

Student Team Achievement Division with Problem-Based Learning-Based Worksheet (LKPD): Improving Students' Math Affection and Cognition

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Abstract

This study aims to determine the improvement of mathematics learning outcomes through the application of the Students Team Achievement Division (STAD) learning model with Problem Based Learning (PBL) based LKPD on set material in class VII A students of SMP Islam Al Azhar 18 Salatiga. This research is class action research conducted in two cycles through the steps of planning, implementation, observation, and reflection. Data collection techniques were tests, questionnaires, observation sheets, and documentation. The data were analyzed by comparing the achievement with the Minimum Completeness Criteria (KKM) and marked by an increase in classical completeness in each cycle. The results showed that the application of the STAD learning model with PBL-based LKPD can improve the learning outcomes of set material. This increase in learning outcomes is based on data on student learning outcomes with an average class in cycle I of 73.54 with 10 students completed (41.66%) and 14 students not completed (58.33%), then increased in cycle II with an average class of 87.08 with 21 students completed (87.5%) and 3 students not completed (15.5%). The research stopped in cycle II because it had reached the success indicator, namely $\geq 85\%$ of the total number of students in one class obtained a score that met the KKM, namely ≥ 80 .

Keywords: *math learning outcomes, student worksheet, PBL, STAD, set.*

INTRODUCTION

Mathematics plays a role in the process of scientific development. It can be said that the development of science and technology today relies on mathematics.



Mathematics needs to be given to students from elementary school to college. In connection with this, the government continues to strive to improve the quality of mathematics teaching.

One of the materials that are still considered difficult by students is set material. The set is material that most students have difficulty in drawing Venn diagrams, besides that many students have difficulty in understanding mathematical sentences or story problems presented in set material, resulting in understanding of algebraic mathematics concepts, especially in set material, is not optimal.

The application of the Student Team Achievement Division (STAD) learning model with Problem Based Learning (PBL) based LKPD is expected to support the success of learning Mathematics on set material to improve learning outcomes. Previous research shows that the Student Team Achievement Division (STAD) learning model is effective for developing learners' abilities (Makhrus, 2020; Tiwow et al., 2020; Yalçın & Hasan, 2018). In this learning technique, combining study groups can be applied to enhance the learning of various facts, concepts, and skills. (Silberman, 2014).

According to Slavin, STAD is a model of cooperative learning in which students work in small heterogeneous groups to learn the rules and procedures as they listen to the whole class presentation by the teacher, complete group work/worksheets, take an exercise/quiz/test without help from others, and then get feedback on their group achievement (Mukuka et al., 2021). STAD learning has the potential to make students the center of learning because this learning requires students to work together, interact, and communicate in completing tasks. (Purba & Andhany, 2018). Isjoni stated that the Student Team Achievement Division type cooperative learning model is a cooperative learning model that emphasizes activities and interactions among students to help each other master the subject matter in order to achieve maximum achievement. (Hidayat et al., 2021).

LKPD is a sheet that contains steps and instructions for completing an activity that students must do (Majid, 2012). LKPD contains steps that guide students to find something, these steps are arranged systematically and regularly so that students work correctly and in sequence as expected by the teacher (Silvia & Mulyani, 2019). With LKPD, students in the learning process become more active and will create effective interactions between teachers and students so that they are able to find mathematical

concepts independently with the help of LKPD (Relia, 2012). Prastowo revealed that LKPD serves to minimize the role of educators, make it easier for students to understand learning materials, make students active, and facilitate the delivery of the learning process (Herdiansyah, 2018). The document of the Ministry of Education and Culture of the Republic of Indonesia states that teachers need to develop their own LKPD to activate students' learning abilities, to improve creative thinking skills, and improve learning outcomes (Dermawan & Andartiani, 2022).

