PRISMA, 13(1), 131-138, June 2024
https://jurnal.unsur.ac.id/prisma
DOI:10.35194/jp.v13i1.3941

p-ISSN 2089 3604
e-ISSN 2614 4611

Application of The Jungle of Phytagoras Discovery Learning Method Assisted with The Nearpod Application

Zulfatus Sakinah[1,*], Rustanto Rahadi[2], I Made Sulandra[3]
[1,2,3]Universitas Negeri Malang, Malang
*Corresponding Author: 207hilwa@gmail.com

Submitted: 10-01-2024	*Revised: 15-06-2024*	*Accepted: 18-06-2024*	*Published: 30-06-2024*

ABSTRACT

The application of this learning aims to improve the quality of students by developing learning media. The teaching media used for the lesson is the Nearpod application for grade 8 Pythagorean material in middle school in accordance with the implementation plan for mathematics learning in junior high school. The approach used in this learning is Discovery Learning. In this case, the teacher will develop one of the teaching materials in the form of learning media using the Discovery Learning approach. Based on the results of the presentation above, the teacher has carried out open media teaching using the Discovery Learning method for the Pythagorean theorem material for grade 8 junior high school which aims to improve student learning outcomes. The subject of this teaching is grade 8 students. The object of this teaching is to create mathematics teaching media using the Discovery Learning approach in understanding the Pythagorean theorem material. This teaching was carried out to determine student learning outcomes after using Android-based mathematics teaching media with the Discovery Learning approach regarding Pythagorean theorem material for grade 8 junior high school students. There are 4 stages in this learning, namely planning, action, observation and reflection.

Keywords: learning; pythagoras; discovery learning; media; android.

INTRODUCTION

The rapid development of science and technology requires human diligence and discipline to improve human resources. Education has a crucial role in improving the quality of human resources to remain relevant to the times (Pahlevi, 2012a). The main factor in the successful development of a nation is education. Mathematics also plays an important role in education, especially in school learning and its application in everyday life.

Mathematics as a universal science is the basis for modern technological advances, plays an important role in the development of human thought patterns, and has a significant contribution in various disciplines (Ibrahim and Suparni 2008). This is due to the universal use of mathematics in various aspects of life. The experience of teaching mathematics in junior high school shows that some students still have difficulty understanding the theorems and formulas in some materials. One of these materials is pythagoras. Several factors contributing to the low mathematical abilities among students in Indonesia include their lack of interest in learning mathematics. This lack of interest is reflected in low motivation to learn, minimal participation, and students' discomfort with the subject. Students often express reluctance when given mathematics assignments, lack motivation to attempt solving problems, and prefer waiting for answers from peers or

teachers. Although they may not admit to not understanding when asked, they struggle to answer questions when their understanding is checked by the teacher.

Making learning media is a solution that can support teachers and students in the math learning process. The goal is to improve students' ability to understand the material and solve problems better (Belawati, 2003). Learning media that are organized systematically and use language that is easy to understand according to age and school level can help students learn independently (Prastowo, 2013). Learning media not only serves as a substitute for educators but can also explain material with language that is more easily understood by students (Daryanto, 2013).

Therefore, additional learning facilities, such as learning media, are needed to make learning more interesting and easy to understand. The use of learning media, such as the Nearpod application that can be accessed via the web, has been an effort to improve the effectiveness of mathematics learning. However, it needs to be recognized that some students may not fully understand the pythagorean material even though it has been presented through the media. Thus, there needs to be additional learning methods so that students can be more interested and easily understand the material. The Jungle of Pythagoras learning method is a pedagogical approach inspired by the teachings of Pythagoras, the ancient Greek mathematician. This approach emphasizes experimental learning, exploration, and discovery to deepen students' understanding of mathematical concepts, particularly geometry and trigonometry related to the Pythagorean theorem. It is expected to stimulate students' interest in learning and allow them to learn independently (Nasution, 2005).

In learning mathematics, students are invited to discover mathematical concepts, patterns, and structures on their own. This is expected to improve students' memory and allow them to apply the theory in the context of other problems. So the discovery learning approach or method is used (Gulo, 2004). Discovery learning is a contemporary learning method that encourages learners to develop their own concepts and inductive reasoning (Sundayana, 2013). With this method, students are expected to learn independently and feel satisfaction after successfully investigating the concept of the material. This method is also expected to strengthen the understanding of mathematical concepts, especially on pythagorean material (Widoyoko, 2011).

