



## Application of PjBL Learning Model and TPACK-Based Learning Media to Improve IPAS Learning Outcomes

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**Abstract:** The goal of this research is to define the stages involved in applying the model of Project Based Learning (PjBL) in order to improve student learning results, particularly in scientific topics. The goal of this research is to define the stages involved in applying the model of Project Based Learning (PjBL) in order to improve student learning results, particularly in scientific topics. Data collection techniques used test and non-test techniques. The data analysis methods employed include descriptive, qualitative, and quantitative. The findings revealed that the adoption model of PjBL with the 4C, HOTS, and TPACK techniques improved learning outcomes in grade 4 pupils at SDN 4 Kenanga. This is demonstrated by the rise in average student achievement observed in cycle 2. In cycle 1, the average individual value of 60.6 with 20 participants (67 percent) in the incomplete section of KKM calculated is 70, indicating that student achievement have not improved. While in cycle 2, there is an improvement in student achievement from an average value of 78 to as many as 23 or (76 percent) pupils finishing.

**Keywords:** Learning Objectives, Project Based Learning, PjBL, IPAS

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### INTRODUCTION

The results of observations in class and interviews with grade IV teachers at SDN 4 Kenanga, it is known that learning outcomes in science (Natural and Social Sciences) subjects for the 2023/2024 school year are still relatively low, as evidenced by the results of evaluation tests conducted by teachers at the time of observation, as seen from the average score of grade IV students in science subjects 55.6 with a percentage of 80% of students incomplete. There is a problem in the field, namely teachers still use lecture learning methods, learning tends to be teacher-centered (teacher center), especially in science subjects, students are required to explore a lot with practical activities such as making projects. This results in a learning atmosphere that is easily saturated, when the lesson is in progress students are less attentive and less responsive to teacher questions. As a result, mastery and understanding of science subjects in grade IV SDN 4 Kenanga has not achieved satisfactory results. Therefore, another learning model is needed that stimulates students to encourage students to do their own experiments. The Project Based Learning (PjBL) model

is one of the learning approaches that may help students think critically and enhance their critical thinking skills (Koyimah 2021; Putri 2020; Sirait 2021).

PjBL model according to Warsono & Hariyanto (2012:153) is a type of instruction that attempts to connect technology to real-world problems that students are acquainted with, or to a school project. In the PjBL learning model, students will be faced with a problem or given a project related to the material and then students will be asked to solve or create a project / activity based on questions and problems which are then continued with the process of searching, investigating, and finding themselves so that students obtain complete knowledge using ideas, or new ideas obtained both from theory, concepts, information that has been developed into something new and different.

Technological, Pedagogical, Content, and Knowledge (TPACK) became very popular (if not to say as a new finding) with an article by Punya Mishra and Matthew J. Koehler in 2006 in the journal *Teacher College Record*. TPACK is a paradigm for technology integration that distinguishes three forms of knowledge namely technology, pedagogy, and knowledge. Teachers need to combine these to develop learning models for the successful achievement of modern learning objectives. It is a necessity that teachers must master information technology. A teacher can utilize information technology to support learning. One application of information technology in learning is the use of digital-based learning media by applying several applications available to support learning activities such as video impressions through LCD projectors, displaying picture stories, or using internet-based applications such as spinner wheels that can be used for selection of discussion groups or presentations. Mastery of information is necessary to acquire concepts and principles, both of which must be remembered and considered in problem solving and creative actions (Slameto, 2010:139).

According to Suardi (2015:3) improved learning outcomes are one indicator of achieving educational goals that cannot be separated from student motivation and teacher creativity in presenting subject matter through various models to be able to achieve maximum teaching goals. Learning outcomes are the talents that students possess as a result of their learning experiences (Sudjana, 2016: 2). Learning outcomes are important things that will be used as a benchmark for student success in learning and the extent to which the learning system provided by the teacher is successful or not. From the benchmark of student success, there are several factors that can influence student learning outcomes.

IPAS is a combination of Natural Sciences (IPA) and Social Sciences (IPS). IPAS content is very close to nature and interaction between humans. Science learning needs to present a context that is relevant to natural conditions and the environment around students (Ministry of Education and Culture, 2020). As a result, learning science is the study of learning outcomes, processes, and attitudes. Science as a result denotes an arrangement of facts, concepts, techniques, principles, and natural laws. Science like a process shows how scientific discoveries are made through scientific procedures or scientific effort. Science like an attitude implies that a scientific mindset underpins a scientific method that may be used to create science products.

