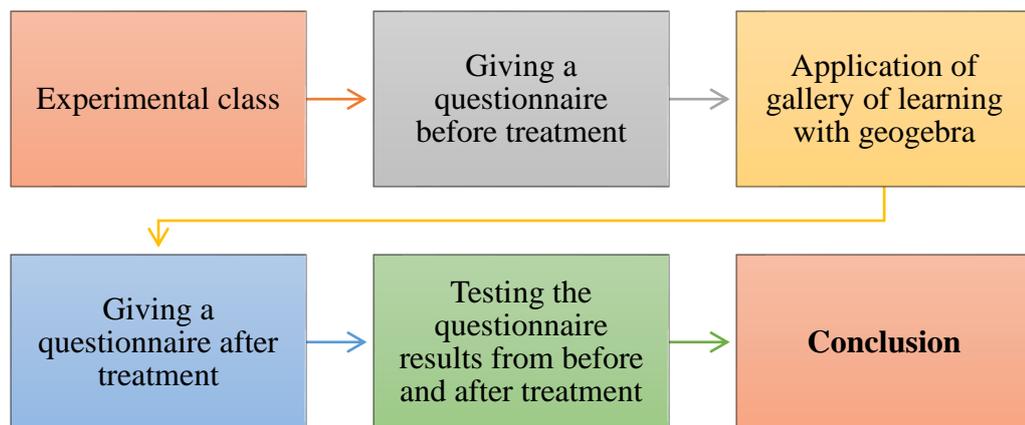

Figure 1. Research Flow

The type of questionnaire used in this study was a closed questionnaire. Respondents were asked to provide a sign (x) or a check mark (√) in one of the answers that matched their characteristics. The questionnaire used consisted of 20 question items which were developed independently by paying attention to the indicators of learning motivation including the level of attention, level of need, level of confidence, and level of satisfaction. The scale used in this questionnaire was a Likert scale with five alternative answers,

namely Strongly Agree (SA), Agree (A), Fair (F), Disagree (DA), and Strongly Disagree (SDA). For the purposes of quantitative data analysis, a scoring system was applied for each answer. The score for each alternative answer is shown in Table 1.

Table 1. Alternative Answers and Questionnaire Scores

Alternative Answer	Score
Strongly Agree (SA)	5
Agree (A)	4
Fair (F)	3
Disagree (DA)	2
Strongly Disagree (SDA)	1

Before being applied, the questionnaire was first tested to determine the validity of the questionnaire [25] and reliability or consistency of the questionnaire [26] so that the results of measuring student learning motivation can be trusted. The results of the validity test with the product moment correlation showed that the 20 items tested were valid. In addition, the results of the reliability test with the Alpha coefficient indicated that the questionnaire was reliable. The data analysis used to compare students' learning motivation before and after the application of the active learning strategy type Gallery of Learning assisted by Geogebra was the t-test.

3. RESULTS AND DISCUSSION

3.1 Student's Motivation Before Implementing Active Learning Strategy Type Gallery of Learning with Geogebra

The description of the data on the students' mathematics learning motivation in the experimental class before applying the Active Learning Strategy Type Gallery of Learning with Geogebra is presented in Table 2.

Table 2. Score of Student Learning Motivation

Correlation	Learning Motivation Indicator	Score					Score of Each Indicator	Total Score
		1	2	3	4	5		
Highest	Attention	3	3	4	3	4	17	
	Encouragement	3	4	3	4	4	18	72
	Confidence	3	3	4	3	4	17	
	Satisfaction	5	4	4	4	3	20	
Lowest	Attention	3	3	3	3	3	15	
	Encouragement	3	3	3	3	3	15	56
	Confidence	2	2	2	2	2	10	
	Satisfaction	2	3	3	4	4	16	

From Table 2, it can be seen that the students' learning motivation scores before applying the Gallery of Learning Type Active Learning Strategy with Geogebra were relatively low (63.22). The low student motivation is due to the fact that conventional learning they used relies on information conveyed by the teacher. Teacher-centered learning activities cause students to be less active so that student motivation is low which is usually indicated by students' lack of interest in the learning process [27].

3.2 Student's Learning Motivation After The Application of Active Learning Strategies Type Gallery of Learning with Geogebra

Gallery of Learning is a group learning where each group member gets the same opportunity to make their contribution and listen to the views and thoughts of other members [28]. After carrying out learning activities using the Gallery of Learning with the

help of Geogebra software, 27 students in the experimental class were tested using the learning motivation questionnaire to see students' motivation to learn mathematics after the application of the treatment. Student motivation scores after treatment are shown in Table 3.

Table 3. Score of Student Learning Motivation After Treatment

Correlation	Learning Motivation Indicator	Score					Score of Each Indicator	Total Score
		1	2	3	4	5		
Highest	Attention	5	5	5	4	5	24	
	Encouragement	4	5	4	5	5	23	90
	Confidence	5	4	4	5	4	22	
	Satisfaction	4	5	4	4	4	21	
Lowest	Attention	4	4	3	4	4	19	
	Encouragement	4	4	4	3	3	18	77
	Confidence	4	5	5	4	5	23	
	Satisfaction	3	4	3	4	3	17	

From Table 3, it can be seen that the score of student learning motivation after treatment was higher than the score before treatment, with an average score of 82.67. With the application of the Geogebra-assisted Gallery of Learning in the experimental class, students became more motivated and enjoy mathematics. They not only sit, listen and take notes on what the teacher says, but they can also express their opinions and thoughts, both orally and in writing. If this strategy is carried out repeatedly, it will become a learning habit that will affect students' motivation in acquiring knowledge, attitudes, skills, and abilities in the learning process [29].

