

**IMPLEMENTATION OF AN *PROJECT-BASED LEARNING MODEL* TO
IMPROVE LEARNING ACTIVITIES IN MATHEMATICAL**

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ABSTRACT

This research aims to improve the learning activities of students using the PjBL (Project Based Learning) learning model in Mathematics subject diagram material for class IV Elementary School. This study uses the type of Classroom Action Research which consists of four stages in each cycle, namely planning, implementing, observing, and reflecting. The research subjects were 20 learners. The research was conducted in two cycles. The research data collection tool is an observation sheet. The data analysis technique uses a qualitative descriptive analysis technique. The results showed that the application of the PjBL (Project Based Learning) learning model could increase the learning activities of students in Mathematics Class IV Elementary School diagram material. This can be proven by, 1) The application of the Project Based Learning model in Mathematics learning which is planned in Cycle I has not been maximized. The success of Cycle II planning was marked by the active participation of researchers, observers, and class teachers in reflecting on actions to find solutions to problems, the enthusiasm of students, and increasing implementation learning process. 2) Activity of the pre-action learning of students was 42.5% in the less category after the action was carried out it showed an increase in the completeness of students' learning activities in Cycle I by 72.5 % in the good category and Cycle II it increased to 85 % in the very good category. From the results of the research, it is better if the learning process of Mathematics needs to use a variety of learning models, wrong the only model is PjBL (Project Based Learning), using concrete and interesting media. Students are more enthusiastic about following the learning process.

Keywords: *Project Based Learning Model, Learning Activities, Mathematics*

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INTRODUCTION

Education is an aspect that cannot be separated from teachers, students, teaching and learning processes, and learning materials. According to Zakiyah Daradjat (Suparlan, 2008: 13), teachers are professional educators. The independent curriculum is the full answer because it gives teachers the freedom to design learning according to the needs and learning environment of students. In the independent curriculum, especially in elementary schools, there are three phases, by the opinion of Budiwati (2023: 525) which state that the phases in the Merdeka Curriculum for the elementary school level are phase A for grades 1 and 2, phase B. grades 3 and 4, and phase C grades 5 and 6. The developmental stage of elementary school children is put forward by Piaget's theory (Ahmad Susanto, 2016: 78-79) at the age of 7-11 years which is commonly called the concrete operational stage. According to Papalia et al (2009: 443) state that the concrete operational stage is the stage where children already have a deeper understanding than pre-operational children regarding spatial concepts, causation, grouping, inductive-deductive reasoning, conservation, and numbers. At this stage, students have started to be able to do concrete things. According to Wina Sanjaya (2008: 265), students will have difficulty solving problems by only relying on their brain power without trying to carry out activities through direct experience.

Setiawati (2018: 33) states that in In the learning process, there is active interaction with the environment and these changes are permanent. According to Nanang Hanafiah and Cucu Suhana (2010: 23), the process of learning activities must involve all aspects of students, both physical and spiritual so that changes in behavior can change quickly, precisely, easily, and correctly, both related to cognitive, affective and motor psycho. The learning process takes place in a fun way so that students will more easily understand the existing learning material. One branch of knowledge that is in the learning process at school is mathematics. James and James (Siti Hastuti, 2017: 16) argue that mathematics as a science of logic regarding shapes, composition,

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quantities, and concepts related to each other in large numbers is divided into four areas, namely arithmetic, algebra, geometry, and analysis. Ahmad Susanto (2013: 188) states that the process of learning mathematics is not just a transfer of knowledge from teacher to student, but a process of activity, namely interaction between teachers and students and between students and students, and between students and their environment. To achieve this situation, the teacher must try to optimize the ability to carry out the teaching and learning process. Therefore, in the teaching and learning process, the teacher must pay attention to several things, one of which is the learning model.

The selection of learning models that are interesting and follow the characteristics of students can increase interest in learning so that student learning outcomes will also increase. So it is necessary to apply a learning model that can provide meaningful learning, make it easier for students to understand the material, and involve students in learning. One of them is the learning model Project Based Learning (PjBL). Project Based Learning (PjBL) Model is a learning model that uses projects/activities as a learning tool to achieve competency attitudes, knowledge, and skills (Hosnan, 2016: 321). The emphasis on learning lies in the activities of students to solve problems by applying the skills of researching, analyzing, creating, to presenting learning products based on real experience. With this learning model, students gain knowledge and develop skills, the attitude of curiosity, cooperation, not easily discouraged, responsible and disciplined. The Project Based Learning (PjBL) model certainly has advantages and disadvantages, namely the advantages of the PjBL model according to Ridwan Abdullah Sani (2014: 177) the advantages of using a project-based learning model, namely: Increase students' motivation to learn, and encouraging them to do important work, Improving students' ability to solve problems, make students more active in solving complex problems, Improving the ability of students to work together, Encouraging students to practice communication skills,

