The Influence of *Project-Based* Learning Model on Student Learning Independence in Science And Social Studies Subjects (IPAS) Class IV at UPT SPF SD Inpres Maccini, Makassar City

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Abstract

The problem in this study is the low learning independence of students in the Natural and Social Sciences (IPAS) class IV subject at UPT SPF SD Inpres Maccini, Makassar City. Many students are still dependent on the teacher's direction and are not able to learn independently. This study aims to determine the use and influence of the project-based learning model (PjBL) on student learning independence. This research is a type of quasi experimental research with a nonequivalent control group design. The research population is all students of grade IV of UPT SPF SD Inpres Maccini, Makassar City which totals 71 students. The sampling technique uses purposive sampling to determine a homogeneous class, then continues with random sampling through lots to determine the experimental class and the control class. The research sample consisted of class IV A as an experimental class with 25 students applying the PjBL model, and class IV B as a control class with 23 students using conventional learning. Data collection uses observations and validated learning independence questionnaires. Data analysis used a t-test with a significance level of 5%. The results show that the use of the PjBL model can increase students' learning independence through collaborative learning, with students playing an active role in completing projects and teachers playing the role of facilitators. In addition, there is a significant influence of the PjBL model on student learning independence, as evidenced by a significance value of 0.0058 < 0.05 in the t-test. The average post test score of learning independence in the experimental class was 95.2, which was significantly higher than that of the control class, which was 88.43. Based on these results, it can be concluded that the PjBL model is effective in increasing student learning independence and has a significant positive influence on social studies learning in grade IV UPT SPF SD Inpres Maccini, Makassar City.

Keywords: *IPAS, Learning Independence, Project-Based Learning Model, Elementary School.*

INTRODUCTION

21st century education aims to produce graduates who are competitive, adaptive, and ready for global change. According to Melinda & Zainil (2020), education is the main foundation in facing the modern era. Teachers play a strategic role as facilitators in developing students' potential to be able to face a dynamic future (Raoda et al., 2022). The national education system is regulated in Law Number 20 of 2003, which emphasizes that education aims to actively develop the potential of students so that they have spiritual strength, self-control, personality, noble morals, and skills that are useful for themselves, society, nation, and state. Sunismi et al. (2022) stated that 21st century learning requires mastery of the 4C skills: Creativity, Critical Thinking, Collaboration, and Communication. In response to the needs of the 21st century, the government developed the Independent Curriculum, which emphasizes flexibility and differentiation. One of the approaches

is Project-Based Learning (PjBL) which has been proven to increase collaboration, independence, and problem-solving skills (Novelni & Sukma, 2021; Febriana, 2018; Sudjimat, 2022).

One of the subjects relevant to the application of the Project-Based Learning (PjBL) model is Natural and Social Sciences (IPAS), which is the integration between Natural Sciences (IPA) and Social Sciences (IPS). This subject aims to build science literacy as well as an understanding of social interaction in daily life. According to Alfatonah, et al. (2023), social studies learning helps students understand natural phenomena and human relationships with their environment through a contextual and meaningful project-based approach. One of the essential skills in 21st century learning is learning independence. Rofiah (2019) states that learning independence is formed through the process of individual practice and experience, where students learn to rely on their own abilities, are responsible for learning outcomes, and actively develop learning strategies independently. Learning independence is very important so that students are able to face global changes and challenges with confidence and have good problem-solving skills.

However, the results of observations made during the implementation of the Teaching Campus program and preliminary studies at UPT SPF SD Inpres Maccini, Makassar City, show that around 45% of grade IV students still do not show optimal development of learning independence. This can be seen from the fact that there are still many students who depend on the teacher's direction in starting or completing assignments. Some students also prefer to ask friends for help rather than trying to find solutions on their own. In addition, some students have difficulty managing study time, so assignments are not completed on time due to a lack of ability to prioritize work and work without external encouragement. This condition shows that some students still need intensive guidance from teachers and support from classmates in completing learning tasks. If this is not addressed immediately, it can have a negative impact on students' ability to solve problems, manage time, and plan learning activities independently. This is in line with the opinion of Sukiman (2017) who emphasizes the importance of developing learning independence as a basis for forming critical thinking skills and decision-making skills.

