

Development of Project Learning Model Based on HOTS di SD Wetlands Banjar Regency



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ABSTRACT: This research is motivated by the demands of the 21st century which requires students to have skills such as communication, collaboration, critical thinking and problem solving and creativity and innovation. These skills are in the stage of higher order thinking or what we usually call HOTS. Like critical thinking skills, creativity is equally important in learning at school. Therefore, educators can find appropriate learning models to develop the creativity of students. The purpose of this study was to determine the effectiveness of the steps of the HOTS-based *Project Learning model* and to analyze students' critical thinking skills and creativity through the HOTS-based *Project Learning model* in learning . The Project Learning model which is a combination of PBL and PjBL is an answer to a model that can be used to develop critical and creative thinking skills of elementary school students. The method used for this research is research and development (Research and Development) . This R&D method is intended to produce a product. The research stages can be detailed as follows: (1) pre-field stage or preparation stage, (2) advanced stage, Development of HOTS-based Project Learning Learning Models, (3) post-field stage where the research team prepares reports. The research activity begins with basic research on the learning model that has been used by teachers at SD Lahan Basah, Banjar Regency, then to the stage of developing the Project Learning learning model which is a solution to stimulate students' critical and creative thinking skills . Based on the results obtained in learning using the *Project Learning model*, it is concluded that learning using this model can improve students' critical thinking skills and creativity in learning, the average student also shows an increase and achieves *N gain* in the high category. The results of the research will be followed up in the form of scientific publications which are implemented in community service programs and further research and research outputs include publications in reputable international journals.

KEYWORDS: HOTS , Project Learning Model

INTRODUCTION

Facing the tough challenges of the 21st century, students must be equipped with 4 skills in the form of *critical thinking, creativity and innovation, communication, collaboration*. These four skills are very much needed, especially the ability to think critically and creativity to face more complex problems for students in the future in producing superior *human resources* .

The problem of education that is in the spotlight in the 21st century is one of the models used by teachers in schools, especially in elementary schools, most of them still use conventional models or commonly called *teacher centered*. While the expected learning is student-centered or so-called *student centered*. In realizing *student centered learning* in the 21st century, according to Nisa & Prasetyo (2018), that is by changing the learning perspective from *teacher centered* to *student centered learning*. Therefore, teachers must make changes to patterns in conventional learning models by transforming learning in the form of updating new models that can develop critical thinking skills and creativity so that students can be trained in facing more complex challenges in the future. The existence of a model update that is in accordance with learning will attract the attention of students to be active and they will try to optimize their respective abilities, so that it will help them develop critical and creative thinking skills in solving problems (Prasetyo & Kristin, 2020).

Critical thinking skills and creative thinking skills are included in higher order thinking skills (Davidi, Sennen, & Supardi, 2021). Critical thinking ability is an ability that is needed in the 21st century now, because with the ability to think critically students can analyze information objectively based on existing facts. Like critical thinking skills, creativity is equally important in learning at school. Elementary school is the golden age for children to develop their creativity, whether they are making a work or doing an experiment. Therefore, educators can find appropriate learning models to develop the creativity of students.

There are still not many learning models used at the elementary school level that are able to develop students' critical thinking skills and creative thinking skills simultaneously, so there is a need for a learning model that can provide opportunities for students

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to develop their thinking skills. PBL and PjBL models are an answer to models that can be used to develop critical and creative thinking skills of elementary school students.

PBL or also known as *Problem Based Learning* is a learning model that involves students in a context of problems presented in learning activities to encourage students' thinking skills in solving existing problems. The PBL model can be a place to develop critical thinking skills and higher thinking skills of students (Pramudya, Kristin, & Anugraheni, 2019). To develop students' creative thinking skills, it is necessary to have a PjBL model in learning activities. The PjBL (*Project based learning*) model is a learning that facilitates students to use thinking skills in producing a useful product or work. PjBL is learning that can be a means to direct learning activities to be more contextual, meaningful and a means to improve intellectually (Jamaludin, 2017).

Elementary school age students are at the stage of concrete thinking, therefore the use of PBL and PjBL models will provide meaningful experiences to students in the learning process, so that their high-level and creative thinking skills are built. *Higher Order Thinking Skills* (HOTS) in the field of education is a question which in relation to Bloom's Taxonomy is included in the category of analyzing, evaluating, and creating from a student. The purpose of making this HOTS question is to test the ability of analysis, evaluation to the creation of a student. So that teachers or teachers can find out how far the development of the mind of a student they teach.

