

Improving Mathematics Learning Outcomes by Using the Hands on Activity Learning Model

Helmi Adnan^{1*}, Arie Purwa Kusuma², Neng Nurwatin²

¹SMP Pangeran Jayakarta, Bekasi, Indonesia

²Mathematics Education, STKIP Kusuma Negara, Jakarta, Indonesia

*helmiadnan40@gmail.com

Abstract

Research to improve mathematics learning outcomes regarding the Pythagoras theorem using the Hands on Activity learning model. The research method used is Class Action Research in 3 cycles. Each cycle consists of four stages, namely planning, implementation, observation and reflection. The research was carried out for 1 month, more precisely from October to November 2023. The students who were the object of the research were class VIII.B, totaling 29 students. Data was collected through observation, interviews and tests. The research results show that learning mathematics on the Pythagorean theorem material using Hands on Activity learning can improve student learning outcomes, this can be seen from the increase in the average score of students. In the first cycle, 16 students (55,2%) completed their studies with an average score of 60,55. In cycle II, there were 22 students (75,9%) who completed it with an average score of 78,00. In cycle III, 26 students (89,7%) completed it with an average score of 85,38. From cycles I to III there was an increase, with learning completeness achieving research targets. It can be concluded that using Hands on Activity learning can improve student learning outcomes on the Pythagorean theorem material.

Keywords : learning model, mathematics learning outcomes, pythagoras theorem.

1 INTRODUCTION

The world of education cannot be separated from the word learning, where learning itself is a process that contains a series of actions by teachers and students based on a reciprocal relationship so that it takes place in an educational situation to achieve certain goals (Akhiruddin., et.al., 2019), So it is clear that success in learning is influenced by a teacher. Teachers are a very important element and cannot be ignored in the teaching and learning process, because teachers can determine the success or failure of a teaching and learning process (Sopian, 2016). Learning activities are also called active learning, because during the classroom conditioning process, active learning is used so that students can be more independent (Susilowati, 2016).

In this era, teachers are not only a source of learning that has a big influence on student learning outcomes, but teachers must create interesting learning models so that students are enthusiastic and motivated in participating in learning activities. Meanwhile, currently many traditional learning models are not interesting enough or do not involve students actively in the learning process, this results in a lack of motivation and understanding of the material. The teaching and learning process is the core of the formal education process in schools. The teaching and learning process in schools has components that are grouped into three main categories, namely teachers, students, and subject matter (Abdullah, 2016). In the learning process, students learn from their experiences constructing knowledge, then giving meaning to that knowledge. By experiencing for themselves, finding for themselves, and in groups such as playing, students become happy, so that interest in learning grows. In

learning, a concentration of attention is needed so that what is learned can be understood, so that students can do something that they could not do before. This is where behavioral changes occur, these behavioral changes include the entire personality of the student, both cognitive, psychomotor, and affective. To increase interest, the learning process can be carried out in the form of activities that direct students to work and experience everything in the environment in groups (Daulay, 2022; Safnowandi, 2016)

Learning that is too theoretical often does not provide opportunities for students to apply concepts in real situations. Especially in mathematics subjects, many students experience difficulty in understanding mathematical concepts only through verbal explanations and theoretical exercises. To strengthen this opinion, researchers conducted a preliminary study. Based on a preliminary study conducted by researchers on class VIII students at SMP Pangeran Jayakarta, Bekasi City, almost all of the material in mathematics subjects had low grades. According to the results of interviews with mathematics subject teachers in class VIII of SMP Pangeran Jayakarta, the model used by teachers when teaching still uses the traditional learning model using the lecture method accompanied by assignments. This model does not maximize students becoming more active in solving problems in learning mathematics.

More specific problems arise during the process of learning mathematics regarding the Pythagorean theorem, which are found to include students not wanting to ask questions if they experience difficulties in learning for reasons of fear and embarrassment, students not being able to understand the questions given by the teacher, students being unable to complete the assignments given by the teacher, both work in class and homework. Based on analysis of student test results (source of daily test scores found in mathematics teacher grade books), 86,2% of students were unable to answer questions on the Pythagorean theorem, so only 13,8% reached the passing grade.

Students' not maximizing efforts in achieving learning outcomes according to the passing grade determined by the school, especially in mathematics, is an obstacle in achieving learning goals. Student activities in the learning process are less dominant, so students are not motivated to learn mathematics taught by the teacher. This results in students' mathematics learning outcomes being low and not as expected. The impact is that learning completion is not achieved as determined.