Each learning step in this study facilitated the indicators of student learning motivation. The learning steps are described in Table 4.

Table 4. Storyboard of the Application of the Gallery of Learning with Geogebra

Steps for implementing the Gallery of Learning with Geogebra	Student Motivation Indicators	Rationalization of the effect of Gallery of Learning with Geogebra on Learning Motivation
1. The teacher explained the concept using Geogebra. After explaining the concept, students were divided into groups of 2 to 4 people. 2. Each group prepared flip chart paper.	1. The level of student **attention** to learning.	When the teacher explained the topic of learning with the help of Geogebra, students' curiosity about learning emerged. Because the learning process using the Geogebra application is a new way of learning and they have never experienced it before. So, students' attention became focused on the teacher's explanation. Students' attention was also focused on the teacher's direction when dividing the group, so they prepared equipment according to the direction (preparing flip chart paper).
3. Students discussed the concepts they have just learned. 4. Each group made a list on the paper they prepared, and wrote down the themes of the topics they studied.	2. Students become motivated and have a strong desire to learn (**encouragement**).	Through the discussion process in learning, it made students directly and actively involved in information seeking activities. Students could express their opinions and ideas freely, students also exchanged ideas about the topics they have studied.
5. The results of group work were posted on the wall.	3. The level of students' **confidence** on their	At this stage, the results of the discussion or ideas they have discussed in the group (which they believe to be the correct concept) were posted on the wall.

6. Each group observed each other's group work. 7. One student representative of the group explained the results of their group's work to another group.	ability to do learning tasks.	After that, each group observed the results of the other group's work and conducted questions and answers about their work.
8. Together with teacher's guidance, students evaluated the discussion results of all groups together. 9. Together concluded the evaluation results.	4. The level of student **satisfaction** with the learning process that has been implemented.	With corrections, clarifications, and concluding (evaluating) activities between teachers and students, they knew the truth of the work they have made. At this stage, the teacher gave rewards to groups with good work results, which automatically resulted in student satisfaction and increased students' learning motivation. This was reinforced by previous research which stated that motivation and student learning outcomes increased by using reward strategy treatment [30], [31]. This finding was also in accordance with the theory which stated that reward is one of the factors that influence student learning motivation. Giving rewards will be very beneficial for students, especially in providing good stimulus. By giving rewards, students will be more excited to carry out learning activities [32].

The use of the Gallery of Learning strategy with Geogebra software is an effort to increase student motivation to apply their mathematical understanding. The results of previous research indicated that the Gallery of Learning or Gallery Walk was a learning model that was able to trigger students' emotional power to find new knowledge and sharpen their memory through direct learning. Moreover, it can also trigger student activity in the learning process, because when students find different views between one group and another, it will cause curiosity about the actual concept [13]. The results of other research also showed that the learning motivation of students who used Geogebra learning media in the quadratic function graph learning was higher than the learning motivation of students who did not use Geogebra [33].

3.3 *The Effect of Gallery of Learning with Geogebra on Student Motivation*
Students' mathematics learning motivation before and after treatment looks different and has increased. This can be seen in Figure 2.
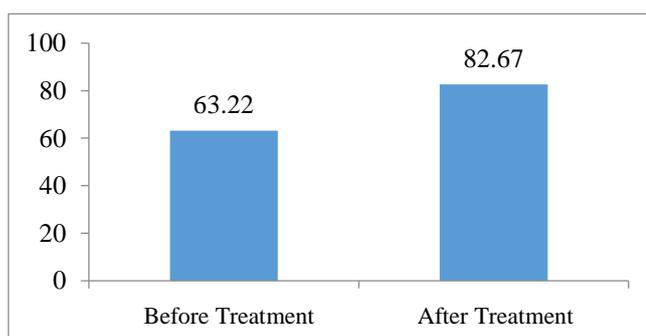

Figure 2. The Difference in the Average Score of Students' Learning Motivation Before and After the Application of Gallery of Learning with Geogebra

Table 5. Hypothesis Test Result

t_{count}	t_{table}	Criteria
-19,34	1,70	H_0 is rejected

From the t-test results obtained t_{count} = -19,34 dan t_{table} = 1,70 maka $t_{count} < t_{table}$, it means H_0 is rejected and H_1 is accepted. So it can be concluded that there is an effect of the application of the active learning strategy type Gallery of Learning assisted by Geogebra software on learning motivation at the level of confidence reaching 95%. The use of the right learning strategies will make the learning process run well. So that it will improve students' ability to solve problems and increase students' motivation. Good motivation in learning will bring students to good learning outcomes as well. In the other words, efforts that are based on motivation in a person will produce good achievements [24].

This research proved that the Gallery of Learning with Geogebra software can motivate students to be more active. This was because through this learning, students were directed to quickly understand the material through making lists, posting lists on the wall, observing the work of other groups, and reporting the answers to questions that have been compiled in the previous stage. Thus, students became more aware of the content of the learning topic, mastered concepts faster, easier to remember the information, got more ideas, and got a deeper impression of learning.

4. CONCLUSION

The results showed the difference in the average score of student learning motivation before and after the application of active learning strategies type Gallery of Learning with Geogebra. Before the treatment was applied, the average score of student motivation was 63.22 (moderate category) and after treatment was applied, the average score became 82.67 (high category). From the results of data analysis, it can be concluded that there was an influence on the application of the active learning strategy type Gallery of Learning with geogebra on student motivation.

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