Based on previous research, the discovery learning model is seen as a solution to address identified lack of interest in learning. Discovery learning is an approach that encourages students to actively seek information through observation and experimentation, and then draw conclusions from their findings. Research by Sutrisno (2020) indicates that discovery learning is more effective in enhancing students' academic achievement and interest compared to conventional teaching methods. The model is believed to stimulate student interest by encouraging active participation.

Findings from Puspitadewi (2016) also support that discovery learning can increase student interest through independent processes of acquiring and synthesizing information. However, there is still limited research on the use of applications to support the implementation of discovery learning methods that are subsequently taught to students.

The research problem statement is: Does the discovery learning method assisted by the Nearpod application influence the understanding and application of junior high school students towards the context of the Pythagorean theorem?

The research objective is to enhance understanding of the Pythagorean theorem concept through the application of discovery learning method assisted by the nearpod application. Thus, the application of the jungle of pythagoras with the discovery learning method with the nearpod application aims to improve the learning outcomes of grade 8 junior high school students. The expected benefits of this research are to provide insights for all educational components to enhance the mathematics learning process towards achieving quality educational outcomes. Additionally, this study aims to assist teachers in selecting appropriate teaching methods to improve students' understanding of the Pythagorean theorem and help students attain a better comprehension of this concept.

Literature Review

Pythagoras

Pythagoras was an ancient mathematician and philosopher from ancient Greece. He is known for his contributions in the field of mathematics, especially in the theorem known as the Pythagorean Theorem. Although many aspects of his life and contributions are still debated, his legacy in mathematics remains a part of the history of science (Ibrahim & Suparni, 2012).

The Pythagorean theorem states that in a right triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the other sides. Therefore, if a,b, and c are the lengths of the sides of a right triangle with c as the length of the hypotenuse. Then the equation $a^2 + b^2 = c^2$.

The Jungle of Pythagoras

Learning with the concept of "The jungle of Pythagoras" is a combination of Pythagoras with a series of problems that occur in the jungle but have a relationship with each other. The purpose of "The Jungle of Pythagoras" concept is to give students examples of situations around them that are related to the Pythagorean theorem formula. Hopefully, this can help students understand the Pythagorean material easily (Dahar, 2006).

”The jungle of Pythagoras” is an interactive educational application designed to help students understand mathematical concepts, particularly the Pythagorean theorem, using engaging graphics and animations. The app integrates educational games and interactive exercises to enhance student engagement and deepen their understanding of mathematics. With a discovery learning approach, students are given opportunities to explore mathematical concepts on their own in a supportive environment. “The jungle of Pythagoras” also leverages technology in learning to create effective and engaging learning experiences.

Discovery Learning

Discovery learning is a learning method that provides opportunities for students to discover and understand certain concepts or principles independently through exploration

and experimentation. This method emphasizes students' active involvement in the learning process, where they develop their own understanding through observation, xperimentation, and investigation (Dahar, 2006). Discovery Learning can be applied in a variety of learning contexts, including mathematics. While it can be an effective learning method for building strong understanding, it is important to note that each student has a different learning style, and some students may require more targeted guidance within a learning context.

The implementation of discovery learning method in teaching the Pythagorean theorem involves several key steps. Firstly, teachers prepare learning materials that align with the mathematical concepts they intend to teach students. For example, they organize information about the Pythagorean theorem to present it clearly and structurally. Secondly, students are given tasks or experiments designed to activate their own discovery process related to these mathematical concepts. This may include measuring the sides of right triangles and verifying their underlying mathematical relationships. Thirdly, teachers play a crucial role in providing guidance and facilitation during the learning process. They use targeted questions to help students stay focused and guide their thinking towards a deeper understanding of the Pythagorean theorem. Through this approach, students not only learn actively but also develop a stronger and more enduring understanding of the taught mathematical concepts.

RESEARCH METHODS

This learning is a form of experimental learning at the junior high school level with research subjects consisting of 8th grade students. Making math learning media using the discovery learning method to make it easier for students to understand the Pythagorean theorem material is the focus of this research. The purpose of the research is to evaluate student learning outcomes after using android-based math learning media (Sugiono, 2016).

The research was conducted in a eigth-grade class at a private school in East Java, involving 28 students. This study took place in August 2023. The research utilized several instruments: observation sheets (documenting observations of classroom activities including student actions, teacher actions, communication, and the learning models used during the lesson), teaching reflection (containing the researcher's reflections after teaching), and mentor feedback sheets (providing the mentor's perspectives and evaluations of the researcher's teaching practices).