Based on this description, this study aims to examine the effect of the application of the project-based learning model on student learning independence in the science subject of grade IV at UPT SPF SD Inpres Maccini, Makassar City. The results of this study are expected to be a reference for educators in implementing innovative and effective learning strategies to increase student learning independence in the elementary school.

METHOD

This study uses a quantitative approach. This approach is used to find out how much the project-based learning model affects student learning independence in science subjects in class IV UPT SPF SD SD Inpres Maccini, Makassar City. The type of research used in this quantitative research is experimental research. The research design used in this study is a quasi-experimental design because the control class cannot fully function to control external variables that affect the implementation of the experiment. The type of research design used in this study is nonequivalent control group design. This design consists of two classes, namely the experimental class and the control class. The experimental class and the control class are given a pre-test first, then the

experimental class is given a certain treatment, and then both the control class and the experimental class are given a post test to see the effect of the treatment on the experimental class, so that it can be known the improvement/change that occurs in the experimental class and can compare it with the control class (Suhasaputra, 2012). More details can be seen in the following table.

Table 1. Quasi *Experimental* Design with *Nonequivalent Control Group Type*

Class	*Pre-Test*	**Independent Variables**	*Post Test*
Eksperimen	O_1	X	O_2
Control	O_3	$-$	O_4

Information:

O_1 = Results *of the experimental class learning independence pre-test* .

O_2 = Results *of the experimental class learning independence posttest* .

O_3 = Pre-test results of the learning outcomes of the control class.

O_4 = The results *of the post test* of the learning outcomes of the control class.

X = Treatment. The experimental class was treated as learning with a project-based learning model

$-$ = Reasonable condition. The control class is treated with reasonable learning conditions or learning that is usually carried out by the teacher, namely material explanations and questions and answers or assignments.

In this study, the researcher used several data collection techniques including; Questionnaire, Observation and Documentation. In this study, data on student learning independence was collected through a learning independence questionnaire. This instrument was given twice, namely pre test and post test. Observations are carried out directly in the field to observe, pay attention, and see the condition of the school where the research is carried out. The data collected through observation is focused on the project-based learning process using observation guidelines as an observation instrument. And Documentation is used to collect supporting data in the form of photos and written documents during the research process. This documentation includes learning activities, student worksheets, and student work results as physical evidence of the learning process and results that have been implemented.

The data analysis techniques that will be used in this study are: 1) descriptive statistical analysis, statistics used to analyze data by describing or describing the data that has been collected as it is without intending to make conclusions that apply to generality or generalization. 2) Inferential statistical analysis, is an analytical technique used to analyze sample data and the results

are applied to the population. And to test the comparative hypothesis the t-test is used. Before the t-test, an analysis prerequisite test is carried out, namely the Analytical Prerequisite Test which is divided into 2, namely the Normality Test and the Hombeniity Test. Furthermore, the initial ability test was used to test the difference in the average pre-test score of the two groups before being given treatment using a t-test with a significance level of 5%. If the significance of the calculation > 0.05 then there is no significant difference and the treatment can be continued and Hypothesis Test, The formula used to test this hypothesis is the t-test with the help of R Studio software. The T-test aims to test the difference in the average post-test scores of the two classes. If the significance counts, it is rejected and accepted.

FINDINGS AND DISCUSSION

This study was conducted to determine the use of project-based learning models on student learning independence in science subjects grade IV at UPT SPF SD Inpres Maccini, Makassar City. And to find out the influence of the project-based learning model on student learning independence in the science subject of grade IV at UPT SPF SD Inpres Maccini, Makassar City. Before conducting the research, the researcher validated the instrument or device to be used during the research, this instrument was validated by Mrs. lecturer Hardiyanti Hatibu, S.Pd., M.Pd., and Mr. lecturer A. Muh. Ali., S.Pd., M.Pd. Based on the results of the research conducted at UPT SPF SD Inpes Maccini, Makassar City, the data obtained and analyzed in this study are as follows:

