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THE INFLUENCE OF PEER TUTORING-BASED HUMANISTIC MATHEMATICS LEARNING ON THE MOTIVATION OF LEARNING MATHEMATICS OF HIGH SCHOOL STUDENTS

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Abstract

Many students are not comfortable studying mathematics and think mathematics is a boring subject. So students do not have good motivation in learning mathematics. This is due to the inhumane teaching of mathematics. This research was conducted to assess students' motivation when learning humanistic mathematics based on peer tutors. This research is experimental research with a one group pretest-posttest design. Data were collected using the Attention, Relevance, Confidence, Satisfaction (ARCS) motivation questionnaire. The data were analyzed using the Wilcoxon test because the data obtained were not normally distributed. The results obtained that the value of sig. (2-tailed) of 0.000 is smaller than 0.05 (0.000 < 0.05), which means that the hypothesis is accepted. So that there is a significant comparison between students' mathematics learning motivation before and after applying humanistic mathematics learning based on peer tutors or there is a significant influence between peer tutor-based humanistic mathematics learning on students' mathematics learning motivation.

Keywords: *Humanistic, Learning Motivation, Peer Tutoring.*

INTRODUCTION

Mathematics has an important role in developing students' thinking patterns in solving the problems they face. Students' mathematics learning outcomes will increase as problem solving abilities increase (Kusumawati, 2013). This shows that learning mathematics can train students to think logically and be able to solve problems systematically. Because mathematics is a tool for scientific thinking to gain meaningful and in-depth knowledge (Rismawati, 2016). Even mathematics is also a supporting factor for the development of modern technology today.

Students need good learning motivation to study mathematics. Learning motivation is a major factor for students in learning mathematics. Learning motivation has an influence

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on increasing student mathematics learning achievement (Indriani, 2016). The higher the motivation to learn mathematics, the higher the achievement in learning mathematics (Rigusti & Pujiastuti, 2020). So that mathematics learning achievement will increase if students follow the mathematics learning process with good motivation.

Motivation to learn mathematics can be seen based on the ARCS model. The ARCS model has been used in research on motivation to learn mathematics such as (Karakis et al., 2016) which results in the development of increased motivation to learn mathematics, (Suherman et al., 2021) produces the ARCS model can increase students' motivation and critical thinking, (Hsu, 2020) found that the ARCS model can increase learning motivation and the effectiveness of learning mathematics, (Pratiwi et al., 2018). According to Keller in (Leong, 2015) the ARCS model consists of four categories, firstly attention is assessed from students' attention and interest while participating in mathematics learning, secondly relevance is assessed by looking at the fulfillment of students' needs in learning mathematics, three confidence is assessed from students' confidence in studying mathematics , four satisfaction seen from student satisfaction in participating in the mathematics learning process.

Students' motivation in learning mathematics is not in line with the importance of mathematics. This is according to what was stated by (Jumadi, 2018) that many students' motivation to learn mathematics is still in the low category, even though learning motivation has an important role in increasing mathematics learning achievement. According to (Sirajuddin & Arsyad, 2019) low learning motivation is because students feel uncomfortable when learning mathematics. It was also found during observations and student interviews that students were scrambling to sit at the back when studying mathematics, choosing to be silent and not asking questions when they did not understand the concepts being studied.

Low motivation to learn mathematics can also be seen from the non-fulfillment of the motivational categories of the ARCS model. First, students' attention in learning mathematics is still low (Putri et al., 2019). Second, students' needs in learning mathematics are not met (Armiati et al., 2019). Third, students' self-confidence is low in participating in learning mathematics (Pangestu & Sutirna, 2021). Fourth, students do not have satisfaction in participating in learning mathematics because they find mathematics a scary subject.

The low motivation to learn mathematics is caused by students feeling insecure. This is due to learning that is not humane. This is in accordance with what was stated (Hibana et al., 2015) that a sense of security will arise when learning is carried out humanely. Comfort in learning will lead to students' desire to excel in mathematics, so that students can learn mathematics well (Tambunan, 2019).

