ICCCM-JOURNAL OF SOCIAL SCIENCES AND HUMANITIES
2026; 5(4): 11-16
Published online 07 05 2026 (https://icccmjssh.com/)
doi: https://doi.org/10.53797/icccmjssh.v5i4.3.2026
e-ISSN 2811-4469

Effectiveness of Problem Based Learning and Project Based Learning with a Tarl Approach on The Learning Outcomes

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To Cite This Article:
Kundono, Rondli, W. S., and Su'ad (2026). Effectiveness of Problem Based Learning and Project Based Learning with a Tarl Approach on The Learning Outcomes. ICCCM Journal of Social Sciences and Humanities, 5(4). 11-16. https://doi.org/10.53797/icccmjssh.v5i2.3.2026

Abstract: This study aims to determine the effectiveness of the problem-based learning model and the conventional model, the effectiveness of the Project Based Learning model with a TaRL approach and the conventional model, and the effectiveness between the problem-based learning model and the Project Based Learning model with a TaRL approach. This type of research uses an experimental research model. This study employs a Nonequivalent Control Group research design. Data collection techniques in this study include tests and interviews. The data analysis technique in this study uses an effectiveness test or t-test. The results of this study show that (1) the learning outcomes of Civic Education (PPKN) students in the Problem Based Learning model are better than those in the conventional model, (2) the learning outcomes of PPKN students in the Project Based Learning model with a TaRL approach are better than those in the conventional model, (3) the learning outcomes of PPKN students in the Project Based Learning model with a TaRL approach are better than those in the Problem Based Learning model.

Keywords: Problem Based Learning Model, Project Based Learning Model, TaRL Approach, Civic Education (PPKn) Learning Outcomes

1. Introductions

The 4C skills are incorporated into education to prepare students to be competitive and become excellent and high-quality individuals (Partono, et al., 2021). However, the government's expectations are not aligned with the reality on the ground. Teachers face common difficulties in learning and designing strategies to overcome them. Additionally, the lack of good learning activities indicates that the quality of education in Indonesia needs improvement. A significant threat to the educational world is the lack of student motivation to show their seriousness in participating in learning, as evidenced when students tend to be active only in the first 20 minutes of class, and afterwards, when the teacher is teaching, students get distracted with their activities.

This issue aligns with the results of an interview with a teacher from SD N Bakaran 02 on November 14, 2023, which revealed that the learning process in the class still prioritizes memorization and tasks. Teachers believe that by assigning tasks, students will understand the material better by reading. However, observations of the learning process in the classroom show that students still do not understand the material. This is evident when the teacher asks questions, and students still have difficulty understanding the reading material for Civics Education. The teaching method used is still conventional, meaning the teacher does not involve students in activities or tasks to solve problems. Students are asked to complete tasks and read from textbooks. The learning atmosphere appears dull, boring, and only two or three children are active.

In Civics Education, particularly in the context of natural phenomena in Indonesia for sixth grade, 13 students failed to achieve a passing score, while 10 others succeeded. This indicates a disparity in reaching the Minimum Mastery Criteria (KKM), set at 70. Therefore, it is necessary for teachers to take further action to improve student learning outcomes. Learning outcomes have a significant impact, considering that the goal of learning is said to be achieved if it exceeds the predetermined criteria. Therefore, an appropriate learning model is needed to improve learning outcomes.

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One of the learning models considered effective is Problem-Based Learning (PBL) and Project-Based Learning. Both models focus on daily problems experienced by students. Learning activities are more active and encourage students to think critically in solving problems and to develop creativity in producing products or works of art. According to Triningsih & Mawardi (2020), the advantages include problem-solving as a good technique for understanding learning better, stimulating, and satisfying students in discovering new knowledge, helping students develop and take responsibility for their learning, making learning more enjoyable, and encouraging students to think critically by directly experiencing the knowledge or problems they encounter in the real world.

Students' cognitive development stages vary, so teachers need to understand them to provide appropriate learning guidance. Therefore, it is not enough to apply a model alone, but it must be combined with the TaRL (Teaching at The Right Level) approach. Based on the research results of Suharyani et al., (2023), it can be concluded that the TaRL approach can improve student learning outcomes. These results show that providing treatment according to the students' ability level impacts learning outcomes.

Several studies that have used the TaRL model and approach show an improvement in student learning outcomes. First, the research by Lisa, et al., (2020) shows that the TaRL approach can improve student learning outcomes and motivation. Second, the research by Nisa, et al. (2023) shows that the project-based learning model with the TaRL approach can enhance learning outcomes and student interest in science education. Third, Aryani et al. (2021) demonstrate that the problem-based learning model is more effective than the Problem Solving learning model for developing critical thinking skills in thematic learning for fourth-grade elementary students.