1. **Project-Based Learning Planning at UPT SPF SD Inpres Maccini, Makassar City**
   The steps or procedures carried out in this study consist of 3 stages, namely:

   a. Preparation Stage
      The steps taken at the preparation stage include: 1) Compiling modules and lesson plans 2) Making LKPD for the project 3) Making research instruments in the form of learning independence questionnaires.
   b. Implementation Stage
      The implementation stage is the second stage after the preparation stage, which includes: 1) Providing a pre-test sheet to determine student learning independence before the implementation of the project-based learning model. 2) Determine which classes are control classes and experimental classes. 3) Carry out learning activities in experimental and control classes. In the experimental class, learning uses a project-based learning model, while learning in the control class uses a conventional model. 4) Post test sheets were given in the experimental class and control class to determine the students' learning independence after being given treatment.
   c. Final Stage
      Activities carried out in the final stage include: 1) Managing and analyzing research data results. 2) Testing the research hypothesis. 3) Present the results of the research.
2. **Implementation of Project-Based Learning at UPT SPF SD Inpres Maccini, Makassar City and the results of research**
   This research was carried out in five meetings in the experimental class and the control class. The first meeting is used to do the pre-test questionnaire/questionnaire, the second, third,

fourth, fifth meeting is used to provide treatment. At the fifth meeting after the treatment ended, it was used to do a questionnaire/questionnaire post test. The implementation of the research in more detail is explained as follows.

1) Description of Learning Independence Pre Test Data
   a. Experimental Class Pre Test Data

   The pre-test in the experimental class was carried out on Tuesday, August 19, 2025. Students totaling 25 students. Fill out a questionnaire/questionnaire in the form of a statement totaling 39 items. Based on the results of the initial learning independence score in the experimental class, the results are known as follows.

   Table 2. Descriptive Data of *Experimental Class* Pre Test

N (number of students)	25
Maximum:	103
At least	62
Total score	2112
Average	84,48

   In table 2, it can be seen that the experimental class obtained the highest score of 103 and the lowest score of 62 with a total score of 2112 obtained an average of 84.48. Below is the learning independence of students in IPAS calculated per indicator in percentage.

   Table 3. Achievement of the *Student IPAS Learning Independence* Pre Test Per Experimental Class Indicator

No.	Indicator	Percentage
1.	Willingness to study highly	50,5%
2.	Responsible	72,5%
3.	Not dependent on others	48,83%
4.	Initiative	55,33%
5.	Confident	69,67%
6.	Able to work with others	55,17%

   In table 3, it can be seen that the percentage of the experimental class IPAS *learning independence pre-test* indicator with the highest percentage lies in the responsible indicator, while the lowest percentage is not dependent on others.
   b. Control Class Pre Test Data

The pre-test in the control class was carried out on Tuesday, August 19, 2025. There are 23 students. Fill out a questionnaire/questionnaire in the form of a statement totaling 39 items. Based on the results of the initial learning independence score in the control class, the results are known as follows.

Table 4. Descriptive Data *of Control Class* Pre Test

N (number of students)	**23**
Maximum:	105
Minimal	76
Total score	1982
Average	86,17

In table 4, it can be seen that the control class obtained the highest score of 105 and the lowest score of 76 with the total score of 1982 obtained an average of 86.17. Below is the learning independence of students in IPAS calculated per indicator in percentage.

Table 5. Achievement of *Pre Test of* Social Science Learning Independence of Students per Control Class Indicator

No.	Indicator	Percentage
1	Willingness to study highly	52,17%
2	Responsible	77,13%
3	Not dependent on others	50,66%
4	Initiative	56,33%
5	Confident	77,32%
6	Able to work with others	61,06%

In table 5, it can be seen that the percentage of *the pre-test* indicators of learning independence in the control class of IPAS with the highest percentage is located in the confidence indicator, while the lowest percentage is not dependent on others.

c. Comparison of *Post Test Scores* of Experimental Class and Control Class

Based on the results of *the post test* in the experimental class and the control class, the score obtained in the experimental class was 95.2 while the score obtained in the control class was 88.43. The comparison of *post test* scores can be presented in the following table

Table 6. Comparison of *Post Test Scores* for Experimental Class and Control Class

No.	Class	Average Score
1.	Experimental Classes	95,2
2.	Control Class	88,43

Based on table 6, it can be seen that the difference in *post test scores* in the experimental class and the control class is 6.77.