The learning process consists of several stages, namely planning, implementation, observation and reflection. The application used in learning is nearpod which can be accessed through the website www.nearpod.com. Students are asked to watch learning videos and answer questions directly that appear every 2-3 minutes in the application. After that, the teacher provides a more detailed explanation through the PPT (power point) that has been prepared. At the end of learning, students are asked to answer quiz questions and LKPD provided by the teacher.

Indicators of learning success include individual and classical completeness. A student is considered successful in learning if he/she achieves a score ≥ 70 out of a

maximum score of 100. A class is considered successful if at least 70% students achieve a score of ≥ 70 of the maximum score of 100 (Sudjana, 2010).

RESULTS AND DISCUSSION

This study was conducted in a junior high school in Malang. The learning method applied is based on the discovery learning design procedure which is explained through 4 steps, namely, planning, action, observation, and reflection. Each step in the procedure will be explained as follows (Pahlevi, 2012b).

Before the worksheets (LKPD) are presented to the students, they are first validated by a validator. Here are the results of the LKPD validation test.

Table 1. Results of LKPD Validation Test

No	Aspect	Average	Category
1	Content Quality	93%	Highly Valid
2	Question Quality	83%	Highly Valid
3	Question Accuracy	83%	Highly Valid
4	Presentation Technique	75%	Valid
5	Supporting Material Delivery	75%	Valid
6	Language Suitability	80%	Valid
7	LKPD Design	80%	Valid
8	User Frienliness	100%	Highly Valid
9	Utilization	83%	Highly Valid
	Total Average	83.5%	Highly Valid

Based on the calculation of the media and material validity of the LKPD, a final score of 83.5% was obtained. According to the criteria in Table 3.10, it can be concluded that the LKPD media and material are highly valid.

Table 2. Research Instrument Validity Test Results

No	Research Instrument	Validity Result (%)	Description
1	Lesson Plan (RPP)	88.5	Highly Valid
2	Teacher Response Questionnaire	92.9	Highly Valid
3	Student Response Questionnaire	92.9	Highly Valid
4	Effectiveness Test Questions	80	Valid

From the calculation of the research instrument validity for the E-LKPD, it was found that the final validity scores are as follows: the Lesson Plan (RPP) achieved 88.5%, indicating a very good level of validity. Similarly, both the Teacher Response Questionnaire and the Student Response Questionnaire scored 92.9%, demonstrating a very high level of validity. Additionally, the Effectiveness Test Questions were also deemed valid with a score of 80%.

Subsequently, a field trial was conducted. The researcher began by introducing the topic and instructed the students to form five groups. Following this, the researcher presented the worksheets (LKPD) in PowerPoint format using a classroom projector.

Figure 1. Field Trial Process

Afterward, an analysis of the validity, practicality, and effectiveness was conducted. Based on the data analysis, results from 14 students showed that 71% completed the tasks successfully, while 29% did not. These findings are summarized in Table 3.

Table 3. Percentage of Students' Learning Completion

Score Range	Category	Number of Students	Percentage (%)
$70 \leq$ score ≤ 100	Completed	10	71
$0 \leq$ score < 70	Not Completed	4	29
Total		14	100

From Table 3, the percentage of students who successfully completed their learning outcomes exceeds 70%. According to the effectiveness formula explained in Chapter methode, percentages ranging from 70.01% to 85.00% fall into the effective category. Therefore, it can be concluded that the average learning outcomes of students in understanding arithmetic sequences are considered effective.

Planning Stage

The lesson plan at each meeting is based on the steps of the discovery learning method. At the stimulation stage, the teacher provides a learning video that can be accessed through the website www.nearpod.com to prove the Pythagorean theorem. At the problem formulation stage, the teacher asks basic questions about how to prove the Pythagorean theorem $a^2 + b^2 = c^2$ as well as some brief statements given in the learning video

At the verification stage, the teacher asks students to conclude the results of the Pythagorean theorem proof that has been explained in detail in the PPT. Futhermore, the teacher asks students to formulate the results of the Pythagorean theorem proof experiment at the generalization stage. In order for students to better understand the material, they are asked to work on the LKPD that has been given by the teacher.