Humanist learning of mathematics is the initial capital in providing stimulus from an early age to students to eliminate negative responses to mathematics (Hendriana, 2014). However, learning mathematics that is humane can foster students' positive perceptions of learning mathematics. This is in accordance with the findings that students will think and have a positive attitude

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towards mathematics (Jamiah, 2018). Positive perceptions greatly influence the process of learning mathematics (Anggoro, 2016). Because students will take part in learning mathematics better than in a state of negative perception.

Humanist learning is a learning approach based on motivation, empathy and concern for students (Asfiati, 2016). The humanist approach positions students more actively than teachers, because the teacher is only a facilitator in the learning process (Wibowo, 2012). The humanist approach also requires students to interact with each other with a sense of security (Indriani, 2021). Therefore, learning humanist mathematics needs to use learning methods that can facilitate students to interact with each other with a sense of security.

Humanist learning of mathematics can be supported by peer tutors, because peer tutors will also provide more comfort when learning mathematics (Munthe & Naibaho, 2019). Students have the courage to ask friends who act as peer tutors (Mariyaningsih & Hidayati, 2018). So that there is a good interaction in the process of learning mathematics. Students feel comfortable asking questions with the teacher, but can also ask their classmates as tutors. Peer tutors will also assist teachers in conducting learning, because in one locale not all students are monitored by the teacher.

Students have the courage that arises from self-confidence to ask friends. This is important in learning mathematics. Because according to (Pangestu & Sutirna, 2021) students' confidence in learning mathematics is still relatively low. Therefore, peer-based humanist mathematics learning can be an alternative to increase students' motivation to learn mathematics.

Research on humanist mathematics learning has been carried out a lot, even with students' motivation to learn mathematics. Research (Cahye, 2018) which increases students' motivation to learn mathematics with the script type cooperative learning model. Research (Jamiah, 2018) uses humanist learning to improve mathematical dispositions. Research (Hendriana et al., 2014) builds students' self-confidence through learning humanist mathematics. Research (Tran & Nguyen, 2021) which proves that there is a strong relationship between motivation and learning achievement.

However, this study has differences from previous research, in this study it combined humanist mathematics learning with peer tutoring learning. This research has not been conducted on research on humanist mathematics learning before. So there is a possibility that students are not monitored by the teacher in the learning process. This can reduce the comfort and motivation of students who are not monitored in learning mathematics. Because humanist learning must give fair attention to all students (Widjajanti, 2019). Therefore, to make all students feel comfortable and monitored in the learning process with peer tutors, it is necessary to conduct research on peer tutor-based humanist mathematics learning to increase students' motivation to learn mathematics.

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METHODS

The research was conducted using the experimental method, using the one group pretest-posttest design. One selected group was given a pretest, namely an ARCS-based mathematics learning motivation assessment questionnaire. After that, they were given the treatment of humanist mathematics learning based on peer tutors, then they were given the same questionnaire before the treatment was carried out. The results of the pretest and posttest were compared to determine the significance of the impact of the treatment given to the motivation to learn mathematics.

The pre-experimental research design used the one group pretest-posttest design. Dasein is used because it can find more accurate results from the treatment given (Sugiyono, 2021). The research process is carried out as shown in Figure 1:

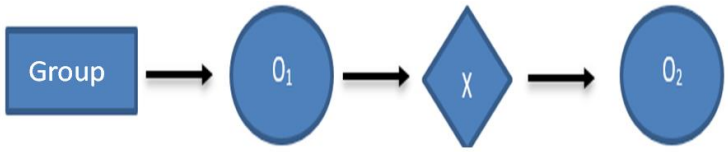

Figure 1. Research design

Description:
O_1 = Pretest (Giving the ARCS motivational questionnaire before treatment)
O_2 = Posttest (Giving the ARCS motivational questionnaire after treatment)
X = Treatment (Peer tutor-based humanistic mathematics learning)