2) Description of *Learning Independence Post Test* Data
   a. **Experimental Class *Post Test* Data**
      The post test in the experimental class will be held on Saturday, August 30, 2025. The post test given to 25 students was in the form of 39 statements that had to be filled out by students. Based on the final score of student learning independence, it is known that the results are as follows

Table 7. Descriptive Data *of Post Test* Experimental Class

N (number of students)	25
Maximum:	112
At least	77
Total score	2380
Average	95,2

Based on table 7, it can be seen that from the number of 25 students, the maximum score obtained was 112, while the minimum score obtained was 77. The total score obtained was 2380 with an average score of 95.2. Below is the learning independence of students in IPAS calculated per indicator in percentage.

Table 8. Achievement of *Post Test* Social Science Learning Independence of Students per Experimental Class Indicator

No.	Indicator	Percentage
1	Willingness to study highly	53,23%
2	Responsible	76,77%
3	Not dependent on others	50,62%
4	Initiative	56,31%
5	Confident	73,23%
6	Able to work with others	56%

In table 8, it can be seen that the percentage of the experimental class IPAS *learning independence post test* indicator with the highest percentage lies in the responsible indicator, while the lowest percentage is not dependent on others.

   b. **Control *Class* Post Test Data**
      The post test in the control class was carried out on Tuesday, August 26, 2025. *The post test* given to 23 students was in the form of 39 statements that must be filled out by students. Based on the final score of student learning independence, it is known that the results are as follows

Table 9. Descriptive Data of *the Control Class Post Test*

N (number of students)	23
Maximum:	105
Minimal	76
Total score	2034
Average	88,43

In table 9 it can be seen that the control class obtained the highest score of 105 and the lowest score of 75 with an average score of 88.43 in 2034. Below is the learning independence of students in IPAS calculated per indicator in percentage.

Table 10. Achievement of *Post Test* Social Science Learning Independence of Students per Control Class Indicator

No.	Indicator	Percentage
1	Willingness to study highly	56,52%
2	Responsible	79,96%
3	Not dependent on others	55,39%
4	Initiative	60,87%
5	Confident	80,53%
6	Able to work with others	61,25%

In table 10, it can be seen that the percentage of *the post test* indicators of learning independence in the control class with the highest percentage is located in the confidence indicator, while the lowest percentage is not dependent on others.

c. Comparison of *Post Test Scores* of Experimental Class and Control Class

Based on the results of *the post test* in the experimental class and the control class, the score obtained in the experimental class was 95.2 while the score obtained in the control class was 88.43. The comparison of *post test* scores can be presented in the following table

Table 11. Comparison of *Post Test Scores* for Experimental Classes and Control Class

No.	Class	Average Score
1.	Experimental Classes	95,2
2.	Control Class	88,43

Based on table 4.18, it can be seen that the difference in *post test scores* in the experimental class and the control class is 6.77.

3. Data Analysis Results

a. Analysis Prerequisites Test

1) Data Normality Test

The normality test is carried out to require that the data to be analyzed is distributed normally. The data used for the initial ability test is *pre-test* data while the data used in the hypothesis test is post *test* data. The tests were carried out using the help of R Studio software using *Shapiro-Wilk*. The test results are presented in the following table.

Table 12. Pre *Test* and *Post Test Data Normality*

No.	Data	Sig_{hitung}	Sig_{min}	Information
1.	*Pre-test* of learning independence	0,2079	0,05	Normally distributed data
3.	*Post Test* of learning independence	0,9336	0,05	Normally distributed data

Based on table 12, the significance of the calculation for *the learning independence pre-test* is 0.2079. The significance price is greater than the minimum significance, which is 0.2079 > 0.05, so it can be concluded that the *pre-test data* is normally distributed. Meanwhile, the significance of the calculation for *the post-test* of learning independence is 0.9336. The significance price is greater than the minimum significance, which is 0.9336 > 0.05.

