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Using a problem-based learning model assisted by comic media to improve students' learning outcomes on the topic of the relationship between addition and subtraction

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Abstract
The Problem Based Learning Model is designed to assist students in building a flexible and broad knowledge base, developing effective problem solving skills, developing independent learning as a lifelong learning skill, becoming effective collaborators and being intrinsically motivated to learn. But in reality, not all teachers use this learning model in the learning process in their class. This learning model is very suitable if combined with the use of comic media in addition and subtraction relationship material because it increases student motivation and focus due to creative, innovative and contextual teaching materials. This classroom action research was carried out with the aim of finding out whether the problem-based learning model assisted by comic media can improve student learning outcomes on the topic of the relationship between addition and subtraction. The participants involved were 22 grade 3 elementary school students in Tabanan Regency. The research instrument was in the form of reflection sheets, learning improvement plans, evaluation question sheets for each cycle which were answered by students. Data analysis uses observation and documentation techniques from student learning outcomes documents at the end of the learning process of each cycle where students who get a score ≥ 70 are categorized as complete, and those who get < 70 are categorized as incomplete. For students' classical learning completeness is determined based on the percentage of students' learning completeness in class, namely at least 80%. This discovery will provide alternative uses of media and learning strategies to fellow educators to be able to have an impact on improving the learning outcomes of the students they teach.

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1. INTRODUCTION

Mathematics is studied from elementary school to college. Daily life relevant day with mathematics (Fadli, 2011). Mathematics can help students solve problems in everyday life. Algebra is one of the important materials in mathematics. Algebra trains students to reason, think critically, think creatively and think abstractly, so that students are expected to become reliable problem solvers (Musyrifah et al., 2023). In reality, the implementation of learning in class often leaves students confused and not understanding the subject matter of the relationship between addition and subtraction which is part of algebra due to several reasons, namely the lack of ability of educators in developing learning strategies using learning models and media. This is proven by the low learning outcomes of students in an elementary school in Tabanan Regency on this material. After reflecting on the learning activities, the author strongly suspects that the model and method used by previous educators was the use of the lecture method which made students bored, unfocused and less contextual, so the learning model for the addition and subtraction relationship material was determined using a problem-based learning model. With the help of comic media, it is hoped that it will be able to increase students' focus in learning and creating activities and concrete abstract things in the learning.

According to Barrow and Kelson, the Problem Based Learning Model is designed to assist students in building a flexible and broad knowledge base, developing effective problem-solving skills, developing independent learning as a lifelong learning skill, becoming effective collaborators and being intrinsically motivated to learn (Pertiwi et al., 2017). Therefore, the author considers that the syntax of the problem-based learning model is very suitable to be applied in this material regarding the relationship between addition and subtraction, especially since the material presents many story problems that often occur in everyday life. Of course, in designing problem-based learning syntax, we as teachers need to display teaching materials and student worksheets using innovative, interesting and contextual media so that students can be motivated to focus on following the learning from the beginning of the syntax to the end of the syntax.

Learning media is a crucial component of learning activities, so knowledge, understanding as well skills A teacher must have knowledge about what learning media is and how to use this media. The word media comes from the Latin language, namely Medius, which means intermediary or introduction. According to (Stit et al., 2019), stated that media is an intermediary, so Learning Media can help teachers to convey explanations of subject matter to students, especially abstract things so that they look concrete in front of students. Educators are required to be creative and master various types of learning media complete with all innovations in the world of education (Nurseto, 2011). The learning media that is appropriate and appropriate to use in learning activities with material on the relationship between addition and subtraction is comic media.

Comic media contains elements of images and stories that are interesting for students and can stimulate imagination and stimulus preparation. Comics are defined as "a form of cartoon that reveals characters and acts out a story in a sequence that is closely connected with images and is designed to provide entertainment to readers" (Nismaida, 2018). Comics can also provide language appreciation and develop processes for cognitive and expression of feelings. So that students are indirectly interested and interested in the learning process and are expected to be able to improve student learning outcomes in the material on the relationship between addition and subtraction.

According to (Anni, 2016), learning outcomes are something that students get in the form of additional competencies, skills and changes in behavior for the better experienced by students as a result of the learning activities carried out. Students who undergo a learning process about a subject matter will gain understanding and mastery of the subject matter as a result of student learning. According to Bloom (1956) in (Anni, 2016) there are three types of assessment for students, namely cognitive, affective and psychomotor assessment. Cognitive assessment is in accordance with the goals of education, namely realizing an intelligent national life and forming students who are knowledgeable and master basic competency achievements in accordance with the curriculum corridor. Affective assessment aims to shape students to have faith and devotion to God Almighty, to have a democratic nature and a responsible nature in accordance with the goals of national education. The psychomotor domain assessment aims to be able to develop abilities, be creative and independent, these goals are implied in the goals and functions of national education. According to (Sukamti, 2008), after students successfully complete learning activities, they will be able to carry out and demonstrate achievements according to competency in the subject matter.