1.1 Conceptual Framework

The success of the learning process is seen from its learning objectives. If learning success has not been achieved, then a teacher can reflect on themselves in implementing learning models or how to deliver material to students. However, not all teachers can reflect on themselves in the learning process that has been implemented. They only focus on teaching and immediately completing the material as a form of providing material. In addition, there is less innovation in implementing learning models. The methods often used are lectures and individual assignments. As a result, student learning outcomes decline and understanding of the material is not optimal.

Jean Piaget, on his cognitive development theory believes that school education must empower learners both men and women to do new things based on creativity, invention and discovery. These learners must verify and be critical to everything they deal with. Piaget also believes that the goal of education is not simply repeating what is being done from the past generations rather learn from it to improve more the present and future endeavor (Lillard, Lerner, Hopkins, Dore, Smith & Palmquist, 2013). In addition, an increase level of scientific literacy will help an individual to be more competitive professionals that will spearhead innovation in the field of work (Ogunkola, 2013).

Based on these problems, the learning models that are considered most appropriate are problem-based learning and project-based learning. The problem-based learning model is a problem-based learning model that can improve student creativity. And than, In the Project Based Learning model, it is often referred to as a project-based model where teachers will assign students to create a form of learning achievement. In this learning, students improve and find their own work results that are done in groups or individually so that they can spur students to improve their abilities.

Through the Project Based Learning model, the strategy used is implementation through projects as a means of learning to achieve competency in attitudes, knowledge, and skills. The model is combined with the TaRL approach which provides a breath of fresh air for students. The hope is that learning will not only improve skills in solving problems, but will be more meaningful because it takes into account the level of student ability.

1.2 Research Objectives

Based on the problem formulation, the objectives of this research are as follows: To explain the effectiveness of the Problem Based Learning (PBL) model on the learning outcomes of grade VI students in Theme 2 Subtheme 2 Harmony in Differences in Juwana-Pati Regency. To explain the Project Basic Learning (PjBL) model with the TaRL approach is effective for the learning outcomes of grade VI students in Theme 2 Subtheme 2 Harmony in Differences in Juwana-Pati Regency. To analyze the effectiveness of the Problem Based Learning (PBL) model compared to the Project Basic Learning (PjBL) model with the TaRL approach on the learning outcomes of grade VI students in Theme 2 Subtheme 2 Harmony in Differences in Juwana-Pati Regency.

2. Methodology

2.1 Research Design

This study employs a quantitative research method. The quantitative approach is grounded in positivist principles, utilizes random sampling, and gathers data through research instruments. Data analysis is performed quantitatively or statistically, with results presented numerically. The research design involves two groups: an experimental group and a control group. The experimental group will receive an intervention in the form of the Project Based Learning model with a TaRL approach, while the control group will undergo problem-based learning model or a previously implemented method without this intervention.

2.2 Respondents of The Study

The population in this research refers to the collection of objects or subjects possessing specific attributes and characteristics defined by the researcher. (Khoiri 2021) defines

population as the totality of all values or data, whether quantitative or qualitative, that describe certain characteristics of all members to be studied. For this study, the selected population comprises fourth-grade students from the General Sudirman of State Elementary Schools in, Pati Regency, for the 2023/2024 academic year, consisting of four classes.

2.3 Sample How Table Should be Placed is As Below

Sampling technique is the method used to determine the sample from the targeted population in a study. A sample is a representation of the population chosen to be the subject of research. This study utilizes probability sampling, a method where every element in the population has an equal chance of being selected as part of the sample. Specifically, simple random sampling is applied, which selects samples randomly from the population without considering groups or stratification. This method was chosen because the entire population of fourth-grade students in SD Negeri General Sudirman in Pati Regency, is considered to have uniform or homogeneous characteristics, with no distinguishing classes. The sample selection also considered students from classes with the same teaching instructor and identical learning materials. Following (Sugiyono 2015) recommendation for simple experimental research, where each group (experimental and control), this study's sample consists of nine-grade students from SDN Genengmulyo 02 the control group and SDN Langgenharjo 02 the experimental group.

3. Finding and Discussion

The prerequisite test is used to determine if the data to be used meet the necessary criteria. Below are the results of the prerequisite test presented in Table 1.

Prerequisite Test		**Sig.**	**Conclusion**
Normality	Experiment 1	0.142	Normally Distributed
	Experiment 2	0.135	
	Control	0.200	
Homogeneity Test		0.083	Data is Homogeneous
Test for Equality of Means		0.000	There is a difference in means across the three classes

Based on Table 1, it is shown that the data meet the requirements to proceed to the next stage of hypothesis testing.

3.1 Hypothesis Test 1

Difference in Averages between the Problem Based Learning Model and the Conventional Model. The difference in means test in this study was used to test the effectiveness of the Problem Based Learning model compared to the conventional model on PPKn learning outcomes. The test for the difference between two means in this study was conducted using a one-tailed test with the t-test formula. The hypotheses used in this study are as follows.