2) Variant Homogeneity Test

The homogeneity test is carried out as an analytical prerequisite test to determine whether or not the variance of the experimental class and the control class is homogeneous. The test was carried out using the help of R Studio software using *Levene Test statistics.*

Table 13. Pre *Test* and *Post Test Data Homogeneity Test*

No.	Data	Sig_{hitung}	Sig_{min}	Information
1.	*Pre-test* of learning independence	0,1364	0,05	Varians homogen
3.	*Post Test* of learning independence	0,9906	0,05	Varians homogen

Based on the table, it was obtained that the significance of the calculation for *the pre-test* of learning independence was 0.1364 The significance price was greater than the minimum significance of 0.1364 > 0.05, so it can be concluded that the variance of the experimental class and the control class was homogeneous. Meanwhile, the significance of the calculation for *the post-test* of learning independence is 0.9906. The significance price is greater than the minimum significance of 0.9906 > 0.05, so it can be concluded that the variance of the experimental class and the control class is homogeneous.

b. Initial Ability Test

The initial ability test is carried out after the analysis prerequisite test has been met. In this study, the normality test and *the pre-test* homogeneity test have been met, so the researcher can conduct an initial ability test. This test is carried out before the treatment to find out whether or not there is a difference in initial ability between the two classes. Initial ability testing uses *an independent sample t-test statistical formula.* If there is no significant difference, then the research can be continued. The results of the calculation are presented in the following table.

Table 14. Initial Ability Test

Things observed	Eksperimen	Control
Mean	84,48	86,17
N	25	23
Signifikansi *two-tailed*	0,4878	

Analysis	0.4878 > 0.05
Information	There is no significant difference

Based on table 14, it is known that the significance of the calculation is 0.4878 > 0.05, so it can be concluded that there is no significant difference in *the mean student* learning independence between the experimental class and the control class. In other words, the initial capabilities in the experimental class and the control class are the same. Therefore, researchers can provide treatment to each class.

c. Hypothesis Test

The hypothesis test is carried out after the analysis prerequisite test has been met. In this study, the normality test and homogeneity test have been met, so the researcher can conduct a hypothesis test. Hypothesis testing uses an *independent sample t-test statistical formula*. *The T-test* was used to test the difference in the average score of *the learning independence post test* from the two classes. If there is a significant difference, it is accepted, and vice versa if there is no significant difference, it is rejected and accepted. And what is proposed in this study are: $H_a H_a H_0 H_a H_0$

H_a: There is a significant influence between the project-based learning model on student learning independence in the science subject of grade IV at UPT SPF SD Inpres Maccini, Makassar City.

H_0: There was no significant influence between the project-based learning model on student learning independence in the science subject of grade IV at UPT SPF SD Inpres Maccini, Makassar City.

Table 15. Hypothesis Testing

Things observed	Eksperimen	Control
Mean	95,2	88,43
N	25	23
Signifikansi *two-tailed*	0,0058	
Analysis	0.0058 < 0.05	
Information	There is a significant difference	

Based on table 15, it is known that the mean difference between the experimental and control classes is 6.77. The level of sig calculation is 0.0058. The sig level of the calculation is <0.05 so that it can be stated that there is a difference in the learning independence of the experimental class of the experimental class that applies the project-based learning model and the control class with the learning that is usually carried out by the teacher. H_a

Discussion

Before the learning process was carried out in the experimental class, the average pre-test score obtained was 84.48 in the medium category, while in the control class, the average pre-test score for learning independence was 86.17 in the medium category. The initial ability test before the learning process with the t-test showed that there was no significant difference in the initial independence of the two classes. Based on this, it can be said that the initial conditions in both the experimental class and the control class carried out in class IV before being given treatment have relatively the same initial ability. This is because 64 before the research and treatment were carried out, both classes used conventional learning carried out by teachers, namely lectures and questions and answers or assignments. In addition, learning is carried out classically, so students have not

been trained in their learning independence. After obtaining these results, the researcher gave treatment to the experimental class, namely class IV A at UPT SPF SD Inpres Maccini Makassar City using the project-based learning model (PJBL), while in the control class, namely class IV B at UPT SPF SD Inpres Maccini Makassar City with learning that is usually carried out by teachers, namely using lecture and question and answer methods or assignments.

