

# The Comparison of Effectiveness of PjBL and PBL Models on Students' Cognitive Learning Outcomes

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## ABSTRACT

In the autonomous curriculum, problem-based and PjBL paradigms are given priority. In terms of cognitive learning outcomes, this study aimed to evaluate the efficacy of PjBL and PBL models. This study employs a nonequivalent control group design and quantitative methodologies. Two groups are used in this study design: the control group employs the PBL model, while the experiment group uses the PjBL model. Forty fifth-grade children from a state elementary school in Cakranegara served as the study sample. A multiple-choice exam with 20 items was employed as the data-gathering method. The experiment group's average score on the pre-test was 65.75 and their post-test was 81.25, while the control group's average score on the pre-test was 65.75 and their post-test was 75.50. The normality test revealed that the two groups' pre-test scores were identical, at 0.222, and their post-test scores were 0.109 and 0.063, respectively. These data analysis techniques include descriptive analysis tests. In order to achieve the findings of the precondition test of data testing using the SPSS 25 for Windows program, the homogeneity test was derived from the results based on a mean of 1.000. The data was homogenous and had a normal distribution, according to the findings. A significant value (2-tailed) of  $0.037 < 0.05$  was shown by the data. In order to achieve the findings of the precondition test of data testing using the SPSS 25 for Windows program, the homogeneity test was derived from the results based on a mean of 1.000. The experiment group and control group showed different cognitive learning results. Following treatment, the experiment group's average value was 81.25, whereas the control group's was 75.50. The experiment group (PjBL) is, therefore, more effective than the control group (PBL), it may be inferred. It has been demonstrated that utilizing both learning models enhances learning results.

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## 1. INTRODUCTION

Since education is the most crucial factor in preparing a person for competition in the global age, efforts to develop human resources (HR) are seriously taken into account (Dasar et al., 2022). The caliber of human resources is evident in the caliber of education, as seen by the professional manner in which school educators, instructors, and other staff members carry out their jobs to raise the caliber of

education. A contributing factor to meeting national education goals and raising staff standards is the Ministry of Education and Culture (Maryati et al., 2022). If the educational objectives are met, then the teaching and learning process is considered effective; nevertheless, there are a number of non-technical and technical aspects that might affect how well the objectives are implemented. Learning methods are used in teaching and learning to help both teachers and students and to speed up the process of learning. The learning approach must be in line with the goals and the resources that will be utilized (Hanipah et al., 2018). The strategy's fit for the learning process will undoubtedly be able to support the degree of learning success and accomplish the goal in addition to the established learning objectives.

Even if the results displayed are not ideal, the accomplishments made by students throughout a learning activity undoubtedly have a favorable influence on learning outcomes and can enhance learning in the future. Of course, one way to gauge the success of learning is through learning outcomes. As a result, learning outcomes—which take the shape of outcomes that may be directly assessed through tests or other assessments—serve as learning centers. The practical implementation of learning outcomes is evident in daily life. According to Amini et al. (2019), it is made up of students' conceptual understanding (knowledge), abilities, and attitudes toward process interactions. As to Winkle's perspective in Pulungan (2020), learning outcomes consist of three crucial elements: knowledge, attitudes, and skills. Both internal and external influences can have an impact on learning results. External elements, such as the curriculum, the atmosphere, the teaching staff, the learning materials utilized, and the learning opportunities. On the other hand, intellect, talent, motivation, interest, and cognitive capacity all affect internal elements. The ability to successfully complete learning tasks due to both internal and external variables is unquestionably correlated with the teacher's involvement in classroom management.

Effective classroom management may set up scenarios that inspire students' curiosity and entrepreneurial learning in every learning exercise. Consequently, educators are crucial to the production of high-caliber graduates. However, the issue that has emerged thus far is that educators continue to use models, strategies, and even conventional teaching techniques, such as the lecture method, which is one-way in nature—that is, the instructor speaks exclusively during the learning process, leaving the students to focus solely on listening. This causes students to feel uneasy and even bored while studying—it can even be considered boring. Nevertheless, the teacher also has a responsibility to control the classroom atmosphere and apply instructional strategies that enable students to learn to enjoy themselves by experiencing and comprehending the knowledge acquired through studies or experiments carried out by Anggraeni et al. (2022). Each student's cognitive talents may be strengthened by their educational experience, but this can be optimized through creative learning strategies.