Improving student skills in managing resources, Providing experience to students in organizing projects, allocating time, and managing resources such as equipment and materials to complete assignments, Providing learning opportunities for students to develop according to real-world conditions, Seeing students learn to gather information and apply that knowledge to solve problems in the world real, Make the learning atmosphere fun. The drawbacks are: Requires a lot of time to solve problems and produce products, Requires a large amount of money, Requires teachers who are skilled and willing to learn, Requires adequate facilities, equipment, and materials, Not suitable for students who give up easily and do not have knowledge and skills needed, difficulty involving all students in group work. It is feared that students cannot understand the topic as a whole. So that by implementing this model students can obtain optimal learning outcomes and students are active in the learning process. In addition, facilities and infrastructure are very important components because the completeness of facilities and infrastructure will help and support teachers in organizing learning so that learning objectives can be achieved optimally.

Based on the description above researchers found several problems regarding the causes of low learning activity of students in Mathematics. Among them is the lack of teacher knowledge about the strategy or learning model used. Have not used concrete media to support learning. The learning process is carried out still centered on the teacher, still using the lecture and discussion method. This method is not going well because not all students are active in participating in learning. Efforts that can be made by the teacher to overcome this problem, is to use a variety of learning models, by implementing the Project Based Learning (PjBL) model to increase student learning activities in mathematics subject bar chart material.

3. Method

3.1. Research Subjects and Focus

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According to Daryanto (2011: 4) PTK is research conducted by teachers in their class through self-reflection to improve the quality of the learning process in class so that student learning outcomes increase. Suharsimi Arikunto (2013: 129) states that the main characteristics of action research are participation and collaboration between researchers and members of the target group. The research subjects were students of class IV with a total of 20 students consisting of 8 boys and 12 girls. Because the learning activities of students are still low and the learning model is not appropriate. The focus of this research is the application of the Project Based Learning (PjBL) model to increase students' learning activities in the mathematics subject matter of bar charts.

3.2. Research Instruments

Suharsimi Arikunto (2010: 101) states that there are several kinds of data collection techniques, namely questionnaires, interviews, observations or observations, tests, and documentation. Eko Putro (2012: 51) explains that a research instrument is a tool used by researchers to collect research data by taking measurements. The research instruments used were observation and documentation. Observation is a data collection technique by observing every ongoing event and recording it with an observation tool following the things to be observed or studied (Wina Sanjaya, 2012: 86). Documentation is a record of events that have passed (Sugiyono, 201 5: 240). Documents can be in the form of writing, pictures, photographs, or other works. The data obtained from the documentation study are in the form of photographs and videos which provide a concrete description of the learning process to increase activity Study on students.

3.3. Data Collection and Analysis

The procedure used in this study was a design according to the Kemmis and McTaggart models (Suharsimi Arikunto 2006: 97) the research flow consisted of four main activities, namely planning, implementing, observing, and reflecting. Indicators of success in this study are if there is an increase in learning activities. Learning activities are said to be successful if the average student learning activity is at least 75% of 20 students. This study uses qualitative data analysis techniques. Sugiyono (2016: 244) suggests that qualitative data analysis is a process of systematically searching for and compiling data obtained from interviews, observations, and documentation by organizing data into categories, synthesizing, selecting which are important and which will be studied, and concluding so that they are easy to understand. So in this study, the qualitative data was obtained from the results of observation and documentation.

Observation data in this study can be seen from the scores on the student activity observation sheet in implementing the learning process bar chart material. Percentages are obtained from the average percentage in each cycle. Observation data that has been obtained is calculated and then the percentage so that it can be seen to what extent the improvement is achieved in learning. Rating can be seen based on the criteria according to M. Ngali Purwanto (2013: 103) to determine the increase in yield learning, is done by comparing the average results of observations of the first cycle and the average results of observations of the second cycle. The average or mean is calculated using the following formula:

$$Mean = \frac{\sum Y}{N}$$

Information:

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Means = average value

ΣY = total score of all students

N = number of students

To calculate the percentage of learning completeness, the following formula is used :

$$\text{Persentase} = \frac{\text{the number of students complete learning}}{\text{numbers of students}} \times 100\%$$

Observational data are qualified using criteria as following Khoiriyatun (2014: 34):

Table 1. Observation Criteria Data

No	Percentage	Criteria
1.	81% - 100%	Very good
2.	66% - 80%	Good
3.	56% - 65%	Enough
4.	40% - 55%	Not enough
5.	$\leq 40\%$	Very less

3.4. Research Limitations

Based on the study of the theory and framework of thinking that has been described, this research is expected to bring about changes towards improvement and an increase in the quality of learning. So that an action hypothesis can be proposed as follows: The Project Based Learning (PjBL) Model can increase student learning activities in mathematics class IV bar chart material.

