

Implementation of The Project-Based Learning Model (PjBL) to Improve Students' Biological Learning Results at MAN Insan Cendekia Palu City

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Introduction

Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to choose spiritual and religious strength, self-control, personality, intelligence, noble character, and skills needed by themselves, nation, and state (Pratiwi et al., 2022). Education plays an important role in building human resources that are competitive and able to compete with other countries. To produce quality human resources. Educational institutions, especially teachers as field directors, are required to change the way of organizing learning, which is more focused on students (Student Center). Students are conditioned to be able to actively seek information and solve problems in the learning process. The learning process, in principle, is very dependent on the teacher and the interaction of students in the learning process. In order for this interaction to occur properly, the teacher is required to create a more effective learning atmosphere through the implementation of models, media, methods, and learning techniques that vary according to the needs of students so that student learning outcomes can increase. Rusman (2012), suggests that learning outcomes are a number of experiences gained that include cognitive, affective, and psychomotor domains. Learning outcomes are not only mastery of subject theory but also mastery of habits, perceptions, pleasures, interests-talents, social adjustment, and various skills. However, the learning process that is carried out sometimes does not provide maximum results. This can be seen in the low learning outcomes of students, even though learning has been carried out in accordance with the model syntax and combined with commonly used media. Low learning outcomes are a problem in the learning process that is often encountered in any school. These problems are also found in the learning process at MAN Insan Cendekia Palu City. According to Seftinar (2023), learning outcomes are the abilities possessed by students through learning activities. Students are said to be successful in learning when they achieve the

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Abstract. *The purpose of this study was to improve the biology learning outcomes of students on Animalia material by using the Project-based learning (PjBL) learning model. The research subjects were students of class X, IPA Al-Qomar MAN Insan Cendekia Palu City, even in the 2022/2023 school year, with a total of 24 students. This research uses a type of collaborative classroom action research (PTKK). The research was carried out in as two cycles, each cycle was carried out as many as two meetings through four stages: planning, implementation of action, observation, and reflection. The results showed that the implementation of the project-based learning (PjBL) model could improve the biology learning outcomes of students with an average score in cycle I of 77.85, and in cycle II the learning outcomes increased with an average score of 87.10. The posttest results showed an increase in student learning outcomes in the form of classical completeness of 96% and an increase in absorption of 46.85%.*

Keywords: *project-based learning, learning outcomes, animalia*

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learning objectives or instructional objectives. The low learning outcomes are caused by several factors, namely the teacher's lack of understanding in using a varied learning model, students being less active and less involved in the learning process, students are less able to develop the ability to make products in learning.

Based on the results of observations carried out, learning only focuses on working on questions in the package book and student worksheets (LKPD). In addition, students in class X, IPA Al-Qomar, have characteristics in the form of visual and kinesthetic learning styles, so to improve the learning outcomes of students in the class, it is necessary to apply a learning model that accommodates the characteristics of students so that it can help students understand the material being taught.

One of the learning models that is relevant to the above problems is the Project-based learning (PjBL) learning model. In the Project-based learning model, students are required to make projects that focus on product development or work performance, where they conduct studies or research, solve problems, or synthesize information (Fikriyah et al, 2015). The final result in learning is a product that is the result of student group work (Kurniawan et al, 2018).

Based on the problems that have been described, the authors intend to conduct research with the title: Implementation of Project-based learning Model (PjBL) to Improve Biology Learning Outcomes of Students in Class X, IPA Al- Qomar MAN Insan Cendekia Palu City.

Research Methods

Type of Research

This research is collaborative classroom action research. Collaborative Classroom Action Research (CCA) is research in which teachers conduct research synergistically in their classrooms and other members visit to observe activities. The implementation of this research consists of four stages: action planning, action implementation, observation, and reflection.

Time and Place of Implementation

This research was conducted in the even semester of April to May of the 2022-2023 academic year at MAN Insan Cendekia Palu City, which is located on Jl. Bukit Tunggal, Mamboro Village, North Palu District, Palu City, Central Sulawesi.

Research Subjects

The subjects of this study were students of class X, IPA Al-Qomar, totaling 24 people, consisting of 12 female students and 12 male students.