$H0$: $\mu 1 \leq \mu 2$ (The average PPKn learning outcomes of students using the Problem Based Learning model are less than or equal to the PPKn learning outcomes of students using the Conventional model.)

$H0$: $\mu 1 > \mu 2$(The average PPKn learning outcomes of students using the Problem Based Learning model are greater than the PPKn learning outcomes of students using the Conventional model)

Based on the data obtained from the calculation process using SPSS.22, the average PPKN test results for the experimental class and the control class were 82.8 and 64.6, respectively, with the number of students in the experimental class ($n1$) and the control class ($n2$) being 23 and 18 students, respectively. The variance of the PPKn test scores for the experimental class ($s2$) was 74.69, while for the control class ($s2$) it was 166.48. The testing criterion used was to accept $H0$ if $t_{observed} > t_{(1-\alpha),(df)}$, with $df = 39$. The result of the difference in means test obtained a $tobserved$ value of 5.640 and $t_{critical} = 1.686$. Because $t_{observed} > t_{(1-\alpha),(df)}$, $H0$ is rejected. This means that the PPKn learning outcomes for students using the Problem Based Learning model are greater than those for students using the conventional model.

The result of the difference in means test above indicates that there is a difference between the Problem Based Learning model and the conventional model. It suggests that learning activities using the Problem Based Learning model are better than conventional learning. This is evidenced during the learning process where students appeared enthusiastic in participating in discussions. Students did not hesitate to ask questions if they encountered difficulties. Communication between students and between students and teachers was good. The students' ability to think critically in solving problems was apparent, as evidenced by their ability to create concept maps about the material presented. These findings are in line with the ideas presented by Meailasari (2020) that the Problem Based Learning model trains ways of thinking and reasoning in drawing conclusions, developing problem-solving abilities, critical and creative thinking, and developing the ability to convey information or communicate ideas through speech, writing, pictures, graphs, maps, and so on.

According to research conducted by Jairina, et al., (2020), Woa., et al. (2018) in their journals, it shows that the Problem Based Learning (PBL) model, which emphasizes problem orientation related to the students' surrounding environment, trains them in thinking and then solving problems. The syntax of Problem Based Learning (PBL) can train in conducting problem-solving processes. This aligns with the research conducted by Bakri, et al., (2018), in their journal, which shows that students taught using the Problem Based Learning (PBL) model have better problem-solving abilities than those learning using the conventional model.

3.2 Hypothesis 2

The Difference in Means between the Project Based Learning Model with a TaRL Approach and the Conventional Model The test of the difference in means in this study was used to examine the effectiveness of the Project Based Learning model with a TaRL approach compared to the conventional model on Civics Education learning outcomes. The t est for the difference between two means in this study was conducted using a one-tailed right test with the t-test formula. The hypotheses used in this study are as follows.

$$H0: \mu 1 \leq \mu 2$$

(The average Civics Education learning outcomes of students in the Project Based Learning model with a TaRL approach are less than or equal to the Civics Education learning outcomes of students in the conventional model)

$$H0: \mu 1 > \mu 2$$

(The average Civics Education learning outcomes of students in the Project Based Learning model with a TaRL approach are greater than the Civics Education learning outcomes of students in the conventional model)

Based on the data obtained from the calculation process using SPSS.22, the average test scores for Civics Education of Experiment Group 2 and the Control Group were 86 and 64.6 respectively, the number of students in Experiment Group 2 ($n1$) and the Control Group ($n2$) were 18 and 23 students respectively, and the variance in test scores for Civics Education in the Experiment Group ($s2$) was 75.76 while the variance in test scores for Civics Education in the Control Group ($s2$) was 166.43. The testing criterion used was to accept $H0$ if $tobserved < t(1-\alpha),(df)$, with $df = 39$. The result of the mean difference test obtained a $tobserved$ value of 6.046 and $tcritical = 1.685$. Because $tobserved > t(1-\alpha),(df)$, $H0$ is rejected. This means the Civics Education learning outcomes of students in the Project Based Learning Model with a TaRL Approach are greater than those of students in the conventional model.

The result of the above mean difference test indicates that there is a difference between the Project Based Learning model with a TaRL approach and the conventional model. Learning activities using the Project Based Learning model with a TaRL approach are better than conventional learning. Activities are designed according to students' needs based on their ability level. At the beginning of the learning activity, the teacher does not forget to conduct diagnostic assessment activities to determine the level of ability possessed by the students. This is done to make it easier for the teacher to apply the right learning strategy. Besides, it makes it easier for the teacher to group students according to their ability levels. In learning activities using the Project Based Learning model, the focus on ability levels shows that students appear enthusiastic and spirited in discussions and in completing products.

