IMPROVE STUDENT'S LEARNING USING MEDIA FOR UNDERSTANDING AND INTEREST IN PYTHAGOREAN THEOREM LEARNING

*(*PENGGUNAAN MEDIA PEMBELAJARAN UNTUK MENINGKATKAN PEMAHAMAN DAN MINAT BELAJAR SISWA PADA PEMBELAJARAN TEOREMA PYTHAGORAS*)*

Imam Setiadi Putra[1]

[1]Sekolah Tinggi Ilmu Keguruan dan Pendidikan (STKIP) Al-Amin Dompu,
imamsetiadi44@gmail.com

Info Artikel	**Abstract**
	This study focuses on the use of mathematics learning media in improving the students' defense and interest in learning Pythagoras theorem. Research subjects are taken in one school in Bima City West Nusa Tenggara Indonesia. The results of this study indicate that the use of learning media can improve students' understanding and interest in learning mathematics, it is shown by an increase in the average result of questionnaire interest in learning mathematics students from before the process of learning using media that is equal to 60.27 with after using media-based ie amounted to 87.07. Also, the results of this study indicate that there is an influence of the use of learning media to improve students' understanding of learning Pythagoras theorem.
Cara merujuk artikel ini:	**Abstrak**
	Penelitian ini berfokus pada penggunaan media pembelajaran matematika dalam meningkatkan pemahaman dan minat siswa dalam mempelajari teorema pythagoras. Subjek penelitian diambil di satu sekolah di Kota Bima Indonesia Nusa Tenggara Barat. Hasil penelitian ini menunjukkan bahwa penggunaan media pembelajaran dapat meningkatkan pemahaman dan minat siswa dalam belajar matematika, hal ini ditunjukkan dengan adanya peningkatan rata-rata hasil angket minat belajar matematika siswa dari sebelum proses pembelajaran menggunakan media yaitu sebesar 60,27 dengan setelah menggunakan berbasis media yaitu sebesar 87,07. Selain itu, hasil penelitian ini menunjukkan bahwa ada pengaruh positif penggunaan media pembelajaran untuk meningkatkan pemahaman siswa tentang pembelajaran teorema Pythagoras.

INTRODUCTION

Understanding and Interest is a matter of great concern in learning. Besides, understanding is one indicator of the achievement of learning objectives. Understanding is the most commonly used term both in school and outside school. It can mean an agreement or contract, sympathy or being sympathetic, and comprehension. The word understanding is sweet to hear especially when used in the contexts of emotional appeal such as mutuality and appreciation. In academic contexts, the term is used concerning intellectual capacity, an example of which is a mathematics lesson, where teachers frequently ask learners whether or not they understand mathematical concepts (Garegae, 2012, p.232). Understanding is handling concepts as part of mental networks. If the mental network is lacking, the depth and strength of understanding are absent. relational understanding is knowing the structure and motives of a concept (Ragnhild, 2014, p.35).

Mathematical understanding is students' knowledge of the concepts, principles, procedures, and ability of students to use the problem-solving strategies presented. Every person who can understand mathematically means that the person has understood what he learned, the steps that have been done, can use concepts in a mathematical context and outside the mathematical context (Usman, F. A &, Ekasatya, AA 2017, p. 27).

Interest is one of the psychological aspects that can drive people to achieve goals. Someone who has an interest in an object tends to give attention or feel greater pleasure to the object. However, if the object does not generate a sense of pleasure, then that person will have no interest in the object. Interest is a permanent tendency to pay attention and remember some activities. Activities that people are interested in, cared for continuously accompanied by pleasure (Slameto,2013, p.45). interest means tendency and high enthusiasm or a great desire for something (Muhibbin 2010, p.34).

Interest allows one to perform an activity because interest is the most powerful impulse of a person. The size of interest will greatly affect one's activities. Students who have an interest in a particular subject tend to give greater attention to the subject. Interests have a big influence on learning because if a lesson learned is not by the interests of students, students will not learn as well as possible, because there is no attraction for him that brings the impetus to do something following the wishes that can later bring satisfaction, which satisfaction will affect the level of interest of a person.