Research Instruments and Procedures

Research instruments used in the form of multiple choice tests of as many as 20 numbers, teacher observation sheets, student activity observation sheets, and student response questionnaires to the implementation of the PjBL model. Students' learning outcomes are declared successful if the students' learning outcomes reach KKM, namely 78 in each cycle.

The research procedure in this PTKK is in the form of implementing two cycles of action, namely the first cycle and the second cycle, each of which is carried out twice a meeting. If the first cycle has not achieved significant learning improvement, then the second cycle will be held. The implementation of this research uses four stages: planning, implementation, observation and reflection. In the planning stage, it is done by making a lesson plan (RPP) in accordance with the steps of the Project-based learning model, which begins with determining the fundamental question, developing project planning, developing a project schedule, monitoring project progress, testing results, and evaluating learning experiences. The implementation stage (action) is carried out by implementing learning in accordance with the lesson plan. The observation stage is carried out simultaneously with the action through the data collection of

research instruments assisted by observers. In the reflection stage, researchers and observers reflect together on the actions that have been taken from the learning process. This reflection can be in the form of strengths and weaknesses that occur in the learning process, as well as following up on what is still lacking in the process of implementing the action.

Data Analysis

1. Teacher and Student Learner Activities

Learning activity is an activity carried out by students in direct learning in the classroom (Rusnandar et al, 2021). The observation data that has been obtained is calculated and then percented so that it can be seen how much the results of increasing learning activities carried out by teachers and students. Calculation of the results of observations of teacher and student activities using the formula and categorization guidelines as follows:

$$\text{Percentage of teacher and student activities} = \frac{\text{Total score obtained}}{\text{maximum score}} \times 100$$

Then the percentage is categorized using the following table 1:

Table 1. Guidelines for Categorizing the Percentage of Student Activities

Value Interval	Category
85 % - 100%	Very active
65 % - 84%	Active
55% - 64 %	Active Enough
35 % - 54 %	Less Active
0% - 34 %	Inactive

2. Students' Response to the Implementation of the PjBL Model

In the learning process, it must be adapted to the characteristics of students so that reflection on the implementation of learning needs to be done in order to find out the response of students to the implementation of the PjBL learning model.

$$\text{Response Percentage} = \frac{\text{Total Score Obtained}}{\text{Maximum Score}} \times 100 \%$$

Table 2. Guidelines for Categorizing the Percentage of Student Response to the Implementation of the PjBL Learning Model

Interval Nilai	Kategori
0 - 39%	Very Uninterested
40 - 55 %	Not Interested
56 - 75%	Interested
76 - 100 %	Very Interested

3. Learning Outcomes

Data on student learning outcomes obtained from the average test results of meeting one and meeting two in each cycle are then analyzed quantitatively to see the completeness of individual student biology learning using the Arikunto formula as follows:

$$\text{Final score} = \frac{\text{Total score obtained}}{\text{Maksimum score}} \times 100\%$$

Students' learning completeness is determined by looking at the Minimum Completeness Criteria (KKM) table set by MAN Insan Cendekia Kota Palu. The Criteria for Completeness (MIPA) can be seen in Table 3 below:

Table 3. Minimum Completion Criteria of MAN Insan Cendekia Palu City

Value Interval	Category
≥ 78	Completed
≤ 78	Not Completed

Then the values are grouped by looking at the categorization guidelines modified by Saenab (2012) in Table 3 below:

Table 4. Categorization of Mastery Level of Student Learning Outcomes

Value Interval	Category
85 – 100	Very Good
75 – 84	Good
65 – 74	Simply
50 – 64	Less
≤ 49	Very Less

Research Results

1. Teacher and Learner Activities

Data on teacher and learner activities are obtained through observer observations. The results of the analysis of teacher and learner activities can be seen in the following figures 1 and 2:

Table 5. Teacher Activity Analysis Results

Action	Early Activities	Giving Apperception	Organizing The Discussion	Implementation of Project Activities	Final Activity
Cycle I	Active (80%)	Active (70%)	Active (70 %)	Active (75%)	Active (75%)
Cycle II	Very Active (100%)	Active (83%)	Active (83%)	Very Active (100%)	Very Active (100%)