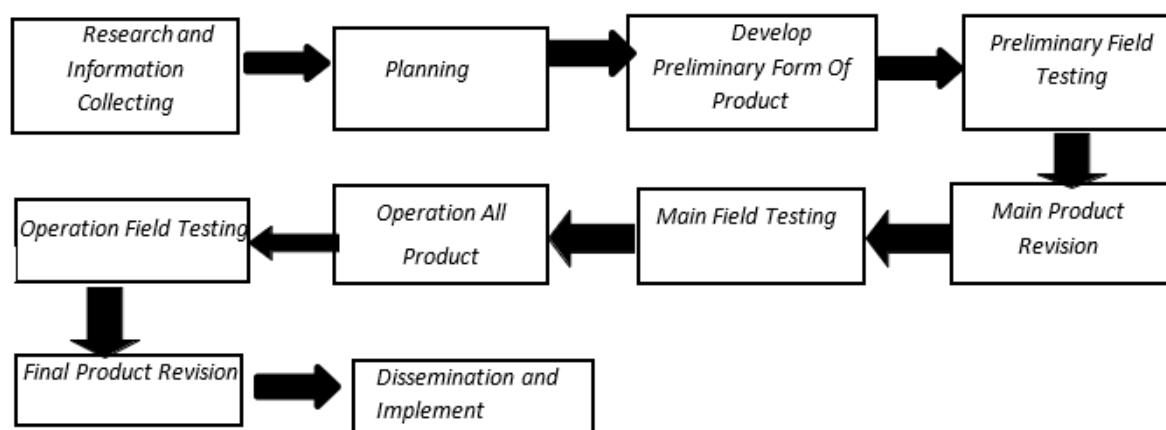
In relation to Problem Based Learning (PBL) and Project Based Learning (PjBL), the questions with the HOTS criteria will stimulate students to think critically and creatively. Critical thinking in general is thinking rationally in order to produce objective decisions, while creative is the ability of the brain to develop something or innovation in one's mind.

On the basis of that goal, a new learning model or a combination of previous models developed in such a way is needed in the world of education, and in this case the researcher formulates a new learning model, namely Project Learning which is a combination of *Problem Based Learning* and *Project Based Learning*.

METHOD

This research uses the type of development research. Research and development (*Research and Development*) is carried out to produce a product. This is in accordance with the opinion of Sugiyono (2013: 297) R&D is a research method used to produce certain products, and test the effectiveness of these products. In addition, Borg & Gall (Setyosari, 2012: 215) also stated that development research aims to produce products based on the findings of a series of trials, through individuals, small groups, medium groups, field trials, revised to obtain adequate results or products or worth using. The type of R&D research used in this study is the Borg and Gall design model (2003:81).