The definition of the concept of interest in learning is a choice of fun in doing activities and can arouse a person's passion to fulfill his / her willingness to learn. The formulated of an indicator of interest there are four: (a) Feeling happy; (b) Student Interest; (c) Student Attention; (d) Student Engagement (Safari, 2003, p.56).

The Pythagorean theorem has been known to the Babylonians some 1,000 years before the life of Pythagoras. Since its discovery, the Pythagorean theorem has attracted the attention of many people, especially mathematicians. Attention is not only to the application of Pythagoras's theorem to solve problems but also to attempt to validate them. Pythagorean theorem is widely applied in everyday life. Pythagorean theorem is widely applied in shipping, astronomy, and architecture. In everyday life, many problems can be solved by using the Pythagorean theorem.

Once the importance of Pythagoras in everyday life than learning Pythagoras becomes a necessity in school. The material of the Pythagoras theorem is given in SMP for class VII. Nevertheless, in the practice of learning, there are still students who have not understood the Pythagoras theorem. As the results of a study conducted by Sutton, K (2012, p. 45) revealed students have no Pythagoras material understanding such as Pythagoras formula in solving problems related to Pythagoras theorem. The research conducted by Holzinger, A. (2016, p. 61) which states that there are still students who make a mistake in the concept of Pythagoras theorem materials, namely: 1) Students are still mistaken in understanding the story so wrong in changing to mathematical models, 2) Students are still wrong in calculating quadratic values, and 3) Students are less thorough in the process so that the result is also wrong.

Pryanto (2015, p.67) in his research also revealed that there are students doing mistakes in doing the story about the Pythagoras theorem, namely (1) error reading problem, in the form of mistake to write the keyword and can not illustrate the picture correctly, (2) misunderstanding, by not writing down what is known and what is being asked (3) transformation error, that is the mistake of using formula (4) error of process skill, that is errors in calculation and (5) error of writing the final answer, that is writing mistake of conclusion.

The result of an interview from some students in One School in Bima City proves that the students do not understand the material of Pythagoras theorem, even there are still students who do not know about the material Pythagoras, even though the material has been studied by students of class VII in the first semester.

Related to the lack of understanding of students in understanding the material Pythagoras, it turns out students' interest in learning mathematics less. This is based on the results of questionnaires given to students related to mathematics learning at One School in Bima City, from 15 respondents who gave a questionnaire of 13.3% who are quite interested in learning mathematics and equal to 86.6% less interested in learning mathematics.

To overcome this problem, learning using the media is one solution to improve students' understanding and student learning interest. The process of learning, especially for learning mathematics will be more fun, not boring, and more easily understood students if using appropriate

media learning is the media that can grow interested in learning mathematics. Therefore, teachers should play an active, proactive, and creative role in finding and designing alternative media /instructional materials that are easy, simple, but still relevant to the subject theme that students are learning to foster interest and stimulate creative learning process and fun. learning by using instructional media is far superior to learning without using instructional media on Pythagoras theorem learning (Chen, 2015, p.14). the use of educational games in Pythagoras Theorem learning can improve students' understanding of the subject matter (Nugraha & Rusmin, 2015, p.45). use of media origami shows that students with high mathematical abilities can use all the characteristics of spatial-visual intelligence in terms of imaging, conceptualization, problem-solving, and pattern search seeking) (Bamby, 2017**)**, p. 78).

Based on the background and previous research, the researcher is interested in using manipulative media to improve students' understanding and interest in the Pythagorean theorem. The formulation of the problem in this study is: How learning with manipulative media can improve the understanding of students' concepts and interest in the Pythagorean theorem. Based on the formulation of the problem, the purpose of this study is to determine the increase of students' understanding and interest in learning using manipulative media for learning Pythagoras theorem.