First, the research was conducted by determining the research sample. Second, an ARCS motivational questionnaire was given to the group that would be given the treatment. Third, applying humanistic mathematics learning based on peer tutors. Fourth, the ARCS motivational questionnaire was given again after being given treatment. Fifth, the data obtained before and after treatment were compared to determine the significance level of differences in student motivation. The criteria for motivation to learn mathematics can be seen in Table 1:

Table 1. Criteria for the level of motivation to learn mathematics

Percentage (%)	Criteria
86 – 100	Very High
71 – 85	High
56 – 70	Medium
41 – 55	Low
25 – 40	Very Low

(Arifin, 2017)

This study has two types of variables, namely the independent variable and the dependent variable. The independent variable in this study is peer tutor-based humanistic mathematics learning. The dependent variable is students' motivation to learn mathematics. The data collection

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technique in this study used the ARCS motivational questionnaire. The questionnaire used is a closed questionnaire containing modified statements from the ARCS Motivation Model (Keller, 2015). The questionnaire was used before and after the implementation of peer tutor-based humanistic mathematics learning.

The data obtained were analyzed to see whether there was a significant difference between students' motivation to learn mathematics during the pretest and posttest. Analysis using pair sample t test. Requirements for conducting a pair sample t test, the data obtained must be normal. If the data obtained is not normal, data analysis is carried out using the Wilcoxon test which is a non-parametric statistical analysis (Wahyuliani et al., 2016). The conclusion is obtained by doing a comparison between the sig. (2-tailed) with 0.05. If sig. (2-tailed) < 0.05, the conclusion from the data analysis carried out is that there is a significant difference between students' motivation to learn mathematics before and after being given treatment or there is a significant influence between humanistic mathematics learning based on peer tutors on students' motivation to learn mathematics. Meanwhile, if sig. (2-tailed) > 0.05, the conclusion from the data analysis carried out is that there is no significant difference between students' motivation to learn mathematics before and after being given treatment or there is no significant effect between humanistic mathematics learning based on peer tutors on learning motivation student math.

RESULTS AND DISCUSSION

The results of the study were obtained from the results of the students' pretest and posttest results after applying humanistic mathematics learning based on peer tutors. The pretest and posttest were carried out using a learning motivation questionnaire. The pretest results obtained illustrate students' motivation to learn mathematics in learning mathematics before being given treatment.

1. Pretest Student Motivation

The value of motivation in the pretest can be seen in table 2:

Table 2. Student motivation on pretest

Criteria	Pretest	
	Score	Percent (%)
Attention	2,7	54,0
Relevance	3,3	66,0
Confidence	2,9	58,0
Satisfaction	3,0	60,0
Average	3,0	60,5

Table 2 shows that the average level of students' mathematics motivation in the pretest is still moderate with a value of 60.5%. The level of motivation to learn mathematics that is being assessed is not sufficient to support students in following mathematics lessons properly. Because according to students, mathematics is a difficult subject to learn. In addition, the learning outcomes of students who have a high level of motivation are better than students who have

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moderate and low motivation (Yohanie, 2015). So it takes a level of motivation with a high minimum criterion, so that students keep trying to focus their attention on understanding the material even though they find difficulties when learning mathematics.

All criteria for students' motivation to learn mathematics are in the medium criteria, except for students' attention which is still in the low category with a score of 58.0%. The state of low student attention in participating in the learning process will not result in effective learning. Students do not focus attention to follow the learning conducted by the teacher. Students cannot understand the math material delivered by the teacher. So that it has an impact on low student mathematics learning outcomes. Therefore, a high level of motivation to learn mathematics is needed, so that students try to focus their attention when learning mathematics even though they find difficulties when learning mathematics.

