Improving Understanding of Data Processing Concepts through the TARL Approach (*Teaching at the Right Level*) in Class 5 Students of SD Muhammadiyah 23 Surakarta

Rizky Amalia[1], Mohamad Waloyo[2]
PPG, FKIP, Universitas Muhammadiyah Surakarta
Email : rizkyamalia1082@gmail.com

Abstract

This study aims to enhance the understanding of data processing concepts among fifth-grade students at SD Muhammadiyah 23 Surakarta through the Teaching at the Right Level (TaRL) approach. The research was conducted using a Classroom Action Research (CAR) methodology, which involved two cycles, each consisting of two meetings. The primary issue identified was the low level of students' comprehension of data processing concepts, such as data collection, classification, interpretation, and the use of diagrams and tables. To address this, an active and contextual learning approach was implemented, involving real-life data collection and analysis, the use of digital tools for data visualization, and Problem-Based Learning (PBL) strategies. In the first cycle, the intervention revealed limited improvement in student engagement and learning outcomes. Consequently, the second cycle introduced revised group formations and additional instructional strategies, including ice-breaking activities. The results showed a significant improvement in student participation and understanding, with an increase in average class scores from 65 in the first cycle to 81 in the second cycle. The percentage of students meeting the learning criteria rose from 14.28% to 82.14%. This study concludes that applying TaRL, along with improved group dynamics and interactive learning methods, effectively enhances students' data processing skills and overall learning outcomes.

Keywords: Teaching at the Right Level (TaRL), Problem-Based Learning (PBL), data processing, Classroom Action Research, student engagement.

INTRODUCTION

In mathematics learning in elementary schools, the problem of low understanding of data processing concepts among 5th grade elementary school students is often encountered. Even though data processing is an integral part of the curriculum, students often experience difficulties in understanding and applying basic concepts such as collecting, grouping, interpreting data, and using diagrams and tables (Endrayanto & Harumurti, 2014). Test results and assignments given to students often reflect their difficulty in understanding this material. Many students have difficulty digging, grouping and analyzing data, which shows that there is a gap between the ideal understanding expectations and the reality that occurs in the field. The lack of application of learning methods that are appropriate to students' developmental stages and the minimal use of appropriate approaches also contribute to this problem.

Data processing is a very important skill, both in academic contexts and in everyday life. The ability to collect, group, and interpret data is needed to understand information presented in various forms such as graphs, tables, and diagrams. Without an adequate understanding of these concepts, students will face difficulties in comprehending information and completing various tasks involving data.

This problem requires immediate attention and action because data processing is one of the basic skills that must be mastered from an early age to equip students with the analytical skills needed in various aspects of life. Therefore, there is a significant gap between ideal expectations regarding understanding of data processing concepts and the reality of low student understanding. This gap underscores the need for action to close the gap between ideal expectations and the reality of inadequate student understanding. Data processing is a fundamental skill that must be mastered from an early age, because this skill is very important for developing students' analytical abilities which are needed in various aspects of life.

To increase understanding of data processing concepts in grade 5 students at SD Muhammadiyah 23 Surakarta, there are several alternative solutions that can be applied, including implementing an active and

contextual learning approach which aims to involve students directly in the learning process by linking teaching material to real situations. For example, students can collect data about classmates' eating habits and analyze it in graphical form, so that they understand data processing in their everyday context. Apart from that, you can utilize technology in learning which involves the use of digital tools such as applications or software for visualization and data analysis which can make the material more interesting and make it easier for students to understand. An example is using a graphic application to visualize the results of a survey carried out by students. the use of problem-based learning methods can also be applied. This method teaches students through solving real challenges that require data processing, such as simple research projects that involve collecting and analyzing data to find patterns or solutions. Lastly, collaborate between teachers and students to strengthen the learning process with active interaction, where teachers provide direct feedback and students share their understanding. For example, teachers can facilitate group discussions where students discuss the results of their data analysis and receive guidance from the teacher. Applying these solutions effectively can help students understand data processing concepts in a more applicable and relevant way.