As reference and reference material and to avoid misunderstandings about the similarity of research works, researchers also found several previous studies that had similarities in terms of the learning model used. Research conducted by Richard, A. N., et al (2019) that the use of the PjBL learning model can boost student creativity and learning results through two cycles of classroom action research, This is demonstrated by a rise in the average inventiveness of students from pre-cycle circumstances, which showed an average score of 52 percent in the low category to 68 percent in the medium category in the first cycle and 81 percent in the high category in the second cycle. An increase in student learning outcomes occurred as well, with an average student score of 65 in the initial condition with 15 students (48 percent) experiencing an increase in cycle 1 with an average student score of 72 with 21 students (66 percent) and in cycle 2 with an average student score of 79 with as many as 27 or (87 percent) students completed.

Based on the opinions of these experts, it can be concluded that the PjBL learning model is a learning model that prioritizes student experience by providing time and opportunities for students both individually and in groups to be able to solve / solve problems given related to the material and in accordance with environmental conditions to be able to increase student creativity, help students find new ideas, create and create a work / product based on concepts, theories or information obtained. Susanto Ahmad (in Yanti, F., & Widya, I., 2020: 9) argues that learning outcomes must show changes in circumstances for the better, so that they can be useful for increasing knowledge, developing their potential, and can bring up new ideas for students. So, learning outcomes have many benefits for students where these learning outcomes affect all positive changes from within students.

In the problems found by the researcher from the results of observations and interviews with grade IV teachers, it was proven when the researcher made initial observations in cycle

1 by providing learning treatments that are usually carried out by class teachers, namely teacher-centered learning activities and by not implementing project activities and not using digital-based learning media, student learning results were obtained in the science subject material "Cultural Diversity and Wisdom Local" with an average score of 59.2 means that it can be seen that there are still many students who do not understand the material in science subjects.

Seeing the problems that exist in grade IV science subjects at SDN 4 Kenanga, this study seeks to provide solutions to improve student learning outcomes, namely by applying the PjBL learning model with a 4C, HOTS and TPACK-based media approach in the learning process. The selection of this learning model is expected to be able to improve student learning outcomes, especially in science subjects in grade IV.

## **LITERATURE**

PjBL according to Warsono & Hariyanto (2012: 153) is a lesson that attempts to connect technology to everyday problems that kids are familiar with, or with a school project. TPACK was popularized by Mishra and Matthew J. Koehler in 2006 in the journal *Teacher College Record*. TPACK is a paradigm for technological integration that distinguishes three forms of knowledge: technology, pedagogy, and knowledge (Slameto, 2010).

Learning outcomes are the talents that students possess following a learning experience (Sudjana, 2016: 2). According to Suardi (2015:3), increased learning outcomes are one indicator of achieving educational goals that cannot be separated from student motivation and teacher creativity in presenting subject matter through various models to be able to achieve maximum teaching goals.

IPAS is a combination of IPA and IPS. IPAS content is very close to nature and interaction between humans. Science learning needs to present a context that is relevant to natural conditions and the environment around students (Kemdikbud, 2020).

## **METHOD**

Classroom Action Research is the research method to be used (CAR). This classroom action research aims to improve student learning outcomes in grade IV science subjects through the use of the PjBL learning model. The research was carried out in class IVA SDN 4 Kenanga, Sumber District, Cirebon Regency for the 2023/2024 Academic Year.

This research was carried out for three months, from March to May 2023, starting from the orientation, observation, guided teaching, independent, non-teaching activities, and up

to the preparation of the CAR report. The subjects in this study were grade IV students of SDN 4 Kenanga, Sumber District, Cirebon Regency for the 2023/2024 academic year. The number of students in grade IV of SDN 4 Kenanga is 30 students, consisting of 16 male students and 14 female students.

Data collection techniques in this study are: 1) Observation; 2) Interviews; 3) Tests; 4) Documentation. The data analysis techniques used in this study are qualitative and quantitative. Qualitative data analysis is obtained from the results of pre-research observations and the implementation of research activities by applying the PjBL model made in the form of descriptive analysis. Quantitative data analysis can be calculated using statistical formulas of learning outcomes, average learning outcomes, and percentage of learning outcomes.