Table 6. Results of Learner Activity Analysis

Tindakan	Antusias	Interaksi	Kerjasama	Aktivitas	Menyimpulkan
Cycle I	Moderately Active (58%)	Active (71%)	Active (67 %)	Moderately Active (64%)	Less Active (52%)
Cycle II	Active (78%)	Active (80%)	Very Active (88%)	Very Active (89%)	Active (83%)

Based on Tables 5 and 6 above, it is known that the activities of teachers and students after the action have increased, but some indicators are still in the same category. As is the case in the results of the analysis of teacher activity, there is an increase from cycle one and cycle two, but only in the indicators of initial activities, provision of apperception, implementation of project activities, and final activities that can increase their categorization from cycle one, getting the active category changed to very active in cycle two. Meanwhile, for indicators of providing apperception and organizing discussions, despite an increase in percentage from cycle one to cycle two, the categorization remains because it has not reached the interval of the very active category.

In the analysis of student activity, there was also an increase in activity from cycles one and two, but not all indicators received an increase in category. The indicators of enthusiasm, cooperation, activity, and conclusion get a category change. For the conclusion indicator, there was a very rapid increase from cycle one to cycle two, which initially move the category from less active to very active. For the interaction indicator, although it received an increase in

percentage, it did not change in category because the percentage increase did not exceed the very active interval.

2. Students' Responses to the Implementation of the PjBL Model

Students' responses to the implementation of the PjBL model are carried out to find out the responses or responses of students to the learning model that has been implemented. This is very necessary to be done to serve as reflection material on the learning process that has been carried out. The following is a diagram of the results of students' responses to the implementation of the Project-based learning (PjBL) learning model.

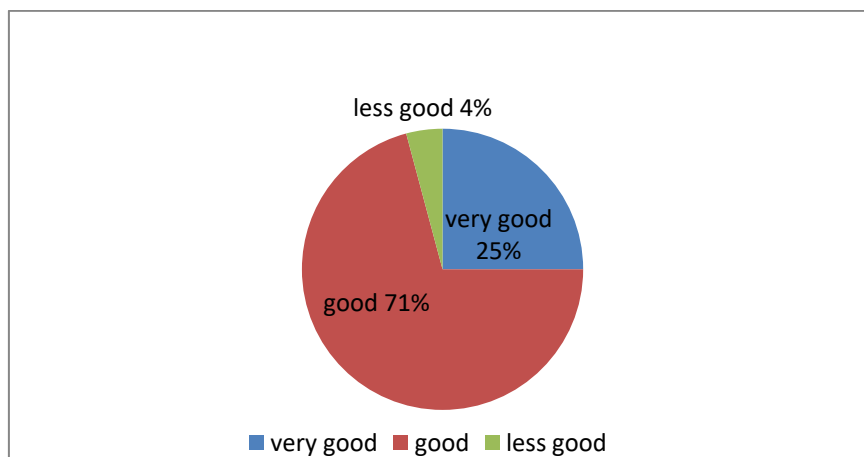


Figure 1. Results of the Analysis of Students' Responses to the Implementation of the PjBL Model

3. Students' Hasil Belajar Peserta Didik

The learning outcomes of students are obtained from the evaluation scores carried out at each meeting, so that when analyzed, they get classical completeness and classical absorbency. The results of the analysis can be seen in the following table:

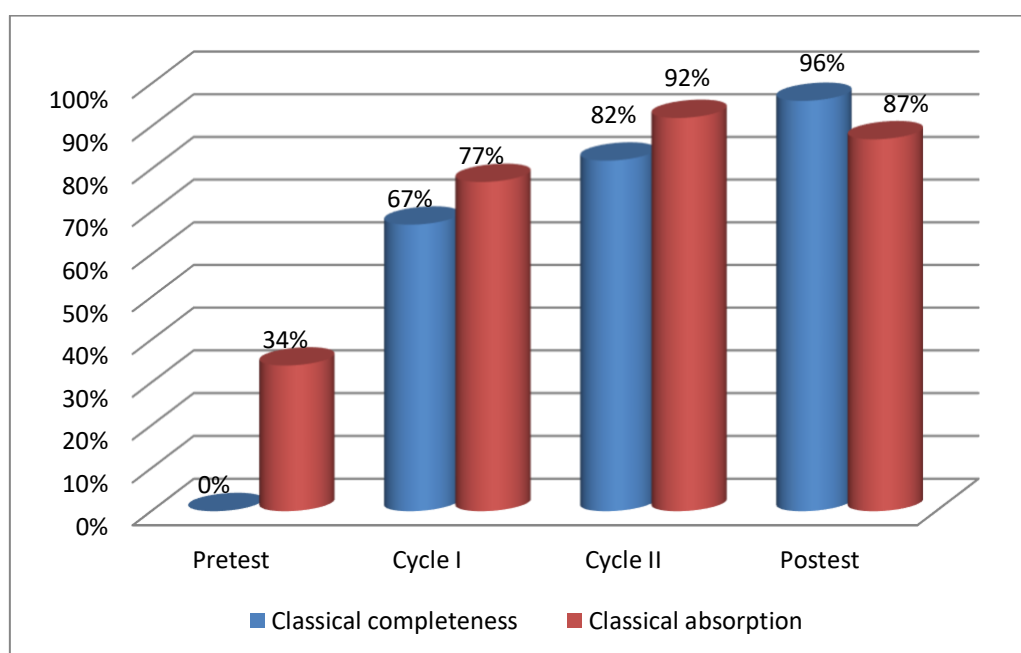


Figure 2. Classical Completeness and Classical Absorption of Students

After knowing the percentage of classical completeness and classical absorbency, the frequency distribution and presentation of students' learning outcomes scores are calculated, which can be seen in the following table:

Table 8. Frequency distribution and percentage score of students' learning outcomes

No	Value Interval	Category	Pretest		Cycle I		Cycle II		Posttest	
			Number of Students:	%	Number of Students:	%	Number of Students:	%	Number of Students:	%
1	85 – 100	Very Good	0	0 %	6	25%	17	71%	6	25%
2	75 – 84	Good	0	0 %	11	46%	5	21%	18	75%
3	65 – 74	Simply	0	0 %	5	21%	1	4%	0	0%
4	50 – 64	Less	2	8 %	1	4%	1	4%	0	0%
5	≤49	Very Less	22	92 %	1	4%	0	0%	0	0%

Data on student learning completeness can be seen from how much learning outcomes obtained by students starting from pretest, cycle I, cycle II, and posttest which are, then categorized as completeness with the KKM applied at MAN Insan Cendekia. The learning completeness data can be seen in the following table:

Table 9. Categories of Cognitive Learning Outcome Completion

Kategori	KKM Score	Pretest		Cycle I		Cycle II		Posttest	
		Number of students	%	Number of students	%	Number of students	%	Number of students	%
Completed	≥78	0	0 %	16	67%	22	92%	23	96%
Not Completed	≤78	24	100 %	8	33%	2	8%	1	4%

The completeness of students' learning outcomes is categorized as complete when the value of students' learning outcomes reaches the KKM value, namely ≥ 78 . When students do not get the KKM score, remedial work needs to be done for them.

Discussion

Learning Activity

The Project-based learning (PjBL) learning model is often referred to as a teaching method that uses problem issues in its system with the aim of facilitating students in the process of understanding and absorbing the theory given (Anggraini et al., 2020). Therefore, the process requires good interaction between teachers and students and between students and other students, because the learning process with the PjBL model is project-based. In this study, the learning activities of teachers and students need to be known so that they can be material for teacher reflection to improve the next learning process.

In this study, students were divided into four heterogeneous groups, which were carried out for two cycles on animalia material. In addition to conducting group discussions, each learner in the group worked together to create an identification card project. The identification card contains information about the material studied, starting from the characteristics, classification, life cycle, habitat, and benefits of animalia that are attractively designed in the identification card. This is done to increase the cooperation, interaction, enthusiasm, and creativity of students while learning and understanding the concept of the material being taught.

After the discussion and creation of the work are complete, each group presents the results of its discussion in turn and is responded to by other groups. The process is accompanied and facilitated by the teacher. The teacher also provided reinforcement and clarification for erroneous answers.