The aim of this research is to see whether the use of a problem-based learning model assisted by comic media can improve student learning outcomes on the topic of the relationship between addition and subtraction. To achieve this goal, researchers from this study used a classroom action research methodology with the aim of being able to obtain valid information on student learning outcomes which are expected to increase. This research also aims to improve the quality of teachers in managing learning strategies in the classroom as well as a teacher's research abilities (Wijaya & Syahrum, 2014).

2. RESEARCH METHOD

The participants involved in this research were 22 participants consisting of 12 male participants and 10 female participants. All participants were students from one of the elementary schools in Tabanan City. The method used in this research is Classroom Action Research. Quoting from (Wijaya & Syahrum, 2014), all instruments and materials and steps- The steps follow the procedures in Classroom Action Research. Instruments and materials used in data collection and analysis include Research Implementation Schedule, Pre-Cycle Learning Implementation Plan, Pre-Cycle Evaluation Practice Questions, Pre-Cycle Learning Activity Reflection Sheet, Cycle I Learning Improvement Plan, Cycle I Evaluation Practice Questions, Reflection on cycle I learning activities, cycle II learning improvement plans, and cycle II evaluation practice questions. Entire instruments that already coordinated with colleagues as supervisors and known to the principal as the head of the institution where the research is carried out.

This classroom action research method consists of four main components in the classroom action research stages, namely design, action, observation and reflection. The pre-cycle stage is the stage carried out by the author to identify and analyze problems that occur in the class. The results of the problem analysis are outlined in a learning improvement plan which will be implemented in cycle I. In this pre-cycle stage, observation and reflection are carried out to identify obstacles and barriers in the learning process and are studied to find solutions for improvement.

Cycle I stage is the stage carried out by researchers when making improvement plans based on solutions found during reflection on pre-cycle learning activities. Implementation of the first cycle stage includes carrying out the steps according to the plan, using powerpoint media in learning activities, observing each step in the learning activity, comparing the time allocation in the plan with the activities being implemented, and anticipating by immediately finding a solution if it is encountered. constraint in implementing learning. At this stage of Cycle I, observation and reflection are also carried out to find deficiencies in the learning process and studied to find solutions for improvement.

Cycle II level is the level implemented when the student's learning results in cycle I have not reached the target goal set in methodology research above. To obtain better learning outcomes and student grades from cycle I, reflection in cycle II must find methods or strategies to improve the previous learning process and continue to carry out observation and reflection after implementing Cycle II. Data collection techniques in this classroom action research use observation and documentation. The data is in the form of documents resulting from student learning assessments for each cycle. The assessment data is obtained from the results of student tests carried out by students at the end of the learning process of each cycle.

Completion or success in learning is determined from the results of tests carried out by students based on the minimum completeness criteria (KKM) score. Students are declared successful or complete in learning if they get a score of 70 or above then the student is declared successful in learning, and students who get a score below 70 then the student is declared not successful in learning. Completion of classical learning is determined based on percentage The student's completeness level in class is 80%, so if the classical learning completeness achievement is ≥ 80%, it can be said that the classical learning completeness has been successful, whereas if the classical learning completeness achievement is <80%, it can be said that the classical learning completeness has not been successful.

3. RESEARCH RESULTS AND DISCUSSION

Classroom action research carried out from Pre-cycle, cycle I, to cycle II, which was attended by 22 students, obtained the following results. In the pre-cycle action, the number of students who got a score of 70 or above was 9 people or around 41%, and 13 students who got a score below 70 or around 59%. This happens because in the pre-cycle, learning is carried out using the lecture

method with dominant one-way communication which makes students bored and unfocused during teaching and learning activities.

In cycle I there was an increase in learning outcomes, namely the number of people who had scored 70 and above was 17 people or around 77%, there was an increase of 36% from the learning outcomes obtained in the pre-cycle. In this first cycle, the learning process uses a problem-based learning model but has not implemented student worksheets using comic media because students do not understand what their tasks are in groups when discussing working on conventional worksheets, so that the increase in learning outcomes has not reached the target of classical learning completeness.

Student learning outcomes and grades experienced a significant increase in cycle II, namely the number of students who had scored above the KKM was 20 people or around 91% of students had succeeded in their learning. The increase in student learning outcomes in cycle II was due to the process of problem-based learning model learning activities using teaching materials and LKPD based on comic media and combined with group discussion methods which were still guided by the teacher to increase student activity in class. This is the final learning improvement, because this research has succeeded in exceeding the target of students' classical learning completeness. The success of this learning improvement occurred because the deficiencies that occurred in cycle I had been corrected, such as combining Presentation Media with group discussion methods while still providing guidance to students in the discussion.