## DISCUSSION

Learning outcomes in science subjects on cultural diversity and local wisdom material in grade IV SDN 4 Kenanga in cycle 1 and cycle 2 have increased learning outcomes obtained from the results of student evaluation tests each cycle. Student learning outcomes are presented in the form of frequency distribution tables. The data analyzed is data on student learning outcomes of science subjects' cycle 1 and 2 grade IV SDN 4 Kenanga for the 2023/2024 academic year. The completeness analysis of each cycle in the completeness table was processed by comparing raw data with a KKM score of 70 for class IV science subjects. The following student learning outcomes in cycle 1 in the form of frequency distribution tables and percentage of test scores of cycles I learning outcomes can be seen in table 1.

**Table 1. Frequency and Percentage Distribution of Cycle I Learning Outcomes Test Scores**

| No | Value    | Category   | Frequency | Percentage (%) |
|----|----------|------------|-----------|----------------|
| 1  | 0 - 40   | Unfinished | 4         | 13             |
| 2  | 50 - 60  | Unfinished | 16        | 54             |
| 3  | 70 - 100 | Complete   | 10        | 33             |
|    |          | Sum        | 15        | 100            |

Source: Research Data

Based on the data in Table 1. Frequency and Percentage Distribution of Cycle I Learning Outcomes Test Scores in science subjects, cultural diversity and local wisdom material for grade IV students of SDN 4 Kenanga there are still many students in the

unfinished category with a value range of 0 – 40 frequencies as much as 4 (13%) and a range of 50 – 60 frequencies as much as 16 (54%). So, the total frequency of incomplete students is 20 students with a percentage of students who have not completed 67% compared to the category of students who have completed from the range of 70-60 scores as many as 10 (33%). Because in the success indicator researchers target to provide research achievement indicators of at least 75% of the total number of students determined, then with the results of the percentage of completion in cycle I only reached 33% so that in cycle I this can be declared incomplete. Thus, researchers will re-implement learning activities using the PjBL model and using digital or TPACK-based media to overcome the problem of low scores of student learning outcomes obtained from cycle I data.

Rohani (in Andita, P., 2013: 3) explains that successful learning must be through various activities, both physical and psychological activities. Physical activity is activities that use a person's physical or limbs, such as making miniatures, taking notes, talking, and doing something. This physical activity is also influenced by psychological activities carried out by a person, such as thinking and considering something.

Students in PjBL are required to develop their own learning objectives. What project you wish to construct should be based on the student's personal and group interests and skills. Students must also plan their own learning activities by splitting the burden and integrating various assignments devised by each student (Sutirman, 2013: 43).

The data on the learning outcomes of grade IV students in science subjects were carried out in cycle 2 by reapplying the PjBL model and using digital media. It can be seen from the data on student learning outcomes in cycle 2 in the form of frequency distribution tables and the percentage of cycle 2 learning outcome test scores can be seen in table 2.

**Table 2. Frequency and Percentage Distribution of Cycle II Learning Outcome Test Scores**

| No  | Value    | Category   | Frequency | Percentage (%) |
|-----|----------|------------|-----------|----------------|
| 1   | 0 - 40   | Unfinished | -         | 0              |
| 2   | 50 - 60  | Unfinished | 7         | 23             |
| 3   | 70 - 100 | Complete   | 23        | 77             |
| Sum |          |            | 15        | 100            |

Source: Research Data

Based on learning outcome data in Table 2. Distribution of Frequency and Percentage of Cycle II Learning Outcome Test Scores for grade IV science subjects SDN 4 Kenanga by

applying the PjBL learning model and TPACK or digital-based learning media was seen to have increased student learning outcomes from the complete category of the 70-100 value range with a frequency of 23 percentage students (77%), while for the incomplete category with a range of 0-40 grades there was no student score data entered in the value range. And for the category of unfinished students with a range of 50-60 values with a frequency of 7 percentage students (23%). From the learning outcome data, it is very visible that in this second cycle the frequency of complete category learning outcomes increased to 77% by applying the PjBL learning model and TPACK-based learning media.

Comparison of learning outcomes from the implementation of cycle I and cycle II using the PjBL learning model with different actions through the application of TPACK-based media in cycle II shows an increase in student learning outcomes in science subjects, cultural diversity material and local wisdom grade IV SDN 4 Kenanga in Table 3. Comparison of Learning Outcomes of Cycle I & II below.