After the learning process was carried out in each class, the average post test score of the learning independence of the experimental class was 95.2 in the high category. Meanwhile, in the control class, the average post-test score for learning independence was 88.43 which was in the high category. From the results of testing using the test in the post test, the significance of the calculation was obtained of 0.0058. The significance level of the calculation is smaller than the significance level of 0.05. From the results of the t-test, it can be stated that there is a significant difference between the experimental class and the control class. Based on the results of the post-test achievement in the experimental class, the highest percentage was obtained in the indicator of responsibility, then confidence. This is due to the implementation of project-based learning. In the learning process, teachers act as facilitators, while students over 65 play an active role so that students will feel responsible to find the information they need through the direction and guidance of the teacher to solve a problem.

The PjBL model gives students a great responsibility to manage and carry out their learning process independently. According to Maisyarah (2022), PjBL is an innovative model that is student-centered, improving creative thinking skills through real experiences or simulations, and encouraging students to become autonomous and independent learners. In PjBL, students are divided into small groups that prioritize collaboration, communication, and cooperation. If students are unable to cooperate, they will have difficulty gathering information from various sources. This model also encourages interactions such as peer teaching and presentations. The lowest indicator of independence is the student's ability not to depend on others. This is natural because grade IV elementary school students are still in the stage of developing independence and need teacher guidance, especially in conveying ideas (Bukit et al., 2022). Conventional learning (lectures, questions and answers) is still very teacher-centered and emphasizes memorization. In contrast, PjBL allows students to learn, remember, and apply the material independently. This principle of "learning" is difficult to achieve with traditional learning.

Based on the results of the study, the conclusion is that there is a significant difference in student learning independence between classes that use the PjBL model and classes that use conventional methods. This difference is evidenced by the significance value of the t-test < 0.05.

CONCLUSION

Based on the results of the research and the preceding discussion, it can be concluded that the implementation of the project-based learning (PjBL) model in the Natural and Social Sciences (IPAS) subject for Grade IV students at UPT SPF SD Inpres Maccini, Makassar City, was carried out through systematic and structured stages. Students were organized into small groups to complete projects collaboratively, while teachers acted as facilitators rather than mere transmitters of knowledge. This learning process created opportunities for students to be actively engaged, to

take responsibility in seeking and processing information, and to develop confidence in expressing their ideas. The post-test results showed that the average learning independence score in the experimental class reached 95.2, which falls into the high category, with the strongest indicators emerging in the aspects of responsibility and self-confidence.

The findings also demonstrate that the project-based learning model has a significant effect on students' learning independence in the IPAS subject. Statistical analysis using the t-test produced a significance value of $0.0058 < 0.05$, indicating a significant difference in learning independence between students in the experimental class, who were taught using the PjBL model, and those in the control class, who experienced conventional learning. This difference arises because the PjBL model provides students with wider opportunities to learn actively, independently, and responsibly as they complete meaningful learning projects, thereby fostering higher levels of autonomy and self-regulation in the learning process.

In light of these findings, teachers are encouraged to apply the project-based learning model in classroom activities in alignment with the characteristics of the material being taught, as this model has been empirically proven to have a positive impact on students' learning independence. It is also recommended that projects be linked to real-life problems and contexts so that students feel challenged to solve them, making learning more meaningful, relevant, and useful for everyday life. Furthermore, school principals are expected to provide strong institutional support for the implementation of varied innovative learning models that foster student independence, particularly PjBL. Such support may include the provision of adequate facilities, tools, and materials, as well as opportunities for teachers to participate in professional development activities related to project-based learning.

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