The document of the Ministry of Education and Culture of the Republic of Indonesia states that PBL model is a learning model that applies contextual problems so that it stimulates students to learn to solve real world problems (Tabun et al., 2020). Problem Based Learning is a learning model that begins with a problem, so that in the learning process students must actively think, communicate, find and process data & finally conclude (Rahmat, 2018). Problem-based learning is learning that started and centered on a problem (Zahara et al., 2020).

Problem Based Learning focuses on a chosen problem so that learners can learn concepts related to the problem but also the scientific method of solving the problem (Novitri et al., 2017). Tan stated that PBL is implemented through 5 stages, namely, meeting the problem, problem analysis and learning issues, discovery and reporting, discovery and reporting, solution presentation and reflection serta overview, integration and evaluation (Wulandari et al., 2019). Fatade, Mogari, and Arigbabu stated that the PBL is one of the modern methods of teaching that allows each learner to construct his/her own schema (Angga, 2022). Dalam PBL juga terdapat muatan penelitian oleh siswa (Laforce et al., 2017).

Many studies recommend PBL to be implemented to teaching various subjects, including Mathematics (Amin et al., 2021). The PBL model has a general objective to improve critical thinking skills and problem solving skills, behavior and social skills according to the role of adults, skills to learn independently (Putra & Muqoyyidin, 2019). PBL must be understood as a learning strategy to develop hard and soft skills related to mathematics (Cruz et al., 2022) The application of PBL can be used to stimulate students to think more critically and creatively (Salam, 2022).

With the application of the Student Team Achievement Division (STAD) learning model with Problem Based Learning (PBL) based LKPD, it is hoped that it can help

students to solve the problems presented in this lesson, make the learning process meaningful for students, and can significantly improve student learning outcomes. Based on the background described above, the researcher will conduct a class action research about application of STAD Learning Model with PBL based LKPD to improve learning outcomes.

METHODS

This type of research is Classroom Action Research. Classroom Action Research is characterized by an action in an effort to improve learning outcomes in the classroom. The research was conducted in class VII A of SMP ISLAM AL AZHAR 18 Salatiga. The research was conducted in at least two cycles. Each cycle in action research consists of four stages, namely 1) planning, 2) implementation, 3) observation, and 4) reflection. The subjects of this study were students of class VII A totaling 24 people consisting of 13 male students and 11 female students. The research instruments used were observation sheets, test questions, and questionnaires to determine the improvement of students' learning outcomes. The criteria for individual learning completeness of students is 80, while the criteria for classical learning completeness is if there are 85% of students who have met the criteria for individual learning completeness.

RESULTS AND DISCUSSION

The results of the study, namely the analysis of instrument test data and discussion of the implementation of cycle I and cycle II in accordance with the objectives to be achieved, namely to determine the improvement of learning outcomes using the Student Team Achievement Division (STAD) learning model with LKPD based on Problem Based Learning (PBL) set material in class VII A students of Al Azhar 18 Salatiga Islamic Junior High School.

Cycle 1

In cycle 1, researchers conducted learning observations. The results of learning observations in cycle I can be seen in Table 1.

Table 1. Data on Learning Outcomes of Cycle I

Score	Number of Students	Percentage of Completion
≥ 80	10	41,66%
< 80	14	58,33%

Based on Table 1 data on the acquisition of student learning outcomes in cycle I, the class average value obtained by students in cycle I was 73.54, where 10 students received the title of complete with a percentage of completeness of 41.66% and 14 students did not complete with a percentage of completeness of 58.33%. From the results obtained in cycle I, it still has not reached the predetermined success indicators.

Affective assessment was carried out at the first cycle meeting which was assessed by the teacher. The criteria assessed in the affective domain include honesty, responsibility and self-confidence of students. The results of the attitude assessment of students in one class in cycle I are summarized in Figure 1.