METHOD

1. **Design Research**

   This research uses quantitative research in the form of a one-group pretest-posttest design, where one-group pretest-posttest design is a study aimed at understanding the improvement of students' understanding of the material of Pythagoras theorem after learning with various learning media. This research uses a pre-test before the treatment is given starting with the giving of material with ICT media then followed by Non-ICT media. Pre-tests are used to measure students' initial understanding before being treated. With the pre-test, the researcher will also see whether the learning media can be applied in class or not paying attention to students' initial abilities. Student learning outcomes after being given treatment are compared with student learning outcomes before being given treatment. In this study, there was one group that would be given a pre-test and post-test, because in this study the researcher wanted to see the extent to which the use of instructional media could increase students' understanding and interest in learning. ICT media in this lesson are designed using Adobe Flash, while non-ICT media are designed using wood, copper and magnets. The following is an example of the media used in this research.

Figure 1. Display of ICT Media
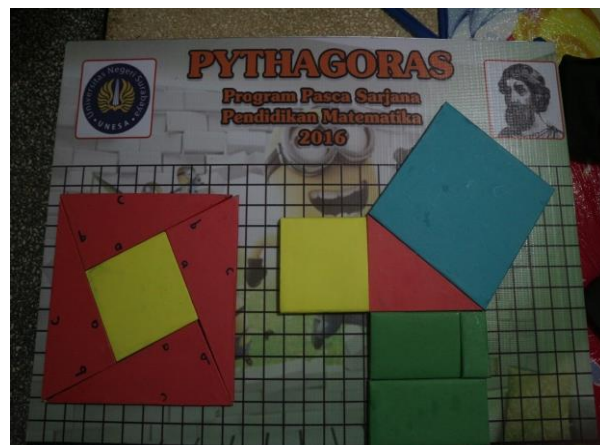
Gambar 2. Display of Non ICT Media

2. Sample Research

This research was conducted at a school in Bima City, West Nusa Tenggara, Indonesia. The subjects in this study consisted of 15 grade VII students. 15 subjects were taken from 20 grade VII students based on the pre-test results given. The subjects in this study were previously given a pre-test, then from the results of the pre-test students were selected based on the minimum completeness criteria (KKM) to take part in learning using instructional media, and at the end of the study the subject was given post-test questions to determine the increase in student understanding. From the pre-test results, there were 15 students whose scores were below the KKM. The researcher only took the score of 15 students to be the research sample, because their pre-test results were not in the complete category.

3. Research Tools

In collecting the data in this study, researchers used several instruments or data collection tools that are questionnaires and tests. The use of a questionnaire in this research is to know the interest of

student learning during learning mathematics by using instructional media. The questionnaire in this research is disseminated to class VII students before and after learning by using learning media. The questionnaire in this research is a Likert scale which is multiple choice which consists of four options, ie option (a) always, (b) often, (c) never, and (d) never. While the use of the test is used to measure students' understanding of Pythagoras theorem material. Problem test in this research there is two that are about the test for pre-test and post-test. The question of the pre-test consists of 10 multiple choice questions, while the post-test item consists of 8 questions, namely 5 multiple choice questions and 3 description questions.

4. **Techniques of Data Analysis**

Data analysis techniques are a way done by researchers to analyze or process data that has been collected to obtain conclusions as a result of research. The data analysis techniques conducted by researchers are: 1) The purpose of the normality test is to know whether the samples taken are normally distributed or not. The normality test of the data is done by using the formula chi-squared (χ^2); 2) The sample homogeneity test aims to test the similarity or homogeneity of some parts of the sample ie the uniformity of the samples taken from the same population; 3) To test the effect of the use of instructional media to the students in learning Pythagoras theorem using t-test with the t-sample related formula in this case the sample used only one group. (Sugiyono, 2003, 2004, 2011).

In this research, to analyze the data that have been obtained by using program SPSS 16.0

RESULT AND DISCUSSION

1. **The Result data on Student Interest Learning**

From the result of the questionnaire of student learning interest in class VI obtained data of interest value of student before and after given treatment, which can be seen in Table 1.