As we know, students' mathematics learning outcomes are greatly influenced by the learning process, therefore it is necessary to implement a mathematics learning model that can motivate students. One learning model that is interesting and can foster students' curiosity is the Hands On Activity learning model, the advantage of this model is that it can make students active, and with this model students are invited to experiment to make it easier to understand the material presented by the teacher (Nisa., et.al., 2020).

The application of the Hands On Activity learning model is useful for deepening students' knowledge about the Pythagorean theorem material which can be studied easily and with fun. The Hands On Activity learning model is a model for learning knowledge using props or material objects that are adapted and can be touched and played with, thereby giving rise to scientific phenomena that can be observed and observed. Hands On Activity makes students directly observe and identify the objects being observed (Nisa., et.al., 2020). One of the learning methods that is suitable for overcoming these problems is to apply the Active Learning learning model, which is one method that has the potential to make students happy. According to Leonard et al. (2019), the Active Learning learning model also has advantages, including: 1) students become more active in the learning process; 2) learning is more enjoyable because there are variations in learning techniques from the media used; and 3) students are trained to solve problems independently, both individually and in groups. The Active Learning learning model with the group method is a learning model developed from the concepts/principles of brain work theory, constructivist learning

theory, and collaborative/cooperative learning theory (Astarina, 2017). A learning model that emphasizes the activities and active participation of students in terms of intellectual and emotional aspects optimally through learning activities within and between teams (team teaching) to gain more meaningful mastery/understanding of the material. The results of this study are supported by the results of other studies which state that the application of the Active Learning learning model can improve the activity and learning outcomes of class VIII students of SMP Negeri 12 Tasikmalaya. In the activities of students and teachers and student learning outcomes there is always an increase, the advantages of implementing the Active Learning learning model, namely teachers find it easier to attract students' interest and enthusiasm for learning, because students are happier interacting directly with students and teachers themselves in learning in class (Ariati, Z., & Hirliana, N., 2024).

Based on existing phenomena, researchers want to help mathematics teachers to improve the learning process, especially during the mathematics learning process by implementing the Hands On Activity Learning Model. In accordance with the background description above, the researcher is interested in observing further by conducting classroom action research entitled: "Improving Mathematics Learning Outcomes by Using the Hands On Activity Learning Model".

2 RESEARCH METHODS

The method used in this research is classroom action research. Class Action Research is action research which aims to improve and improve the teaching and learning process in the classroom (Herlanti, 2006). This classroom action research was carried out to observe events in the classroom framed over several periods or cycles using the Hands On Activity learning model. Each cycle includes planning, implementation, observation and reflection stages. The cycle stops when the success criteria have been achieved.

The process design used in this classroom action research is a spiral action research model which refers to the Kemmis and Mc. Taggart classroom action research model. The Kemmis and Mc Taggart model of classroom action research essentially takes the form of tools or strands with one tool consisting of four stages, namely: planning, action, observation, and reflection. The four stages are one unit in the cycle (Pahleviannur., et.al., 2022). The cycle repeats continuously until the problem at hand is resolved.

The following is a process chart used in classroom action research, the cycle model used is spiral rotation which refers to the classroom action research model developed by Kemmis Mc. Taggart which consists of four stages, namely: planning, action, observation, and reflection. The research design can be seen in Figure 1.

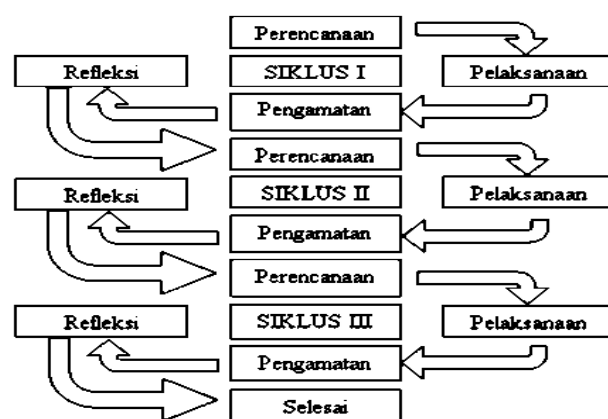


Figure 1. Kemmis and Mc Taggart Model Cycle Chart

This research was carried out at SMP Pangeran Jayakarta, Bekasi. The subjects of this research were 29 students. The data collection tool used was a test to record or observe student achievement which was in line with the observed assessment targets. Observation to obtain data or information from the object being observed. Interview to avoid misinformation. Data is divided into 2 types, namely qualitative from observations of teachers, students, and interviews, while qualitative data is obtained from written tests carried out by participants.