METHOD

The research method used was classroom action research (PTK). This research was carried out in two cycles with each cycle consisting of 2 meetings. The research was conducted in the odd semester of the 2024/2025 academic year in Class V of SD Muhammadiyah 23 Surakarta. Data collection took place in Class V of SD Muhammadiyah 23 Surakarta starting in cycle 1 which consisted of two meetings. The subjects in this research were all students in class V of SD Muhammadiyah 23 Surakarta, totaling 28 students. Classroom Action Research is carried out in a class using several cycles, each cycle consisting of 4 stages using the Kemmis and Taggart spiral model. The model used in this classroom action research uses four components in Figure 1, which occur in cycle I and cycle II, namely Plan (*Planning*), action (*Action*), observation (*Observation*) and Reflection (*Reflection*).

Research data was collected using various techniques, namely observation and tests. The data analysis technique in cycles 1 and 2 is analyzing student learning outcomes data. Data on student learning outcomes is taken by giving tests to students at each meeting. This test is useful for finding out the extent of student concentration, seen from the level of students' conceptual understanding of the material being taught after the action process takes place. Data on the implementation of students' learning activities during the learning process was obtained from the results of observations. Observation is used to monitor the teaching and learning process in the classroom. The indicators of success in this research are 1) The learning process carried out by the teacher is in accordance with the teaching module and students' activity is increasing; 2) The learning outcomes of the students are good, if the students' completeness increases in each cycle

RESULTS AND DISCUSSION

RESULTS

1. Description of Cycle I

In cycle 1, research was carried out in two meetings. Before carrying out research actions, the author prepares all the requirements, such as a lesson plan using a model *Problem Based Learning* (PBL), media, group LKPD, evaluation, learning outcome test instruments and divided into 7 groups. The learning material used in this lesson is sorting and comparing equivalent and non-equivalent fractions.

The implementation of learning is adapted to teaching modules that have been prepared containing PBL learning syntax and using approaches *Teaching at Right Level* (TaRL). The learning process consists of 3 activities, namely preliminary activities, core activities and closing activities. Preliminary activities consist of providing appreciation, motivation,

conveying learning objectives and the material to be studied. The core activity is implementing the PBL model syntax, namely orienting students to problems, grouping students, guiding students, presenting results, analyzing and evaluating the process. The final activity, namely the closing, consists of reflection and work on evaluation questions.

Based on the results of observations through direct observation, student activity during the cycle I did not show any improvement. This can be seen from the lack of student activity in learning. There are still students who are still chatting during discussion activities and are not yet focused on learning activities. There were only two students who dared to ask the teacher about material they did not understand. Meanwhile, for student learning outcomes in cycle I, the average score was obtained. However, the results obtained were not optimal, as explained as follows.

Table 1. Class Average Value in Cycle 1

No	Description	Mark
1	Number of participants	28
2	Lowest value	40
3	The highest score	80
4	Number of students who have completed	4
5	Number of students who have not yet completed	24
6	Average class score	65
7	Completion percentage %	14,28%

Reflecting on cycle I, student learning outcomes have not improved from pre-cycle. So cycle II was carried out to correct the errors and deficiencies that occurred in cycle I. Things that had to be improved in cycle II were group formation, student activity in learning, and learning outcomes. There needs to be more innovation in implementing learning to overcome and correct problems that still occur in cycle I.

2. Cycle 2 Description

In cycle II, two learning meetings were also held, updated with the re-formation of new groups. Each group consists of 5-6 students. The hope is that in this learning, the number of members will be greater than in cycle 1, namely that students will get a variety of problem-solving strategies. Many group members mean more different approaches and techniques for solving math problems which helps students understand concepts from different points of view and the teacher keeps track of any difficulties.

After that, the researcher prepared a learning plan using the Problem Based Learning (PBL) model, teaching materials, LKPD, media, and research instruments in the form of learning outcome tests. However, the LKPD is designed differently, focusing more on students' motor skills, as well as groups that have been created again. The implementation of learning is adapted to teaching modules that have been prepared containing Problem Based Learning (PBL) learning syntax and using the TaRL approach.