To ensure that learning activities are engaging and varied, educators have developed innovative learning models that include new resources. Learning models are strategies or frameworks designed to accomplish learning goals in an efficient and successful manner (Evita et al., 2019). Lesson planners and instructors can use the learning model as a conceptual framework of reference to design teaching and learning activities. It outlines a methodical approach to structuring learning experiences to meet certain learning objectives. Students participate actively in learning models, particularly those that are creative. Students now come first when it comes to learning, not teachers. Teachers must thus be able to use learning models in a way that encourages students to learn and makes them more creative and engaged. When engaging in learning activities, students who lack motivation are unable to focus (Wulandari, 2022). There is an enormous variety of learning models, such as PjBL and PBL models, that encourage students to participate more actively in class activities.

The PjBL model is an innovative learning model that emphasizes contextual learning through complex activities (Susilowibowo & Hardini, 2019). The application of the PjBL model is part of an independent curriculum that provides meaningful and interactive learning (Fahlevi, 2022). This is based on the Circular Letter of the Minister of Education and Culture No. 4 of 2020. The main purpose

of the PjBL model is to train students to be more collaborative, work together, and empathize with others (Martati, 2022). The teacher's teaching and learning process activities are only facilitators in guiding students; students who work in teams (collaboration) are given the opportunity to determine the process of planning and doing projects. The planned project is predicated on the teacher's questions and independent research; the teacher's questions then determine the project's outcomes. The instructor then tests, presents, and evaluates the project findings for each of the completed projects (Siagian et al., 2020). The PjBL model consists of the following steps: (1) giving students questions or project assignments; this is the initial stage when they delve further into the questions that stem from real-world events. (2) Project design: Project plans can be created through experimentation as a practical approach to address open-ended concerns. (3) Establishing the project plan: Creating a project schedule is crucial to ensuring that the project is completed in accordance with the goals and time constraints. (4) keeping an eye on the project's activities and advancement: The instructor keeps an eye on the project's execution and advancement.

Students assess continuing initiatives (Sinaga, 2022). Students' excitement for studying will rise when they use the project-based learning approach since they will gain a deeper understanding of the subject matter by working on a specific project. In addition to project-based learning, there is another type of learning called problem-based learning that calls for students to hone their critical thinking abilities while working through challenges in educational materials. PBL is a teaching and learning approach that has students actively solve real-world issues in order to build a variety of abilities, including communication, critical thinking, problem-solving, motivation to learn, and increased teamwork (Fajari et al., 2020). According to Pratiwi and Wuryandani (2020), the problem-based learning model (PBL) is helpful for fostering students' critical thinking in challenging circumstances, problem-solving abilities, and integrating knowledge with practical issues. Learning enhances mental flexibility and intellect.

The goal of the problem-based learning approach is to give students the freedom to express their creativity and expertise in all learning activities freely. Problem-based learning models, according to Mulyanto et al. (2018), are part of a larger teaching and learning process and offer opportunities to develop collaborative knowledge, skills, and attitudes that are crucial for creating shared knowledge and assisting students in drawing connections between learning outcomes and collaboration. Fachrurazi in Qomariyah (2019) states that the problem-based learning strategy has shown promise in raising the caliber and learning results.

It is important to note that problem-based learning (PBL) has several stages, as stated by (Goni et al., 2022; Timor et al., 2021). These stages include (1) orienting students to the problem, educators providing motivation, and active students in solving problems. PBL can be described as a learning model that is able to make students independent and think broadly. (2) arranging assignments and mentoring students in their learning; (3) leading group or individual investigations; (4) developing and presenting work; and (5) acting as facilitators in the information-gathering process. Teachers help students organize and prepare to present their group work findings (5), analyze and evaluate the process of solving problems, and they also help students reflect on the information they have found. The problem-based learning model's implementation is unquestionably inextricably linked to a number of tasks, including organizing, guiding, developing, communicating, and analyzing results and evaluation. These tasks are necessary to ensure that, when it comes time for assessment, all assessment-related aspects are obtained equally.