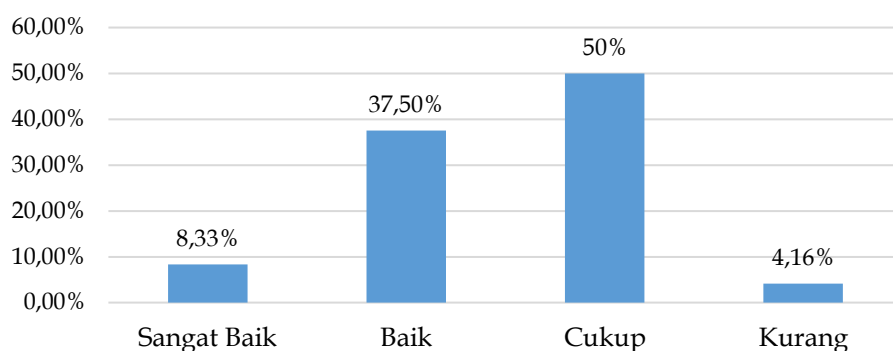


Figure 1. Graph of Students' Affective Learning Outcomes Cycle I

Based on Figure 1, affective learning outcomes in cycle I get the percentage of students who get a very good category as much as 8.33%, for the good category as much as 37.5%, for the sufficient category as much as 50% and the less category as much as 4.16%. The class average value for affective values is 2.42 so that it is in the good category. Thus it can be concluded that the affective learning outcomes in class VIII A have not yet reached the predetermined indicators, namely 85% of the number of students with good/very good predicates. Students' psychomotor learning outcomes are measured from performance when working on LKPD. In cycle I, the average value obtained by students in one class was 87.5% and entered the good category. However, there are still some students who are less active during learning and discussing with their groupmates. The results of observations of teachers are measured through observation sheets by observing teacher activities during learning. The results of observations of teachers in cycle I obtained a percentage of 75.81% in the sufficient category.

As for the reflection on learning activities in cycle I, there are several shortcomings, including: (a) Teachers manage the class better by giving assertiveness to students so that the class situation is more conducive. (b) Plan a more detailed time allocation and better monitor students' activities so that learning can be carried out effectively. (c) Teachers study in more detail and apply learning models and approaches to current learning. (d) Teachers make learning more attractive by involving students in learning, so that students are more enthusiastic in participating in learning.

Cycle II

In cycle II learning takes material about set operations. Based on these activities, the learning outcomes in cycle II can be seen in Table 2.

Table 2. Data on the Acquisition of Cycle II Learning Outcomes

Score	Number of Students	Percentage of Completion
≥ 80	21	87,5%
< 80	3	12,5%

Based on Table 2 above, an increase was obtained from the previous cycle, namely 21 students in the complete category with a percentage of 87.5% and 3 students in the incomplete category with a percentage of 12.5%. So it can be concluded that the value of learning outcomes in one class has met the predetermined success indicator, namely $KKM \geq 80$, with a percentage of 85% of the total number of students.

Affective assessment in cycle II used an observation sheet assessed by the teacher. The results of affective scores for one class can be summarized in Figure 2.

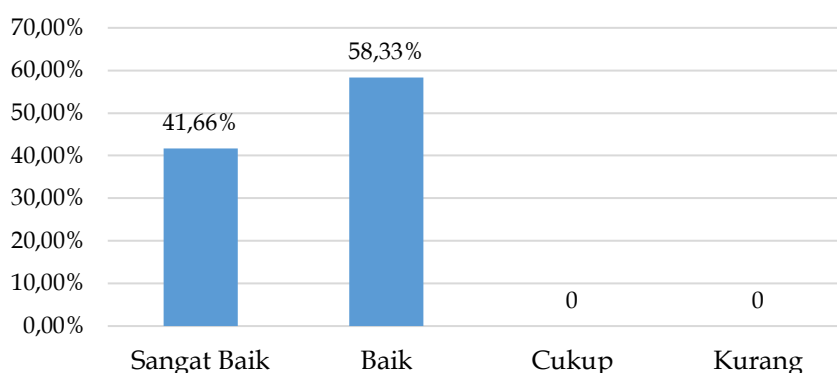


Figure 2. Graph of Students' Affective Learning Outcomes Cycle II

Based on Figure 2 above, it can be concluded that affective learning outcomes have increased in cycle II from the previous cycle. This increase can be seen from the percentage of students in the very good category of 41.66% and students in the good