Action Stage

In this stage, the teacher carries out learning activities in accordance with the lesson plan that has been prepared previously. The implementation of learning is aimed at 8th

grade students. In this step, the teacher prepares students psychologically and physically to follow each learning process. the teacher tells students that on that meeting they will prove the Pythagorean theorem formula.

In the appreciation (initial) stage, the teacher asks questions about right triangles because they are needed in the Pythagorean theorem. To strengthen students' understanding, the teacher displays a picture of a right triangle as an illustration to prove the theorem. In addition to oral delivery, the teacher also explores students' knowledge through various illustrations of problem solving related to the Pythagorean theorem.

Data Collection Results

The process of collecting data results or observations is carried out simultaneously with learning activities. This stage aims to obtain information about the dynamics of teaching and learning activities and the level of student participation while using the discovery learning method. Observation data includes records of students' activities during the learning process and the achievement of their learning outcomes. The following is a summary of observation results related to student activities and student learning achievements.

Table 4. Student Activities

No	Indicator	Average Value	Description
1	Indicator 1	1,96	Simply
2	Indicator 2	2,04	Simply
3	Indicator 3	2,12	Simply
4	Indicator 4	1,56	Simply

Description:

1. Likes to ask questions during the learning process.
2. Likes to observe something related to finding theorems pythagoras in discovery learning.
3. Do not depend on others/be independent in solving problems related to the pythagorean theorem using nearpod.
4. Dare to present in front of the class.

Table 5. Student Learning Outcomes

No.	Criteria	Value Range	Number of Students	Percentage
1.	Completed	≥ 70	10	60%
2.	Not Completed	< 70	4	40%
	Total		14	100%

Inference

From The results of the observation found that during the implementation of discovery learning, the teacher managed to present the material in accordance with the lesson plan (lesson plan) well. However, there were some students who still had difficulty in maintaining their concentration during the learning process.

CONCLUSION

Learning the discovery learning method on Pythagoras material using the Nearpod application can improve student learning outcomes. In addition, the Nearpod application allows students to access learning materials easily in various locations, and gives them the opportunity to learn independently.

REFERENCES

Aedi, W.G. (2018). Upaya Meningkatkan Minat Belajar Matematika dengan Pendekatan Open Ended. *JPMI (Jurnal Pendidikan Matematika Indonesia)*, 3(2), 41-46.

Belawati. (2003). *Pengembangan Bahan Ajar*. Penerbitan UT.

Dahar, R. (2006). *Teori-Teori Belajar dan Pembelajaran*. Erlangga.

Daryanto. (2013). *Penyusunan Modul Bahan Ajar untuk Persiapan Guru dalam Mengajar*. Gaya Media.

Gulo, W. (2004). *Strategi Belajar Mengajar*. PT. Grasindo.

Ibrahim, & Suparni. (2012). *Pembelajaran Matematika Teori dan Aplikasinya*. Suka Press.

Nasution, S. (2005). *Berbagai Pendekatan dalam Proses Belajar dan Mengajar*. Bumi Aksara.

Pahlevi, R. (2012a). *Pengembangan Modul untuk Meningkatkan Prestasi Siswa pada Mata Diklat Menginterprestasikan Gambar Teknik di SMK Muhammadiyah 01 Paguyangan Brebes*. Universitas Negeri Yogyakarta.

Pahlevi, R. (2012b). *Pengembangan Modul untuk Meningkatkan Prestasi Siswa pada Mata Diklat Menginterprestasikan Gambar Teknik di SMK Muhammadiyah 01 Paguyangan Brebes*. Universitas Negeri Yogyakarta.

Prastowo, A. (2013). *Panduan Kreatif Membuat Bahan Ajar Inovatif*. Diva Press.

Saifuddin. (2014). *Pengelolaan Pembelajaran Teoritis dan Praktis*. Yogyakarta, Indonesia: Deepublish Publisher.

Sudjana, N. (2010). *Penilaian Hasil Proses Belajar Mengajar*. PT. Ramaja Rosdakarya.

Sugiono. (2016). *Metode Penelitian Kuantitatif, Kualitatif dan R&D*. Alfabeta.

Sundayana. (2013). *Media Pembelajaran Matematika*. Alfabeta.

Widoyoko. (2011). *Evaluasi Program Pembelajaran*. Pustaka Belajar.

Yuniawatika. (2021). *Penyusunan Perangkat Pembelajaran Terpadu Berorientasi Karakter Peduli Lingkungan dan Kompetensi Abad 21 di Sekolah Dasar*. Madiun: Bayfa Cendekia Indonesia.