However, the criteria for students' motivation to learn mathematics are in the medium criteria, except for students' attention which is still in the low category with a score of 58.0%. The state of low student attention in participating in the learning process will not result in effective learning. Students do not focus attention to follow the learning conducted by the teacher. Students cannot understand the math material delivered by the teacher. So that it has an impact on low student mathematics learning outcomes. Therefore, it is necessary to increase students' motivation to learn mathematics so that students can achieve maximum learning goals.

2. Postest Student Motivation

Students' motivation in the posttest was assessed after being given treatment, namely humanist mathematics learning based on peer tutors. The value of motivation in the posttest can be seen in table 3:

Table 3. Posttest student motivation

Criteria	Posttest	
	Score	Percentage (%)
Attention	3,8	76
Relevance	3,9	78
Confidence	3,5	70
Satisfaction	3,8	76
Average	3,7	74

In Table 3, the results of the questionnaire on students' motivation to learn mathematics found that motivation to learn mathematics in all criteria was at a high level of motivation. High motivation to learn mathematics can have a positive impact on the achievement of student mathematics learning outcomes. Because students' motivation to learn mathematics has a significant positive impact on learning outcomes in mathematics (Waritsman, 2020). Likewise according to Jemudin et al. (2019) that with high motivation in learning mathematics, students can obtain maximum results. So student

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learning motivation will have a good impact on student learning outcomes.

Peer tutor-based humanist mathematics learning can not only increase students' motivation to learn mathematics. But it can also have an impact on student achievement in participating in mathematics learning. Due to the increase in students' motivation to learn mathematics, it will have a positive impact on the results of learning mathematics. This is also supported by the application of peer tutors so that the learning carried out can also support the increase in student mathematics learning outcomes (Rosanti, 2018). Even the motivation to learn mathematics also has a positive influence on students' critical thinking skills in mathematics by 16.2% (Neneng et al., 2018). In addition, learning motivation has an influence of 33.32% on mathematical communication skills (Abdi, 2018). This confirms that increasing students' motivation to learn mathematics will have many impacts on the implementation of learning mathematics.

3. Description of Students' Motivation Pretest and Posttest

This section describes the results of student motivation before the pretest and posttest. Explanation is done by comparing the value of students' motivation to learn mathematics during the pretest with the posttest. Comparisons were made to see an increase in motivation from pretest to posttest.

Overall, student motivation has increased from an average of 60% to 74%, which is an increase of 14%. So by applying humanistic mathematics learning based on peer tutors can increase students' motivation to learn mathematics. This will also have a positive impact on student mathematics learning outcomes (Warti, 2018). Tables 2 and 3 prove that the value of students' motivation to learn mathematics in all criteria has increased after applying humanist mathematics learning based on peer tutors.

Students' attention in participating in mathematics learning increased by 22%, so that it changed from low to high category. According to Wibowo (2012), student attention can be increased by actively involving students in fun learning. This is in accordance with the humanist learning theory conveyed by Rogers in (Nast & Yarni, 2019) that learning must actively involve students intellectually and emotionally. Peer tutor-based humanist mathematics learning is carried out by actively involving students in learning, especially interactions between students and students and teachers. In addition, students also feel happy in learning mathematics that is done.

The relevance criteria increased by 12%, so it changed from medium to high category. According to Keller (2010), relevance can be increased by conveying material with great familiarity so that students feel important about the material they are learning. Humanist learning strives for students to avoid pressure and emphasizes a sense of security for students, so that the learning carried out will be meaningful (Qodir, 2017). Peer tutor-based mathematics learning can provide students with a sense of security and familiarity, resulting in increased relevance in the mathematics learning carried out.

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Student self-confidence increased by 12%, so that it changed from medium to high category. Students' self-confidence can be increased by eliminating students' anxiety in participating in mathematics learning (Keller, 2010). Humanist learning is carried out with a sense of empathy and care for students (Asfiati, 2016). Humanist learning prioritizes students' comfort in learning, so that meaningful learning is realized. Peer tutor-based humanist mathematics learning provides a sense of security for students to take part in mathematics learning, thus increasing student self-confidence.