In the teacher's activity, the indicators observed were initial activities, providing perception, organizing discussions, implementing project activities, and final activities. Based on the results of the observation, it is known that after the action, the teacher gets an active average category, and some are even very active. Based on this, it is known that the teacher has made good lesson planning and classroom organization so that the learning process gets a minimum category of activity according to the observers' observations. Careful preparation made by the teacher will have an impact on the activities of the students. In the questionnaire observed by the observer, students' activities are divided into 5 categories: enthusiasm, interaction, cooperation, project making activities, and concluding learning. Observer assessment for learner activities categorizes cooperation and project work activities, which in cycle one get the active category increased in cycle two to be very active, while enthusiasm, interaction, and conclusion indicators get the active category in cycle two. This shows that the learning process can increase students' learning activities. This is in accordance with research conducted by Zainal, M. (2010), which states that project-based learning can improve the activity and learning outcomes of the students.

Learning Outcomes

Student learning outcomes are obtained through Pre-and Post-test instruments and evaluation results from each meeting in cycles I and II. Based on the results obtained from the frequency analysis of learning outcomes, it is known that there has been an increase in learner learning outcomes starting from the pretest with 0% passing to 67% after cycle one and increasing 25% to 92% when cycle II is implemented, and has absorption from the original (pretest) of 34% to 77% in cycle one and increased 19% to 96% in cycle II. The increase in learning outcomes was mostly categorized as moderate, with an average percentage of 75% at the time of the pretest. This increase in learning outcomes shows that the implementation of the Project-based learning (PjBL) learning model can improve students' cognitive learning outcomes. This is in accordance with research (Simangunsong et al, 2023) that states that student learning outcomes can increase effectively if the PjBL learning model is applied because it can stimulate students to be active, understand, and relate learning concepts that can make students' memories of lessons last a long time. Students are also required to be more creative because they are given freedom in making projects and are responsible for teamwork on their projects.

Students' Response to the Implementation of the PjBL Model

Based on the observation of 24 students, it is known that 25% of students assess that the implementation of the Project-based learning (PjBL) learning model can improve learning outcomes very well, with 71% good and 4% less good. For students who answer less well, further reflection can be carried out in the form of interviews or in-depth observations to find out the characteristics of students so that future learning can be designed to liberate all students by paying attention to learning styles and other learning needs.

A. Students who respond poorly (4%)

The existence of students who respond poorly to the implementation of the Project-based learning (PjBL) learning model is because these students do not like time-consuming learning and working collectively. They prefer to learn and complete tasks independently. This is in line with research from Poerwati and Cahya (2018), which says that PjBL learning in the interaction

process allows for unfriendliness among group members so that it can cause negative experiences for all students. Therefore, it is necessary to conduct in-depth observations of students who give unfavorable responses to find out the real problems so that alternative solutions can be found to increase their motivation and learning outcomes.

B. Students who respond well (71%)

Students who respond well to the implementation of the learning model are generally students for whom the PjBL learning model can be well received. This is in accordance with Nugraheni's (2018) research, which says that the implementation of project-based learning models generally has a positive impact on the teaching and learning process.

C. Students who respond very well (25%)

Students who respond very well to the learning model are those who have good socialization and interaction skills, as well as those who give good responses. However, students who respond very well tend to have higher learning outcomes than students who respond less well to the implementation of the PjBL learning model. This is supported by Yani (2020), who says that project-based learning models are good at developing basic skills that students must have including thinking skills, decision-making skills, creativity, problem-solving skills, and at the same time are seen as effective for developing students' self-confidence and self-management.

Conclusion

The conclusions that can be drawn from this study are:

1. The PjBL learning model can improve student learning outcomes with Absorption (DS) when the posttest is 87% and Classical Completeness (KK) is 96%. Project-based learning (PjBL) is categorized as quite effective.
2. Students like the implementation of the PjBL model because it can hone their skills in making work in the form of Animalia identification cards with a very good category of 25% and a good category of 71%.
3. For Students who dislike the implementation of the PjBL learning model by 4%, the possible reason they don't like it is because they have a non-kinesthetic learning style.

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