Several experts have done similar investigations. In the first study, "Effectiveness of PjBL and Guided Inquiry to Improve Learning Achievement and Entrepreneurship in Blora, Indonesia," Hayuningtyas et al. (2019) found that the two approaches yielded distinct results. Enhanced learning achievement had a t-value of 0.980 and a sig score of 0.000, whereas expanding entrepreneurship had 0.397 and 0.000. According to the study, PjBL models helped students learn and become entrepreneurs better than guided inquiry models. Second, Nasir et al.'s 2019 study found significant differences in

science process skill acquisition (sig. 0.022 <0.05) and cognitive learning outcomes (sig. 0.013 <0.05) between PjBL and guided inquiry. The study found that PjBL helps students build science process and cognitive learning skills better than guided inquiry. Third, Setia Dewi's (2020) study on PjBL and student autonomy found that students who used conventional methods with gains had different effects on speaking skills ( $F=18.391$  and  $p<0.05$ ). Research indicates that project-based learning improves speaking skills, with an interaction between PjBL and student autonomy ( $F = 45.325$ ,  $p <0.05$ ). PjBL was more effective than traditional methods. One of the first PBL research studies by Lena et al. (2019) focused on students' learning outcomes using problem-based learning and discovery learning models in integrated theme learning. Problem-based learning models had an average learning outcome of 89.51, whereas discovery learning models had 89.50. Since both models were cooperative learning models, the researcher found that both improved learning outcomes and that there was no difference. The fourth study, "Effectiveness of Guided Inquiry Learning Models and Problem-Based Learning Models in Integrated Learning Competency Thematics," by Sari et al. (2019), used the t-test. The findings showed that (1) the Guided Inquiry model improved learning competencies based on the t-count of  $20.5649 >$  table 1.7011, (2) the Problem-Based Learning model improved them based on the t-count of  $8.5467 >$  table 1.6991, and (3) the two models improved learning competencies equally. So, get knowledge count  $0.2764 >$  t-table 1.6725. In conclusion, Salombe & Harjono's (2022) study explored how problem-solving and discovery-learning approaches improve fifth-grade elementary school students' critical thinking during thematic learning. Using two-tailed scoring, the t test results showed a significance level of  $0.000 < 0.05$ . As  $H_0$  is rejected and  $H_a$  is accepted, the PBL and DL models are not equally effective in improving fifth-grade primary school children's critical thinking in theme learning. The PBL model produces 80.33, while the DL model produces 74.67. This is inconsistent. The study found that PBL learning improved students' critical thinking in theme learning over DL.

Previous studies indicate no comparative procedure between PjBL and PBL has been established. For this reason, this research is being presented to investigate new and deeper aspects of the impact of learning models on cognitive learning outcomes. PjBL and PBL models have been used in Indonesian language classes in grade 5 primary schools. In terms of cognitive learning outcomes, this study compares the efficacy of problem-based learning with PjBL methods. Thus, the question that emerges from this research is: How may cognitive learning outcomes be enhanced using PjBL and PBL models? And which model works better out of the two? The goal of some pertinent earlier research is to compare one learning model with another learning. There are variations in the methods used for gathering and analyzing data, such as employing parametric t-test analysis and multiple-choice test instruments. The assessments employed and the data analysis done are only relevant to cognitive learning objectives.

## 2. METHODS

Technique Researchers employ quasi-experiment design in their studies. The Non-equivalent Control Group Design (NCGD) was employed in this investigation. Using non-random group selection, non-equivalent control group design (NCGD) is a study strategy that examines variations between experiment and control groups (Sugiyono, 2017). There are two groups in this design: the control group employs the PBL mode, while the experiment group uses the PjBL model. In 2020, Susilowati and Wahyudi Table 1 below illustrated the experiment study design, also known as the non-equivalent control group design:

**Table 1.** Research design Nonequivalent Control Group Design

Group	Before treatment	Treatment	After treatment
Experiment Group	O <sub>1</sub>	X <sub>1</sub>	O <sub>2</sub>
Control Group	O <sub>3</sub>	X <sub>2</sub>	O <sub>4</sub>

Experiment Group O<sub>1</sub> X<sub>1</sub> O<sub>2</sub>

Control Group O<sub>3</sub> X<sub>2</sub> O<sub>4</sub>

An explanation of the study's methodology Using the following Nonequivalent Control Group Design:

X1: Intervention (intervention utilizing a PjBL paradigm)

X2: Intervention (using the problem-based learning approach)

O1: Experiment group pre-test results

O2: Experiment group post-test outcome

O3: Control group's pretest outcome

O4: Control group post-test results

At SDN 24 Cakranegara, the study's subjects utilized classes VA, which had 20 students, for experiment 1 and VB, which had 20 students, for experiment 2. The study was carried out in January of 2023. With interview materials for both courses, the Indonesian language course. Researchers used the test to get the data. The researcher employed pre- and post-tests consisting of 20-item multiple-choice questions. Each question item on a multiple-choice exam is scored as part of the assessment process. In a traditional evaluation, students are given 45 minutes or an hour during class to finish all of the objects while working on the questions. The traditional method of evaluation, which involves assigning numbers based on (correct scores) Ariyanti & Bhakti (2020), is replaced with regular multiple choice utilizing weighted scores. When questions are scored using the right response system, the correct answer receives one point; incorrect answers receive zero or no points. Every point obtained by answering every question correctly multiplied by 100 and divided by the total number of questions.

**Tabel 2.** question indicator

Aspects	Indicator
Remembering	Can remember things related to the interview
Understanding	Can grasp the intent of the interview material
Applying	Students independently implement an interview activity.
Analyzing	Can analyze the ideas or content obtained from the interview.
Create	Can develop creativity to design own interview scheme

(Zulqarnain, 2021)

Table 2 shows the indicators used during learning activities on interview material. The use of these indicators aims to make it easier for researchers to determine the standard of conformity of criteria or success achieved by students. In the interview material, students were formed into groups that would be assigned to conduct interviews. Interviews are specialized for groups that use the PjBL model while groups using the PBL model only discuss the results of existing interviews. By determining indicators, it can make it easier for researchers to give value to the performance of students.

Researchers use descriptive statistics as a data analysis technique to determine the maximum, minimum, average, and other pre- and post-test scores. The normality test determines whether the data obtained is normally distributed or not, allowing for the administration of the next test. The homogeneity test determines whether the variances of the two groups or samples are similar, and the t-test compares the average of the two samples. The t-test is used because the sample used is less than 100 when analyzing data using SPSS 25 for Windows applications.

Each model's study protocols, PjBL and PBL, have been established. where a number of preparations are required, including study resources (both modules and RPP), grade 5 Indonesian language textbooks, and interview materials that are distributed to each group. A sequence of steps begins with administering a pre-test and continues with treating the PjBL and PBL models. While PBL requires one week of meetings to complete the project, the PjBL group needs two weeks to complete the learning process. Following treatment, students are given a 5- to 10-minute break before the final evaluation is provided, and they are allowed 45 minutes to complete the post-test. The researcher assigns a score for the completed pre-test and pot-test before doing an analysis of the data.

The study's hypothesis,  $H_0$ , states that there is no discernible difference in the cognitive learning outcomes between PjBL and the application of problem-based learning models. It will be put forth for the difference test between the two groups.  $H_a$ : Using problem-based learning models in conjunction with PjBL yields significantly different cognitive learning outcomes. The rules of the test criteria that use the sig. coefficient is as follows: if the sig value is less than 0.05,  $H_0$  is refused; if it is more than 0.05,  $H_0$  is approved.