Each group creates products according to their ability levels and creativity, so students appear enthusiastic without any pressure. Besides, the teacher can guide according to the students' ability levels. Therefore, groups with lower ability levels need more guidance, so the teacher spends more time with these groups than with groups that are more independent. The Teaching at The Right Level (TaRL) approach is a learning design that considers the achievement levels of students and aims to facilitate students in mastering competencies in a subject (Ismail & Zakiah, 2021).

The TaRL approach is important because it aims to help students deepen their knowledge and enhance their abilities in line with their cognitive development stages. Implementing learning with the TaRL approach shows a fair attitude that is reflected in a teacher, where the teacher will map students into groups according to their cognitive development levels and facilitate each student according to their learning needs, which in this case is indicated based on the cognitive levels of the students (Faradila, 2023).

3.3 Hypothesis 3

The Difference in Averages between the Problem Based Learning Model and the Project Based Learning Model with a TaRL Approach. The mean difference test in this study was used to test the effectiveness of the Problem Based Learning Model and the Project Based Learning Model with a TaRL approach compared to the conventional model on the learning outcomes of Civic Education (PPKN). The two-mean difference test in this study was conducted using a one-tailed right test with the t-test formula. The hypothesis used in this study is as follows.

$$H0: \mu 1 \leq \mu 2$$

(The average learning outcomes of Civic Education (PPKN) students in the Problem Based Learning model are less than or equal to the learning outcomes of PPKN students in the Project Based Learning model with a TaRL approach.)

$$H0: \mu 1 > \mu 2$$

(The average learning outcomes of Civic Education (PPKN) students in the Problem Based Learning model are greater than the learning outcomes of PPKN students in the Project Based Learning model with a TaRL approach.)

Based on the data obtained from the calculation process using SPSS.23, the average test scores of Civic Education (PPKN) for experiment class 2 and the control class are 82.8 and 62.8, respectively. The number of students in experiment class 2 ($n1$) and the control class ($n2$) are 20 and 18 students, respectively. The variance of the PPKN test scores for the experiment class ($s2$) is 74.69, while the variance of the PPKN test scores for the control class ($s2$) is 75.76. The testing criterion used is to accept $H0$ if $tobserved < t(1-\alpha), (df)$, with $df = 38$. The result of the mean difference test yielded a $tobserved$ value of -1.163 and $ttable = 1.686$. Since $tobserved > t(1-\alpha), (df)$, then $H0$ is accepted. This means the average learning outcomes of Civic Education students using the Problem Based Learning model are less than or equal to those of students using the Project Based Learning model with a TaRL approach.

The result of the above mean difference test indicates that there is a difference between the Problem Based Learning model and the Project Based Learning model with a TaRL approach. The learning process using the Project Based Learning model with a TaRL approach is better than using the Problem Based Learning model. This is evidenced by the higher average results in the Project Based Learning model with a TaRL approach than in the Problem Based Learning model, which are 82.8 and 86, respectively. The result of the mean difference test shows a tendency towards the Project Based Learning model with a TaRL approach. The result is due to SDN Genengmulyo 02, which is experiment class 2, paying attention to the students' ability levels, thus showing optimal Civic Education learning outcomes.

The TaRL approach is important because it aims to help students deepen their knowledge and enhance their abilities according to their cognitive development stages. Implementing learning with the TaRL approach demonstrates a fair attitude reflected in a teacher, where the teacher will map students into groups according to their cognitive development levels and facilitate each student according to their learning needs, which in this case is shown based on the cognitive levels of the students (Faradila, 2023). In line with the aspiration to enlighten the nation, Teaching at The Right Level can optimize students' understanding of the material taught according to their cognitive level, thus creating meaningful learning.

The existence of the TaRL approach contributes significantly to the current learning process. Students can develop according to their abilities without any pressure. This is because each child cannot be equated in their cognitive level. Therefore, guidance is needed for children who have lower ability levels.

4. Conclusions and Recommendations

The findings of this study indicate that (1) the learning outcomes of students in Civic Education (PPKn) using the Problem Based Learning model are better than those of students using the conventional method, (2) the learning outcomes of students in Civic Education (PPKn) using the Project Based Learning model with a TaRL approach are better than those of students using the conventional model, (3) the learning outcomes of students in Civic Education (PPKn) using the Project Based Learning model with a TaRL approach are better than the learning outcomes of students in Civic Education (PPKn) using the Problem Based Learning model.

Based on the results of the study which show that teachers can improve their skills in implementing problem-based learning models, project-based learning, and the TaRL approach as well as other strategies that foster scientific attitudes. Implementing interactive and reflective learning approaches, such as discussions and projects, to encourage critical thinking and active student engagement.

Acknowledgement
Thanks to the thesis supervisor who has provided input to improve the writing and ideas. Thanks also to the university that has provided a place for students to hold an international seminar.

Conflict of Interest
The authors declare there is no conflict of interest

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