Table 1. Recap of Student Learning Results

No	Nilai	Pembelajaran		
		Pra Siklus	Siklus I	Siklus II
1	≥ 70	9 orang siswa	17 orang siswa	20 orang siswa
2	< 70	13 orang siswa	5 orang siswa	2 orang siswa

From the table above, it can be seen that in the pre-cycle there were 9 students who got a score of 70 or above or around 41%, and 13 students who got a score below 70 or around 59%. This happens because in the pre-cycle, learning is carried out using the lecture method with dominant one-way communication which makes students bored and unfocused during teaching and learning activities.

After that, in Cycle I, learning improvements were made based on the results of pre-cycle reflection using learning syntax using Power Point media. So, it was found that 17 students had achieved a score above 70 or around 77%, and there were still 5 students who had scored less than 70 or around 23%. Learning improvements were continued to cycle II while still referring to the results of the reflection on the implementation of cycle I and using learning syntax with power point media so that 20 students had achieved learning outcomes that had reached a score above 70 or around 91% and those who had not achieved a score of 70 were as many as 2 students or around 9%. The following is a graph of the increase in student learning outcomes based on the number of students who passed and did not pass from Pre-Cycle to Cycle II.

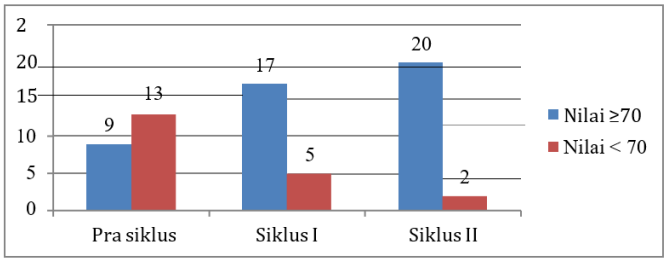

Diagram 1. Student Learning Completeness Data

From pre-cycle learning to cycle II, the percentage of students' classical learning completeness in class increased to 44% from pre-cycle, student completion increased in cycle I, reaching 77%. and finally, the students' classical learning completeness in Cycle II was 91%, with this research proving successful after Cycle II where students' classical learning completeness increased to more than 80%. The following is a graph of the growth of students' classical learning completeness from the previous II period.

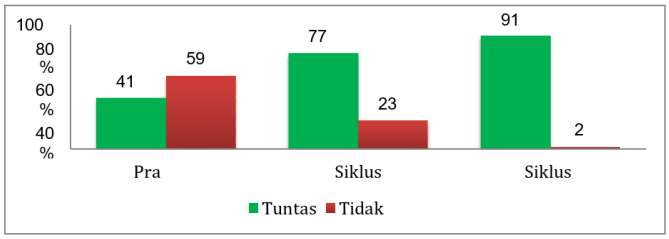

Diagram 2. Graph of Students' Classical Learning Completion

From the graph above, you can see the percentage increase in students' classical learning outcomes from 41% in the pre-cycle to 77% in Cycle I then to 91% in Cycle II. Achieving 91% classical learning completeness exceeds the 80% success rate determined in the data analysis technique above. Based on the results of this discussion, we relate it to previous research on improving student learning outcomes in mathematics story problem material using comic media by (Nismaida, 2018) which concluded that student learning outcomes in mathematics story problem material increased after using comic media. These results are closely related to the results of the author's research which shows that student learning outcomes have improved using the problem-based learning model assisted by comic media. However, in this author's research, the focus of the research is using a problem-based learning model complete with its syntax because according to the author, this PBL model is very suitable to be applied in mathematics subjects regarding relationship material. summation and reduction.

4. CONCLUSION

After we carried out all stages of the research from pre-cycle, cycle I to cycle II, where each cycle included planning, implementation, observation and reflection, the conclusion was obtained, namely that the use of problem-based learning media models assisted by comic media can improve student learning outcomes. In implementing learning, we as teachers should use learning models, media, methods and learning strategies that are appropriate to the conditions and potential of the class. A teacher is someone who is imitated and emulated by students, we as teachers should set a good example and role model. Teachers must always carry out reflection regularly to find out their weaknesses and shortcomings and how to follow up to improve them. To support teacher activities in improving student learning outcomes, of course the school infrastructure must be adequate so that teachers can use various media and teaching aids in the learning process. Harmony between teachers and leaders, teachers and fellow teachers and other school staff, teachers and parents of students, teachers and students must be well maintained for the sake of cooperation and a supportive working climate so that in the end good and innovative teaching and learning activities can be implemented by teachers.

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