Table 1. Descriptives Data Acquisition Value Interest Learning Mathematics with Media Learning

Statistic Description	Pre-test	Post-test

Valid	15	15
Missing	0	0
Mean	60.27	87.07
Std. Error of Mean	1.152	2.377
Median	60.00	89.00
Mode	65	81
Std. Deviation	4.464	9.208
Variance	19.924	84.781
Range	15	30
Minimum	53	70

Table 1 shows the descriptive statistical value of the acquisition value of pre-test and post-test of respondents. It is seen that in the pre-test column obtained an average of interest questionnaires of 60.27. The median or middle value of 60.00; variance of 19,924; and the standard deviation of 4,464; with 15 respondents who followed the learning before using the media, While in the post-test column obtained the average questionnaire of interest of 87.07 with median or middle value of 89.00; variance of 84.781; and the standard deviation of 9,208 with 15 respondents who followed the learning before using the media. Furthermore, questionnaire value data before and after learning with media based on the above is categorized based on interest categories that have been determined. Here's a summary of categorization results.

Table 2. Category Result Spread Student Learning Interest Before Learning with Learning Media

No	Interval	Category	Student	Percentage (%)
1.	102-120	Very Interest	-	-
2.	84-101	Interested	-	-
3.	66-83	Pretty Interested	2	13,3
4.	48-65	Less Interested	13	86,6
5.	30-47	Not Interested	-	-
	Total Student		15	

Based on Table 2 it can be seen that the result of the spreading of a questionnaire of interest before learning with the media shows that 2 students are interested enough. If the Percentage 13.3% and 13 students categorized less interested and if Percentage amounted to 86.6%, so before the learning with student-based media on average less interested.

Table 3. Category Result Spread Student Learning Interest Before Learning
with Learning Media

No	Interval	Category	Student	Percentage (%)
1.	102-120	Very Interest	-	-
2.	84-101	Interested	9	60
3.	66-83	Pretty Interested	6	40
4.	48-65	Less Interested	-	-
5.	30-47	Not Interested	-	-
Total Student			**15**	

Based on Table 3 it can be seen that the result of the spreading of a questionnaire of interest after learning with the media shows that 9 categorized students are 60% censored, and 6 students are interested enough with a 40% incident, so that after the learning with students' interest.

2. The Result Data on Student Learning

From the result of student learning in class VI used to know the improvement of student understanding in Pythagoras theorem material. The data on student learning outcomes before and after being treated can be seen in Table 4 below.

Tabel 4. Descriptives Data Acquisition of Student Learning Results Before and After Using Learning Media

Statistic Description	Pree-test	Post-test
Valid	15	15
Missing	0	0
Mean	42.0000	78.6667
Std. Error of Mean	4.04734	1.50132
Median	40.0000	80.0000
Mode	30.00	75.00
Std. Deviation	1.567	5.81460
Variance	245.714	33.810
Range	50.00	20.00
Minimum	20.00	70.00

Table 4 shows the descriptive statistical value of the learning outcomes of pre-test and post-test. It is seen that in the pre-test column obtained the average student learning outcome of 42.00. The median or middle value of 40.00; variance of 245,714; the standard deviation of 1.56; the minimum value of 20 and the maximum value of 70 with 15 respondents who followed the learning before using the media, While in the post-test column obtained average learning outcomes student

for 78.67 with median or the middle value of 80.00; variance of 33.810; and the standard deviation of 5,814; the minimum value of 70 and a maximum value of 90 with 15 respondents who follow learning after using the media.

Based on the data analysis above can be obtained that, the student's grasp of Pythagoras theorem material has increased. This is based on the results of the maximum value and drinking obtained by students, which is 20 to 70 for the minimum and 70 to 90 for the maximum score, and the average student score of 42 to 78.67.

3. **Test the Influence of Learning Media Usage on Student Understanding**

Test Influence of Learning Media Usage on Student Understanding in this research using the t-sample related test, using SPSS 16.0 program aid with Paired-Sample analysis T-test of two-sided test which then consulted with t-table value. From the result of the calculation of the t-sample test related to the analysis of the Paired-Samples T-test of two-sided test obtained t-count = -8,696 and t-table = 1,753 for significant level 5% with df = 14. So based on hypothesis testing criteria that are if t-count ≥ t-table or t-table (-8,696 ≥ -1,753 or -8,696 - 1,753), it can be concluded that there is the influence of the use of learning media to increase students' understanding on learning Pythagoras theorem.