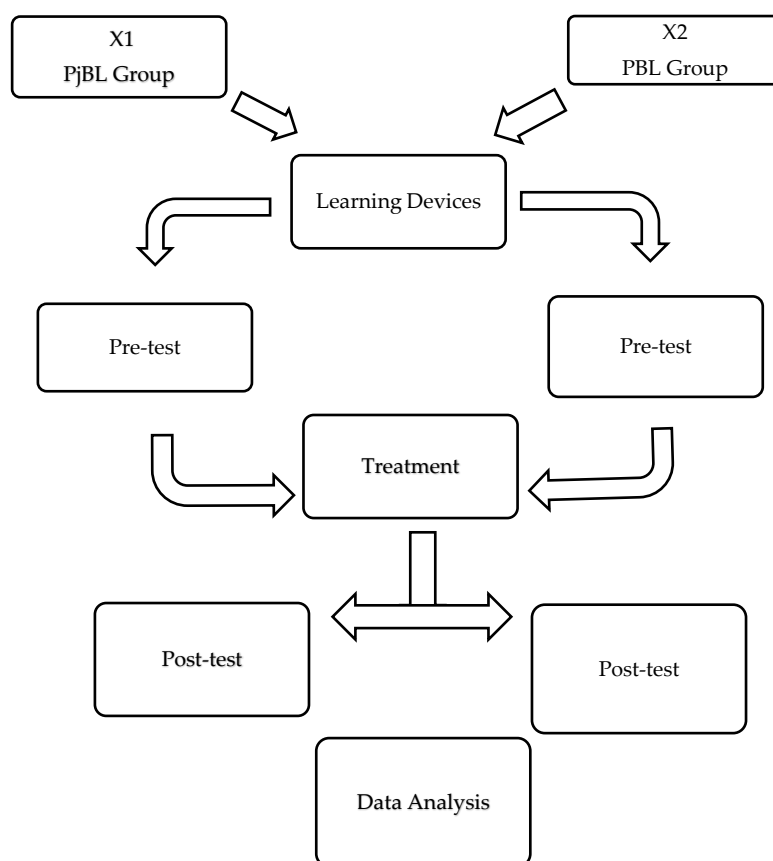


Figure 1. Research Procedure

### 3. FINDINGS AND DISCUSSION

#### 3.1. Findings

Prior to the study's execution, a preliminary submission of the information about how the researcher assigned tasks without providing students with the actual material was conducted. The completed questions yielded comparable answers, ensuring that the information provided with the model also yielded comparable findings. Two distinct models are used to provide treatment: PBL is used for one group and PjBL is used for the other. Learning is done utilizing both models according to the phases of each model. In order to determine whether the increase in learning outcomes between the PjBL and PBL models has more substantial effects on the learning process, comparable questions are asked during the final evaluation stage following treatment.

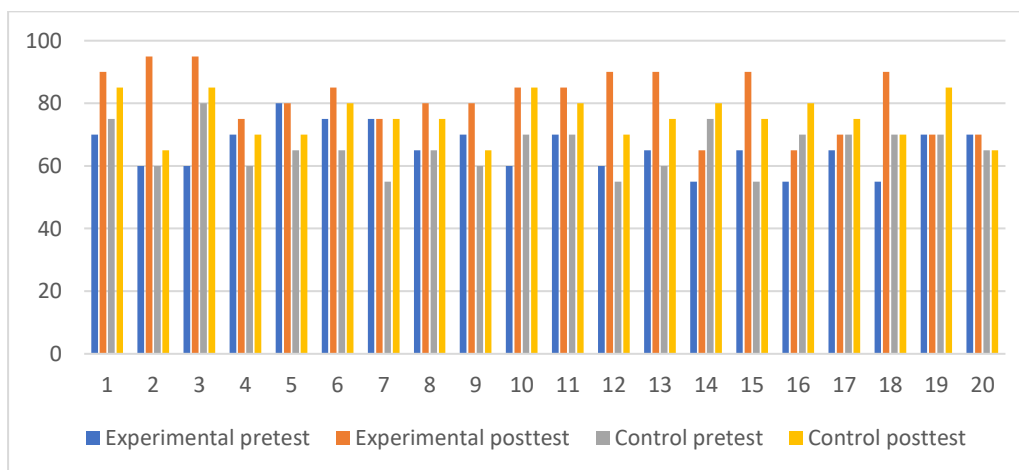
### 3.1.1 The Results of the Descriptive Analysis of Experiment and Control Groups

Based on the conducted study, the following conclusions – which subsequently form the results – require some analysis to get at: The maximum, minimum, average, and other scores from the pre- and post-tests are obtained using descriptive statistics. The normality test is used to ascertain whether the data obtained is normally distributed or not so that the subsequent test can be administered. The homogeneity test is used to determine whether the two groups/samples have an equal variance, and the t-test is used to compare the average of the two samples used. Because the sample size was less than 100, the t-test was employed. The following sums up the study's overall findings.