category of 58.33%. So it can be concluded that the Student Team Achievement Division (STAD) learning model with Problem Based Learning (PBL) based LKPD can improve the affective learning outcomes of students in class VII A of Al Azhar 18 Salatiga Islamic Junior High School. Psychomotor learning outcomes in cycle II also increased, where the increase in scores reached 95% with a very good predicate and students had begun to be active during discussions and were more enthusiastic about learning. The improvement in student learning outcomes is supported by the success of the teacher in teaching during the learning process by providing motivation and preparing everything needed before starting learning. As well as the application of the Student Team Achievement Division (STAD) model with Problem Based Learning (PBL) based LKPD in learning also makes students more active, enthusiastic and enthusiastic in participating in learning. The improvement of the teacher's ability to teach can be seen in cycle II which has an increase in percentage of 91.49% and is in the very good category. So it can be said that the application of the Student Team Achievement Division (STAD) model with LKPD based on Problem Based Learning (PBL) set material in class VII A students experienced success in its application in this study.

These results are in accordance with previous research related to the application of STAD in mathematics learning. STAD cooperative learning model can encourage students to learn math more enthusiastically, improve the learning process, and learning outcomes. (Amnajuita, 2018). Application of STAD can develop geometric problem solving ability and mathematical disposition (Saputra, 2022), math learning outcomes (Makhrus, 2020; Yantik et al., 2022). Learning with cooperative and STAD model give the positive impact to the interest on mathematics (Tiwow et al., 2020). TPT supported STAD technique is more effective in increasing the academic achievement of the students in mathematics course compared to the teacher-centred teaching; however, it is less effective than teacher-centred teaching in their mathematics attitudes (Yalçin & Hasan, 2018). The Student Teams-Achievement Division (STAD) was found to be an effective approach for enhancing students' mathematical reasoning alongside self-efficacy belief (Mukuka et al., 2021). It implies that STAD in particular is effective to teaching math and other lessons for SMP, provided indicators to evaluate learning activities are based upon the criteria used in this study (Hartati, 2018).

These results are also in line with the theory related to the potential of PBL. The application of PBL can stimulate students' thinking skills (Yuliana et al., 2021). The results of research related to the application of PBL are that PBL improves critical thinking skills (Hobri et al., 2018; Nainggolan, 2020; Setyaningsih & Abadi, 2018; Trisanti, 2017). The application of PBL has an impact on students' mathematical literacy ability (Tabun et al., 2020).

CONCLUSION

Based on research activities that have been carried out in two cycles and based on research data, data analysis and discussion, it can be concluded that the Student Team Achievement Division (STAD) learning model with Problem Based Learning (PBL) based LKPD can improve the learning outcomes of students in class VII A SMP Islam Al Azhar 18 Salatiga on set material. The increase can be seen from the learning outcomes in cycle I, students who reached the success indicator were completed as many as 10 students (41.66%) and 14 students (58.33%) with an average class score of 73.54. In cycle II there was an increase, students who had reached the success indicator were completed 21 students (87.5%) and those who were not completed were 3 students (12.5%) with an average class score of 87.08.

In an effort to improve the quality of education, the following suggestions need to be made: 1) Teachers are expected to improve professionalism by choosing and using more innovative learning models so as to create interesting and enjoyable learning and can improve student learning outcomes. 2) Students are expected to be able to take part in learning by always being enthusiastic and concentrating more when participating in class teaching and learning activities, so that the material obtained will be easier to understand. 3) Writers who will conduct classroom action research can develop broadly and increase understanding of classroom action research, so as to produce research that can improve the quality of education in Indonesia.

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