Student satisfaction in participating in mathematics learning also increased by 16%, changing the medium to high category. Student satisfaction can increase when students get good learning objectives (Keller, 2010). Because students' attention, relevance, and self-confidence have increased, an increase in these three criteria will have a positive impact on students' learning outcomes in mathematics.

4. Pretest and Posttest Data Normality Test

The results of the pretest and posttest were tested for normality first, before testing the hypothesis. This is done to determine the right hypothesis test in drawing conclusions. The results of the normality test can be seen in table 4 below:

Tabel 4. Tests of normality

	Kolmogorov-Smirnov[a]			**Shapiro-Wilk**		
	Statistic	**df**	**Sig.**	***Statistic***	**df**	**Sig.**
Pretest	,154	35	,036	,932	35	,032
Posttest	,214	35	,000	,924	35	,018

Lilliefors Significance Correction

From the data table 4, it can be seen that the results of the pretest and posttest significance are small from 0.05, this explains that the data obtained in the pretest and posttest are not normally distributed. So to analyze the data can not use paired sample t test. Because it does not meet the requirements of the pair sample t test, namely the data obtained must be normally distributed.

Therefore, the data were analyzed using the Wilcoxon test which is a non-parametric statistical analysis. This test is also used to determine the significance of the effect of learning carried out on students' motivation to learn mathematics.

5. Wilcoxon Test

On table 5, it was found that the sig. (2-tailed) of 0.000. sig. value (2-tailed) smaller than 0.05 (0.000 <0.05), this means that the hypothesis is accepted.

Table 5. Test statistics[a]

	Posttest – Pretest
Z	-4,577[b]
Asymp. Sig. (2-tailed)	,000
a. Wilcoxon Signed Ranks Test	
b. Based on negative ranks.	

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So it can be concluded that there is a significant comparison between students' motivation to learn mathematics before and after applying humanist mathematics learning based on peer tutors or there is a significant influence between humanistic mathematics learning based on peer tutors on students' motivation to learn mathematics.

Increased student math motivation can support an increase in student math learning outcomes. The higher the motivation to learn mathematics, the higher the learning outcomes of mathematics. Because an increase in students' motivation to learn mathematics will be able to have an impact on aspects of students' mathematical abilities. This can be seen from some of the students' mathematical abilities.

The higher the students' mathematical ability, the higher the students' mathematics learning motivation, the higher the students' mathematical communication skills (Abdi, 2018). This is influenced by students' self-confidence, because the higher the students' self-confidence, the students' mathematical communication skills will also increase (Rizqi et al., 2016). Problem solving the higher the students' motivation to learn mathematics, the higher the students' problem solving abilities (Agsya et al., 2019). Understanding students' mathematical concepts is directly proportional to students' motivation to learn mathematics (Damayanti & Rufiana, 2020). Critical thinking skills can increase with students who have high self-confidence because self-confidence has a positive effect of 57.3% on students' mathematical critical thinking abilities (Melyana & Pujiastuti, 2020).

Students' motivation to learn mathematics is one of the foundations for students to learn mathematics. Motivation will determine learning outcomes and increase students' mathematical abilities. Therefore, the motivation to learn mathematics must be a consideration in implementing mathematics learning. One thing that can be done so that students have a high motivation to learn mathematics is by applying humanist mathematics learning based on peer tutors.

CONCLUSION AND RECOMMENDATION

Based on the results of the study, it can be concluded that peer tutor-based humanistic mathematics learning has a significant influence in increasing students' motivation to learn mathematics. These results were obtained from data analysis using the Wilcoxon test that the sig. (2-tailed) of 0.000 less than 0.05 (0.000 <0.05). Increased motivation is directly proportional to the learning outcomes and students' mathematical abilities. Therefore, peer tutor-based mathematics learning is recommended to be used in learning mathematics in order to increase students' motivation to learn mathematics. So as to obtain maximum mathematics learning outcomes.

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