**Table 3.** The Results of the Descriptive Analysis of Experiment and Control Groups

Descriptive statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Experiment pre-test	20	55	80	65.75	7.122
Post-test experiment	20	65	95	81.25	9.716
Control pre-test	20	55	80	65.75	7.122
Post-test control	20	65	85	75.50	6.863
Valid N (listwise)	20				

Table 3 indicates that the pre-test experiment group's average value (mean) was 65.75, but the post-test revealed an average value (mean) of 81.25. The pre-test control group's average (mean) was 65.75, and the post-test resulted in 75.50. By using the two learning models, learning outcomes may be improved since the mean value shows that there is a difference between the experiment and control groups.



**Figure 2.** Comparison diagram of Experiment-control study results

The learning outcomes of the experiment group and the control group differ, as shown in Figure 2. The pretest results for each group demonstrate the equality of the temporary average scores. Following each group's therapy, till the posttest is administered. After answering the questions, the scores differ from one another. The findings acquired by the experiment and control groups showed substantial differences, as indicated by the diagram on each posttest score. In the experiment group, average scores approached 90 or higher, but in the control group, only a small number of scores approached 90.

The researcher performed a preparatory test that includes the homogeneity and normality tests before doing the t-test using the independent Sample T-test. Because there were only 40 students in the study's sample, the researcher employed the Shapiro-Wilk method for normality and the Homogeneity of Variance method for homogeneity. The researcher will use the independent Sample T-test to continue the t test if the data is homogenous and regularly distributed. Table 4 below displays the normalcy test results.

### 3.1.2 Normality and Homogeneity Test Result

**Table 4.** Shapiro-Wilk Normality Test Results

Class	Statistic	Df	Sig.
pre-test_experiment	.938	20	.222
post-test_experiment	.922	20	.109
pre-test_control	.938	20	.222
post-test_control	.910	20	.063

The data in the experiment group and control group are displayed in Table 4 of the Shapiro-Wilk normality test results. If a significance value  $> 0.05$  is obtained, the data is normally distributed; if the value is  $< 0.05$ , the data is not normally distributed. The experiment group's pre-test results show a significance value of 0.222 and post-test results of 0.109 in the Shapiro-Wilk table, whereas the control group's pre-test results show a significance value of 0.222 and post-test results of 0.063. Thus, it may be said that the distribution of the data is normal. In addition, the variance homogeneity test was used in the homogeneity test to determine if the variables in the experiment and control groups were similar or not. Data is considered homogenous if the significance value is greater than 0.05, and non-homogeneous if the value is less than 0.05. The homogeneity test results are displayed in Table.

**Table 5.** Results of Variance Homogeneity Test

	Levene			
	Statistic	DF1	DF2	Sig.
Based on Mean	.000	1	38	1.000
Based on Median	.000	1	38	1.000
Based on Median and with adjusted df	.000	1	38.000	1.000
Based on trimmed mean	.000	1	38	1.000

Table 5 indicates that the variance of the data for the pre-test experiment and pre-test control is homogenous, or the same, with a significance value based on the mean of 1,000 ( $1,000 > 0.05$ ). The data must be homogenous and regularly distributed, as demonstrated by the results of the homogeneity and normality tests, in order to proceed with the t-test using the independent sample T-test. Table 6 provides a description of the test outcomes.

Based on the independent sample t-test analysis findings shown in Table 6, the study hypothesis is applied to the test. One way to find out if a theory is accepted or rejected is to test it. The hypothesis put out in this study is:

Ho: Using problem-based learning models in conjunction with PjBL does not significantly alter the cognitive learning results.