4. Results and Discussion

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Before Taking action, the researcher conducted observations and interviews first. Observation of student learning activities in class as a first step to finding out learning activities in bar chart material. Following the results of observations and interviews with fourth-grade teachers, it was found that the level of learning activity of students in the class was still low because there were still some students who only listened to the teacher explaining the material, some were even busy playing with their peers and did not pay attention to the teacher. when learning takes place.

The results of initial observations indicate that it is known that during the delivery of material, it is felt boring, because a pleasant learning atmosphere has not been created, and the PjBL model has not been applied in learning. From the observed data from 20 students, there were 9 active students (complete) with a percentage of 42.5% in the less category and 11 passive students (incomplete) with a percentage of 57.5%. The indicator of success in this study was obtained in at least 75% of students' learning activities.

The implementation of cycles I and II was each carried out in two meetings with learning activities consisting of preliminary, core, and closing activities. Preliminary activities of students are conditioned by the teacher to learn by asking students to sit neatly and not talk alone, students and teachers give and answer greetings to each other, and convey the news to each other, "Assalamualaikum wr. wb," "How are you today?", Students are checked for attendance by taking attendance by the teacher, "Is there anyone absent today? Why?", Students and teachers pray according to their respective beliefs to start learning activities, "Before starting learning this morning it would be better for us to pray first, pray according to each other's beliefs!", Students together with the teacher sing the National song "From Sabang to Merauke", The teacher gives reinforcement about the importance of instilling a spirit of Nationalism,

Students are asked whether they have had breakfast and arrived at school on time. The teacher praised the students for being ready and enthusiastic about going to school, "Who had breakfast this morning?", Students are given trigger questions: "Have you seen the list of visitors in the library ?", " Approximately how many children visit the library every day?", "Did you know that the data can be converted into a bar chart?", Students are given an apperception by recalling data processing material, Students listen to the teacher's explanation about the purpose of learning activities and the material to be studied, namely data processing and bar charts. The core activity of students is directed by the teacher to observe PPT media regarding table data, students observe the table data images displayed. Students respond and ask questions regarding the table data image. Stage 1: Determining the Project, Students listen to the teacher's explanation of the bar chart material, present examples of data on the hobbies of children who like to read, and relate it to the number of visits to the library, Students listen to the teacher's explanation that in this lesson they will make a bar chart. Stage 2: Designing the steps for completing the project, Students with teacher guidance form heterogeneous groups of a maximum of 4-5 children, Students are distributed LKPD to complete the project, Students together with their groups are given directions from the teacher in the form of steps for making a project. Stage 3: Preparing a project implementation schedule, the teacher informs students that project activities will be carried out, and students are asked to prepare tools and materials to make bar charts. Stage 4: Completion of the project with teacher facilities and monitoring, Students with teacher guidance read and understand the instructions for making a bar chart listed on the LKPD, Students practice the instructions for making a bar chart, After finishing making a bar chart, participants students are asked to check back the results of projects that have been made. Stage 5: Preparation

of reports and presentations/ publication of project results, students compile a report on the results of the discussion of making the project, students are given the opportunity by the teacher to present and tell the results of their discussions with their groups, students are invited by the teacher to give appreciation to advanced group with "Applause". Stage 6: Evaluation of the process and results of the project, students are given the opportunity by the teacher to respond or give constructive input to the group presenting, students and the teacher reflect or evaluate the results of the projects that have been made, students and teachers do ice breaking, students work on teacher evaluation tests, to know the level of learning achievement. Closing activities include students being allowed to ask about material that has not been understood, students and the teacher concluding about the learning activities that have been carried out at this meeting, students and the teacher reflecting on today's learning, "How was the lesson today?, Are you guys happy? What activities do you like the most?, Is there anything you don't understand?", Students whose grades are still below the KKM will receive remedially and those who have completed are given enrichment, Students listen to directions regarding the next lesson, Students are given motivation and reinforcement by the teacher, Students together with the teacher pray according to their respective beliefs to end the activity learning, students and teachers greet each other. Project Based Learning model to teachers during the learning process and student learning activities. The results of observations in cycles I and II can be seen in the following table.

Table 2. Observation Data of Learning Activity Cycles I and II

Information	Pracyclus	Cycle I	Cycle II
Total Average Score	17	29	34
Percentage	42.5%	72.5 %	85 %

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Completed Number of Students	9	14	17
Complete presentation	45%	70%	80%

Based on Table 2 above, the results of observations on the learning activities of students in the first cycle the percentage of results was 72.5 % and in the second cycle it became 85 %. Between cycles I and II it increased by 12.5 %. It can be concluded that each cycle has increased, meaning that the Project Based Learning Steps in each cycle are increasing.

5. Conclusion

The project Based Learning learning model can increase the learning activities of class IV students. The application of the Project Based Learning model in each cycle is always increasing. In the process of implementing learning in class IV on Activity, the pre-action learning of students was 42.5% in the less category, after the action was carried out it showed an increase in the completeness of students' learning activities in Cycle I by 72.5 % in the good category and Cycle II it increased to 85 % in the very good category.

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