3 RESULT AND DISCUSSION

This research began with observation activities and a short interview with the class VIII.B teacher at SMP Pangeran Jayakarta, Bekasi City on 23 October 2023. Based on the interview, it was discovered that in the mathematics teaching and learning process of students at SMP Pangeran Jayakarta, Bekasi City, especially class VIII.B, during this time the teacher still using lecture and assignment methods. The results of interviews with teachers show that student learning outcomes, especially in mathematics class VIII.B, are still relatively low.

The success of the teaching and learning outcomes process in mathematics learning can be measured from the success of students who actively participate in these activities. This success can be seen from the level of understanding and mastery of the material as well as the students' learning outcomes. The higher the understanding and mastery of the material, the higher the student's learning outcomes. Based on the results of initial observations, it was found that the results of mathematics tests on the Pythagorean theorem material were still low and far below the Minimum Completeness Criteria, while the passing grade for mathematics subjects was 72. There were 25 students who had not yet reached the passing grade (86,2%), while Only 4 students (32,8%) had reached the passing grade, with an average class score of 57,07.

A good learning process can create an active teaching and learning process with two-way communication between teachers and students. Teaching and learning is a process that must be experienced by students which not only emphasizes what is being learned, but also emphasizes how they must learn. Therefore, the results of these observations and interviews prove that there is a need to improve learning so that researchers will prove that using the Hands On Activity learning model can help students to be more active in improving mathematics learning outcomes, namely by using the Hands On Activity learning model on the Pythagorean theorem material in class. VIII SMP Pangeran Jayakarta, Bekasi City. The method used in this research is Classroom Action Research. This Classroom Action Research procedure consists of 3 cycles. Each cycle consists of planning activities, implementing actions, observing and reflecting. Each cycle has 3 meetings, where 2 meetings involve in-depth study of the material and 1 meeting involves carrying out a cognitive test. The time allocation is 2 lesson hours (2x35 minutes) for each face-to-face meeting.

Data collection uses observation, documentation and interviews which are used as qualitative data. For quantitative data purposes, it was obtained from the results of students' work assessments which were carried out three times on the Pythagorean theorem material, cycles taken from observation, documentation, interviews and questionnaires as non-test data. Observations are carried out by observers to obtain an objective picture of conditions during the learning process, as well as observing students' activities during research actions. Interview activities were carried out to ask collaborators for responses regarding the ongoing learning process. The function of administering questionnaires is to determine responses from students and the consequences arising from action activities during the learning process. The basic competencies developed in this research are explaining and proving the Pythagorean

theorem and solving problems related to the Pythagorean theorem and Pythagorean triples.

This research shows that in this way the action hypothesis can be achieved based on the final results of the 3rd instrument test, there is an increase in the mathematics learning outcomes of class VIII students at SMP Pangeran Jayakarta, Bekasi City on the Pythagorean theorem material using the Hands On Activity learning model. This can be seen in figure 2 below:

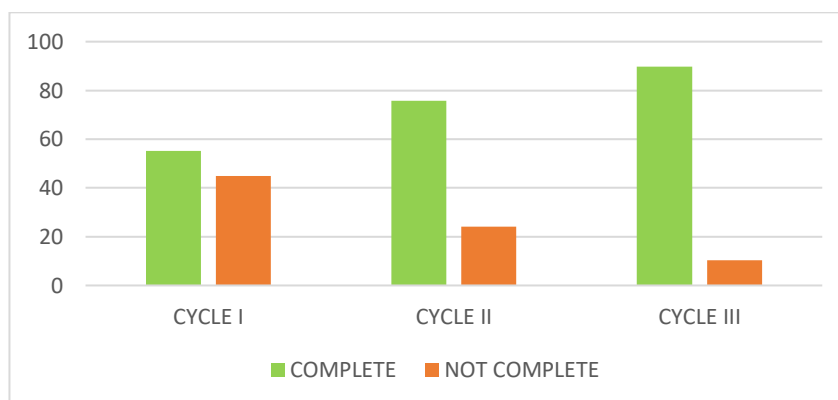


Figure 2. Percentage of Complete Learning Outcomes

4 CONCLUSION

Based on the Classroom Action Research that has been described, the author can conclude that the Hands On Activity Learning Model can improve student learning outcomes in class VIII.B Pythagorean Theorem material at SMP Pangeran Jayakarta, Bekasi City. The increase in students' understanding is evident from the increase in the average value from 60,55 in cycle I, the average value from 78,00 in cycle II to an increase in average to 85,38 in cycle III. Apart from that, the advantage of using the Hands On Activity learning model is that students become more active, they are able to relate learning to everyday life, and are free to develop their own ideas. The only problem that initially occurred was that students were not motivated and did not dare to express opinions about the learning they received because they were used to the traditional learning model with the lecture method which resulted in teacher-centered learning. With the Hands On Activity learning model, learning is student-centered.

5 REFERENCES

- Abdullah, R. (2016). Learning in the Perspective of Teacher Creativity in the Utilization of Learning Media. *Lantanida Journal*, 4(1), 35-49. <http://dx.doi.org/10.22373/lj.v4i1.1866>
- Akhiruddin., et.al. (2019). *Learning and Teaching*. Gowa: CV. Cahaya Bintang Cemerlang.
- Ariati, Z., & Hirliana, N. (2024). Application of Active Learning Model in Improving the Activity and Learning Outcomes of Class VIII Students in Biology. *Biocaster: Journal of Biology Studies*, 4(2), 72-80.
- Astarina, R. (2017). Improving Activity and Learning Outcomes through Small Group Work Learning Strategy for Class IV Students of SD Negeri 1 Tangjungenang. *Thesis. University of Lampung*

- Daulay, H. (2022). Islamic Cultural History Teacher Strategy in Overcoming Learning Boredom at MTs. Ulumul Qur'an. *Educate: Journal of Education and Teaching Sciences*, 1(2), 152-169. <https://doi.org/10.56114/edu.v1i2.270>
- Herlanti, Yanti. (2006). Pocket Book: Questions and Answers about Science Education Research. *Jakarta: Department of Science Education, Faculty of ITK, UIN Syarif Hidayatullah*.
- Kusuma, A. P., Rahmawati, N. K., & Ramadoni, R. (2020). The Application of the Accelerated Learning Cycle, Brain-based Learning Model, and Direct Instruction Model toward Mathematical Reasoning in Terms of Mathematical Communication. *Al-Jabar: Jurnal Pendidikan Matematika*, 11(1), 21-28.
- Kusuma, A. P., Waluya, S. B., Rochmad, R., & Mariani, S. (2021). Algebra problem solving ability based on solo taxonomy assessed from cognitive style. *Jurnal Pendidikan Matematika dan IPA*, 12(2), 148-158.
- Leonard., Wibawa, B., & Suriani, S. (2019). Classroom Learning Models and Methods. *South Jakarta: Institute for Research and Community Service, Indraprasta PGRI University*
- Nisa, Farhatun., et.al. (2020). Implementation of the Hands-On Learning Model to Improve Students' Mathematics Learning Outcomes in Statistics Material. *Proceedings of the National Seminar on Education STKIP Kusuma Negara II*, 324-329.
- Pahleviannur, Muhammad Rizal., et.al. (2022). *Classroom Action Research*. Sukoharjo: Pradina Pustaka.
- Rahmawati, N. K., Kusuma, A. P., Widyawati, S., & Putra, F. G. (2020). Google-based learning and learning motivation: The impact and interaction on students' mathematical communication. *Tadris: Jurnal Keguruan Dan Ilmu Tarbiyah*, 5(2), 215-223.
- Safnowandi, S. (2016). The Use of Role Playing Method on Biology Learning Interests and Outcomes of Class X Students of MA Addinul Qayyim Kapek Gunungsari in the 2010/2011 Academic Year. *Mandala Education Scientific Journal*, 2(2), 133-139. <http://dx.doi.org/10.58258/jime.v2i2.89>
- Sopian, Ahmad. (2016). Duties, Roles, and Functions of Teachers in Education. *Islamic Tarbiyah Journal*, 1(1).
- Susilowati. (2016). Increasing Science Learning Activities and Outcomes through STAD Type Cooperative Learning in Class IX Students of SMP Negeri 1 Wedarijaksa in the 2015/2016 Academic Year. VII National Science Seminar in 2016. *Innovative Science Educators Who Are Competitive in the ASEAN Economic Community (AEC)*, 73