Ha: The use of PjBL and PBL paradigms produces very different cognitive learning results.

### 3.1.3 Independent Sample T-Test Test Results Post-Test Experiment-Control Group

**Table 6.** Independent Sample T-Test Test Results Post-Test Experiment-Control Group

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Learning outcomes	Equal variances assumed	3.811	.058	2.162	38	.037	5.750	2.660	.365	11.135
	Equal variances not assumed			2.162	34.181	.038	5.750	2.660	.345	11.155

The researcher utilized the output data of SPSS 25 for Windows to test the hypothesis. The Sig coefficient is used to test criterion provisions. That is, (1) Ho is rejected if the sig value is less than 0.05, and (2) Ho is allowed if the sig value is more than 0.05. Table 6 demonstrates that Sig is displayed in the results of the independent sample t-test calculation for the hypothesis Sig. (2-tailed) is 0.037. This indicates that it is less than 0.05 ( $.037 < 0.05$ ). It suggests that Ha is accepted while Ho is rejected. It is not anticipated that the values are almost the same in the equal variance table, which displays Sig. (2-tailed) of 0.038 ( $0.038 < 0.05$ ), indicating that Ha is accepted while Ho is rejected. This result demonstrates that, despite the two samples' differing variances, the decision-making process nevertheless demonstrates that, in terms of cognitive learning outcomes, there is a substantial difference in the learning outcomes between the application of problem-based learning and PjBL models.

### 3.2. Discussion

This study used two classes at SDN 24 Cakranegara, VA class as the experiment group and VB class as the control group, to assess the efficacy of the PjBL and PBL models applied to class V. In order to apply this research to the issue of interview-based Indonesian language acquisition, both groups received instruction using identical materials but with different approaches. This study's implementation was done in three stages: pre-test, therapy (treatment), and post-test. There are twenty multiple-choice questions on the pre-test. Following the completion of the pre-test for both the experiment and control groups, each group received treatment. Each group receives a distinct course of therapy.

The study introduced Project-based Learning (PjBL) to the experiment group by starting with a teacher's explanation aimed at igniting students' curiosity and excitement. Subsequently, the teacher allocates the assignment to several groups of students. Projects are conducted in groups to supervise student activities effectively and avoid any deviation from allocated obligations. During the second phase, the instructor explained the project's goal of connecting the results of interviews conducted in the neighborhood to diversity. Utilising a tape recorder or notepad to document the interview results will facilitate students in analysing the information obtained from interviewing sources. After the teacher's explanation, students are responsible for planning and managing the completion of a project from beginning to end in the third phase. Creating a mind map and developing questions to ask the

sources are essential steps in the process. In the fourth phase, students work with the teacher to organize the schedule of activities for implementing the project once the planning is complete.

During the fifth phase, the instructor supports, motivates, and assists the students as they engage with the assignment. In the sixth phase, the teacher provides students with guidance on compiling reports, delivering presentations, and sharing the project's discoveries. Following the presentations, classmates offer feedback on each other's findings. During the final stage, the instructor provides guidance on improving student presentations by evaluating the project's development and results.

Meanwhile, researchers employed the PBL model in the control group; Hosnan had earlier suggested the stages of this approach (Irwan & Mansurdin, 2020). The first stage in PBL is to acquaint pupils with the issue. Student organization for learning is the second phase. Guiding both individual and group investigations is the third phase. The creation and presentation of the work is the fourth phase. Analyze and assess the problem-solving procedure in the end. Using the PBL model in the classroom, the instructor assigns the students a problem to solve after organizing the class to learn. The students are divided into multiple groups, and each group is given a student activity sheet to complete the problems on the sheet with their group members. After completing their group work, students jot down their findings and then alternately present them to the class. Teachers and students assess and examine answers to issues from groups that have given presentations. Students learn more actively and independently after using the PBL paradigm, and they also develop critical thinking skills when solving problems.