The learning process consists of three activities, namely preliminary activities, core activities and closing activities. Preliminary activities include providing apperception, motivation, conveying learning objectives, and the material to be studied. Core activities include implementing the Problem-Based Learning (PBL) model syntax, namely student orientation to problems, student grouping, student guidance, presentation of results, analysis and process evaluation. The closing activity consists of reflection and work on evaluation questions. Different from cycle I, in this learning

cycle, media is added and there is ice breaking.

Based on the results of observations through direct observation, student activity during the two meetings increased. This can be seen from students who are more involved in learning, dare to ask, answer and discuss. Students who chat during the discussion process have decreased and they pay attention to explanations from peer tutors, so that they already understand the material being taught. This is because students are still adapting to the Problem-Based Learning (PBL) model used. They work together to work on projects in the LKPD. Student learning outcomes in cycle I obtained an average value that was not optimal. However, in cycle II, student learning outcomes had improved. This can be seen from the class average obtained as follows

Table 2. Class Average Value

No	Description	Mark
1	Number of participants	28
2	Lowest value	40
3	The highest score	90
4	Number of students who have completed	23
5	Number of students who have not yet completed	5
6	Average class score	81
7	Completion percentage %	82,14%

It can be seen in the table above that of the 28 students, there are 23 people who have achieved minimum completeness. Reflections in cycle II show that students are more interested in practicum activities. Therefore, there is a need for continuous innovation regarding the use of practicum in each material.

DISCUSSION

The results of observations and interviews in class before the research cycle showed that students were not very active in learning. The learning outcomes of class V students at SD Muhammadiyah 23 Surakarta are still in the low category, according to the results of the initial assessment. Before the research began, the problem of the target class was the students' poor mathematics learning outcomes. After that, the researcher created a teaching module to be used in one learning cycle with two meetings per cycle. They then plan learning activities. Based on the results of student learning tests from cycles I and II, the learning model is problem-based *Problem Based Learning* (PBL) is used with the TaRL approach. Student learning outcomes show improvement, as shown in the following table

Table 3. Improvement in Student Learning Outcomes

Data	Average score	Completion percentage	Learning outcome categories
Cycle 1	65	14,28%	Low
Cycle 2	81	82,14%	High

Based on this table, it can be seen that there is an increase in student learning outcomes from cycle I to cycle II, there is an increase in the average score of 16 in the medium learning outcome category. Apart from that, to improve learning outcomes teachers need to innovate from groups that are tailored to abilities into heterogeneous groups. So that students are more active by helping each other and asking questions. And learning must be interspersed with ice breaking.

Based on the results of student learning tests, it is known that mathematics learning in the material is increasing. According to (Mangesthi *et al.*, 2023) that this study shows that there is a relationship between the TaRL approach and student mathematics learning outcomes. Mathematics pretest scores are used as a research tool to measure learning outcomes. The pretest result was an average of 62.00. After carrying out treatment using the

Teaching at Right Level (TaRL) method, the researchers carried out cycles I and II to get an average class score of 88.67. It is known that there is effectiveness between the TaRL approach on the learning outcomes of class IV students (Apriliani *et al.*, 2024). The use of learning approaches at the right level, not depending on grade level as a reference to help overcome student differences (Rahmat *et al.*, 2023).

CONCLUSION

Based on the results of classroom action research carried out using the approach *Teaching at the Right Level* (TaRL) through direct observation, student activity and learning outcomes during the cycle I did not show any improvement. This can be seen from the lack of student activity in learning. There are still students who are still chatting during discussion activities and are not yet focused on learning activities. Based on the results of observations through direct observation, student activity during the 2 meetings increased. This can be seen from students who are still involved in learning, students who dare to ask, answer and discuss. In cycle II, student learning outcomes experienced an improvement from cycle I. There were 23 students who had completed their studies with scores ranging from 80-90. For students who get low scores the score range is between 40-60. It can be concluded that there was an increase in student learning outcomes from cycle I to cycle II, an increase of 16 in the high learning outcomes category. Apart from that, to improve learning outcomes teachers need to innovate from groups tailored to their abilities into heterogeneous groups. So that students are more active by helping each other and asking questions. And learning must be interspersed with *ice breaking*

SUGGESTION

To improve learning outcomes further, it is recommended that teachers continue to explore and apply various learning methods that are relevant to student characteristics. Using diverse approaches can help students understand material from various perspectives.

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