**Table 3. Comparison of Learning Outcomes of Cycle I & II**

| Category       | Cycle 1   |            | Cycle 2   |            |
|----------------|-----------|------------|-----------|------------|
|                | Frequency | Percentage | Frequency | Percentage |
| Complete       | 10        | 33%        | 23        | 77%        |
| Unfinished     | 20        | 67%        | 7         | 23%        |
| Sum            | 30        | 100%       | 30        | 100%       |
| Highest Value  | 100       |            | 100       |            |
| Lowest Value   | 20        |            | 50        |            |
| Average Rating | 60,6      |            | 78        |            |

Source: Research Data

Table 3 shows a comparison of student learning outcomes in cycle I and cycle II by applying the PjBL learning model for grade IV science subjects SDN 4 Kenanga it is known that in the implementation of cycle I students have applied the PjBL learning model but student learning outcomes still look low with incomplete student categories frequency 20 (67%), seen an increase in learning outcomes in cycle II by applying the PjBL learning model and TPACK-based learning media categories Unfinished performance seems to decrease compared to the complete category with a frequency of 23 (77%) students who get scores above the average KKM score of 70. Sudjana (2009: 22) defines "Learning outcomes are the abilities that students have after they receive their learning experience, and the learning outcomes themselves".

This research is relevant to the results of Umi Faizah's (2015) research on the Application of Scientific Approaches through the PjBL Model to Improve Process Skills and Learning Outcomes of Grade IV Students of SD Negeri Seworan, Wonosegoro. And the results of research by Ni Made Nepri Andari (2016) on the application of the Character Education-Oriented PjBL Model to Improve Science Learning Outcomes of Grade IV Students of SDN Dangin Putri.

What distinguishes this study from previous research is that this study uses the PjBL learning model for student learning outcomes of science subjects by applying TPACK-based learning media applied to learning in cycle II, where in the learning process teachers present digital-based learning media in the form of motivational video animations and learning video animations that are liked by students so that they deliver material Through video shows, students are very enthusiastic and very excited. In addition, in the learning process students are asked to create their own project or product assignments, where students look for their own ideas about the product related to the material studied. Students will plan what project assignments will be created with teacher guidance, then students in groups schedule for the completion of the project assignments. If it is made, each group will make a final report on the project assignment which will then be presented in front of the class. After that, students do evaluation questions as a form of assessment of learning outcomes in accordance with learning indicators.

This is in line with the opinion of Warsono & Hariyanto (2012: 153) that the PjBL learning model is a teaching that tries to link technology with daily life problems that are familiar to students, or with a school project. In this learning students are able to manage and solve existing problems and are able to develop creativity in thinking in the form of products, so that it can also improve student learning outcomes. This project-based learning provides a more interesting and meaningful learning experience to students (Hosnan, 2016: 319).

From the results of the presentation, it can be concluded that the PjBL learning model that the researchers did can be said to be successful. The PjBL learning model will be able to increase motivation, confidence, tolerance, cooperation and also understanding of student material. This is what makes student learning outcomes in grade IV science subjects SDN 4 Kenanga increase.

## CONCLUSION

Based on the data and discussions, it is possible to infer that the application of the PjBL model has improved the learning outcomes of students in grade IV scientific courses at SDN 4 Kenanga. This is shown based on the results of data in the comparison table of cycle I and cycle II, it can be seen that the learning outcomes of cycle I students are still incomplete with a frequency of 20 students (70%) and for students who complete with a frequency of 10 (33%). The increase in learning outcomes was seen to increase from the results of data in cycle II with the frequency of students completing as much as 23 (77%) and for the frequency of students who have not completed only 7 (23%).

The use of the PjBL learning model in learning activities can improve the learning outcomes of science subjects, cultural diversity material and local wisdom in grade 4 SDN 4 Kenanga, namely by applying learning in accordance with the learning steps in order. The PjBL model of learning is a cooperative learning approach that includes academic competitions including all students of all abilities, genders, tribes or ethnicities. And also, a cooperative learning model where the part consists of classical delivery of material, grouping, this learning is one of the creative and effective learning models that focuses on problem solving, innovation between students, creativity thinking, and creating or creating a work / project both individually and in groups. The PjBL learning model will be able to increase motivation, confidence, tolerance, cooperation and also understanding of student material.

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