Following the administration of varying therapies to each group, students completed a post-test to determine the ultimate outcomes for each group. Post-test data was utilised to compare the experiment and control groups. The post-test analysis yielded an average value of 81.25 with a standard deviation of 9.716 for the experiment group and an average value of 75.50 with a standard deviation of 6.863 for the control group. The analysis's findings demonstrated that the post-test scores of the experimental group and the control group differed. Pupils who had previously used the PBL model scored lower than those who had used the PjBL approach. Based on the acquired significance value, it can be inferred that the PjBL approach is more successful than PBL.

A study by Fiana et al. (2019) provides support for this claim, demonstrating that the PjBL model is more effective than the PBL model. According to a study by Irnawati et al. (2019), the PjBL paradigm shows better results in terms of learning efficacy measures compared to PBL. Obtaining t-counts larger than t-tables ( $5.720 > 2.023$ ) suggests a significant disparity in learning results generated by the PjBL approach with the incorporation of a mind map. Post-test scores for student learning outcomes were greater than pre-test results. The mean score prior to the exam was 67.75, but the mean score following the test was 81.25. (Hening et al., 2019). According to research conducted by Sofia in 2023 under the title "Increasing Scientific Literacy and Cognitive Learning Outcomes of Students Through the Ethnoscience-Based PJBL Model," the model's outcomes were well-received.

By utilizing the ethnoscience-based PjBL approach, students' cognitive learning outcomes and scientific literacy can be enhanced. Research by Sutriyani & Widyatmoko (2020), in contrast, indicated that PBL models were more successful than traditional learning models in increasing learning outcomes based on the results of learning utilizing the media song mathematical formula. According to Sianturi et al. (2020), when it came to students' willingness to study mathematics and develop their algebraic critical thinking abilities, the PBL model outperformed PjBL by a large margin.

Learning results vary, according to the research that has been conducted. Rather than using PBL models, PjBL approaches yield excellence. This is possible as a result of PJBL's ability to motivate students to draw conclusions from the issues they encounter and share their conclusions with the class (Reski et al., 2019). Due to the fact that project completion is closely related to the surrounding environment, students' comprehension will grow as a result of the PjBL model's connection to information when creating PjBL in interviews. As per research conducted by Muliaman in 2021.

Encouraging students to relate ideas and subject matter to real-life situations is a key aspect of the PjBL approach. Research indicates that PjBL and PBL have the potential to enhance student motivation and improve learning outcomes (Simbolon & Koeswanti, 2020). PjBL can enhance the learning experience of the Indonesian language for students, making it more enjoyable and interactive.

PjBL is the creation of a learning model that takes into account a student's mental development level and adapts its activities to suit their comfort level, interest in learning, and competence. Furthermore, a learning paradigm that necessitates student participation in the learning process is consistent with a study conducted by (Fithriani et al., 2022). Through PjBL, students actively participate in the creation of the project. According to Kt et al. (2013), the PjBL approach can enhance PBL, scientific attitudes and process skills, learning outcomes, and learning motivation.

Students study Indonesian with great enthusiasm and excitement while using PjBL and PBL approaches. When kids exhibit this mindset, they actively seek knowledge, ask thoughtful questions, and demonstrate curiosity—especially when they are working in groups to find information. They also consistently demonstrate enthusiasm when they complete learning activities. Students' attitudes demonstrate that the PjBL and PBL models may, in fact, enhance student learning results.

There are two distinct learning designs: PjBL and PBL learning models. Teachers can attain learning objectives and facilitate well-structured, relevant learning by implementing PjBL and PBL models. More studies are envisaged to be able to use these two learning models by utilizing additional features and larger sample sizes.

#### 4. CONCLUSION

According to the research, it can be inferred that implementing PjBL and PBL learning models can lead to new innovations in learning and enhance learning outcomes. These two learning models are engaging and enjoyable, motivating students to participate actively in their learning. Nevertheless, the results show variations due to the distinct tasks and activities within each group. Hence, the implications of the PjBL and PBL models can serve as a valuable guide for teachers to ensure an engaging and meaningful learning experience for students. When considering future research, the focus is on exploring aspects related to critical thinking, process skills, cooperation, and cognitive learning outcomes. Additional tools like questionnaires, observation sheets, and interview guidelines may be incorporated for a more comprehensive analysis.

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