4. **Discussion**

The Pythagorean theorem has been known to the Babylonians some 1,000 years before the life of Pythagoras. Since its discovery, the Pythagorean theorem has attracted the attention of many people, especially mathematicians. Pythagorean theorem is widely applied in everyday life. Pythagorean theorem is widely applied in shipping, astronomy, and architecture. In everyday life, many problems can be solved by using the Pythagorean theorem.

Once the importance of Pythagoras in everyday life than learning Pythagoras becomes a necessity in school. The material of the Pythagorean theorem is given in SMP for class VII. Nevertheless, in the practice of learning, there are still students who have not understood the Pythagoras theorem.

Math lesson is one of the lessons that get priority to be developed because mathematics is a means to solve problems in everyday life such as language, reading, and writing, as well as other science. Many students assume that math lessons are a difficult lesson and are heavily mastered. This is due to other lack of interest and motivation of students this will impact students' understanding of mathematical

content.

The use of interactive learning media that is always given by the teacher to the students, will be able to give the spirit to the students to follow every teaching and learning activity, thus will generate interest in student learning and students' understanding of mathematical concepts will be better. The use of interactive learning media is also implemented by teachers to utilize more time so that students are more focused on the material taught during the learning activities so that students' ability in learning mathematics will increase, by itself interest in learning and student achievement will be increasing. With the use of interactive learning media, teachers no longer need to teach and discuss the subject matter with the only together in front of the class, because it gives a sense of boredom in students themselves.

Judging from the spreading of questionnaire interest in learning before and after learning with the media. After performing data analysis on the pre-test and post-test results, there is an increase in student learning interest. This shows that students 'learning interest taught by learning media is better when compared with the students' learning interest taught before using learning media. This happens because the learning media in it not only implicitly contains mathematical materials but also accompanied by pictures and materials or mathematical concepts presented very interesting with language that is easily understood by students.

Furthermore, this study shows that students' understanding of the concept of Pythagoras theorem increases. This can be seen from the average, maximum and minimum values of student learning outcomes before and after applying the lesson using interactive media. To corroborate the results of this study, researchers also tested the influence of the use of learning media to increase awareness and interest in student learning.

The results show that the use of interactive learning media can improve students' understanding and interest in the material of the Pythagoras theorem. This is the following research by Maslina, S, (2018) who suggests learning by using learning media that can improve students' mathematical understanding. While Hanifah, O & Rully, C, (2020) discuss learning media that supports students to understand the concept of the Pythagorean theorem formula, through various evolutionary learning. In learning that uses instructional media, students are guided to learn the Pythagorean theorem theory by discovering for themselves and facilitated by the teacher.

Furthermore Muhammad. N., Saidi. U, & Henry. P, (2019); Mas'ud, R & Erlina P, (2020); Benidictus, A. C & Helti, L. M, (2020) in their research explained that learning media helps students build a mathematical understanding of the Pythagorean proposition. Applying learning media in the process of learning mathematics will train students who can improve their understanding.

The conclusion that can be drawn from the above description is the use of adobe flash-based learning media can give an improvement to the student's learning interest in mathematics. The level of students 'understanding of the subject matter, the students' activity, and the enthusiasm of students in the group can lead to the creation of a fun learning environment for students and make students more confident in conveying their ideas.

CONCLUSION

The conclusions that can be drawn based on the results of analysis and discussion in this study are: "The Use of Learning-Based Media Can Improve Understanding and Interest in Student Mathematics Learning. This is indicated by the increase of the average result of questionnaire interest in learning mathematics students from before the learning process by using media that is equal to 60.27 with after using media-based that is equal to 87,07. Next is the average value of student learning outcomes before the amount of 42.0 and after learning using the media of 78.66. Besides that, from the result of the calculation of the t-sample test related to the Paired-Sample analysis T-test of two side tests obtained t-count = -8,696 and t-table = 1,753 for 5% significant level with df = 14. So based on hypothesis testing criterion that is t-count ≥ t-table or t-table-table (-8,696 ≥ -1,753 or -8,696 - 1,753), hence there can be an effect of using instructional media to increase student understanding on Pythagoras theorem learning.

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