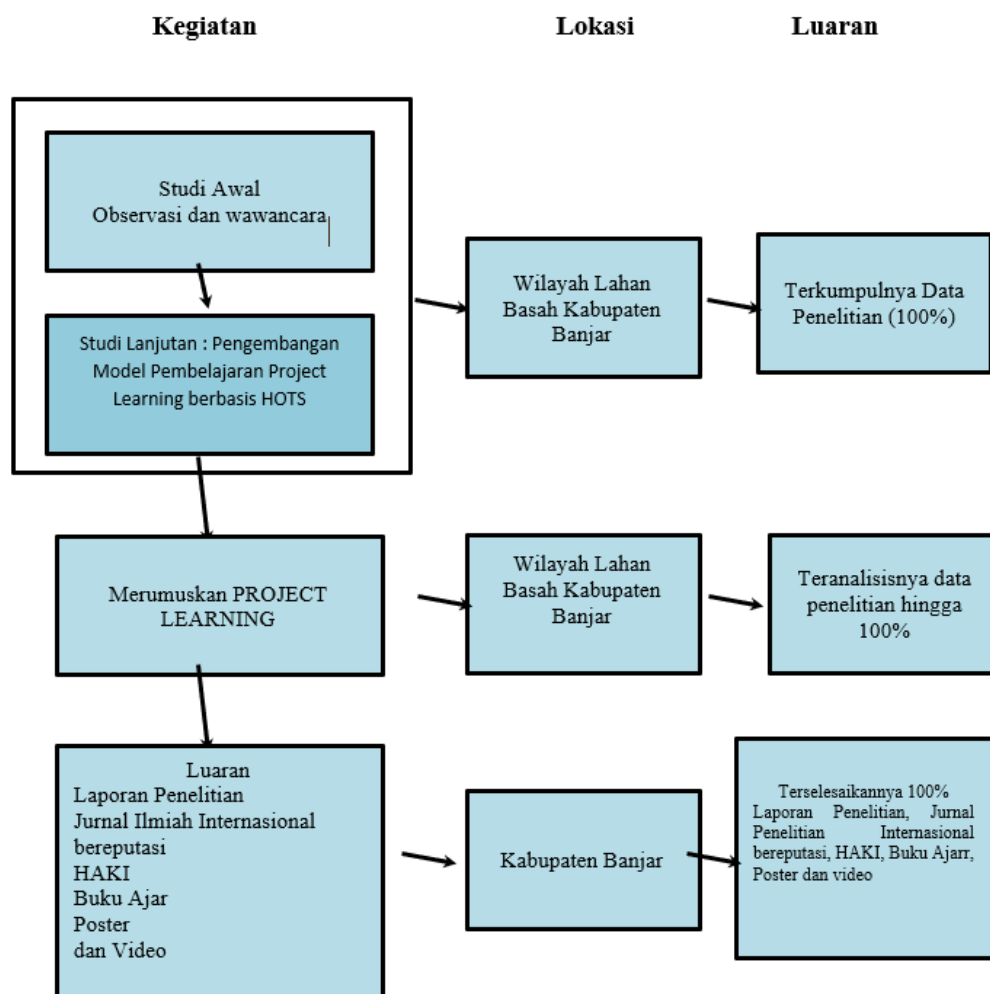
The R&D steps can be seen in the following picture



This research was conducted for nine months and aims to develop a new learning model, namely *Project Learning* which is a combination of *Problem Based Learning* with *Project Based Learning* based on HOTS in the wetland elementary school of Banjar Regency. The research stages can be detailed as follows: (1) pre-field stage or preparation stage, (2) advanced stage, Development of HOTS-based *Project Learning Learning Models*, (3) post-field stage where the research team prepares reports.

The chart of the research carried out is described as follows:

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The research was conducted at SDN Manarap 1 and SDN Kertak Hanyar 1, with 26 and 22 students respectively. Which means that the total number of students from the two elementary schools is 48 people, which means that the subjects of this study are 48 people. This research was conducted in Banjar Regency, South Kalimantan.

This research is an experimental research with a pre-experimental design method. Experimental research is research that aims to find a causal relationship between two factors that are intentionally caused by researchers with the intention of seeing the effects of a treatment. The data collection techniques used in this study were carrying out a *pretest* (initial test), giving treatment, and carrying out a *posttest* (final test). Data analysis techniques used in this study are as follows:

1. Giving a score to the test results in the form of a *pretest* and *posttest* Project Learning model

The scores obtained by students from the test are converted in the form of values with a range of 0-100 using the formula according to Uno, 2017:

$$\text{Nilai akhir} = \frac{\text{jumlah skor yang diperoleh siswa}}{\text{skor maksimum}} \times 100$$

2. Data from the scoring of the test results obtained by students, then categorized according to intervals and critical thinking skills and creative skills. The interval and category of critical thinking ability according to (Yunita, 2020) can be seen in the following table:

Interval and Category Critical thinking skills

interval	Category
76 - 100	Tall
60 - 75	Currently
0 - 59	Low

For intervals and categories of creative thinking ability can be seen in the following table:

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Interval and Category Creative thinking skills

interval	Category
81 – 100	Very creative
61 – 80	Creative
41 – 60	Pretty Creative
21 – 40	Less Creative
0 – 20	Not Creative

(Riduwan, 2015)

3. Then calculate the average (\bar{X}) of the *pretest* and *posttest* scores using the formula according to Supardi (2016) as follows:

$$\bar{X} = \frac{\sum xi}{n}$$

\bar{X} : mean (average)

$\sum xi$: total score for each *pretest* or *posttest* data

n : lots of data

4. After getting the average (\bar{X}) of the *pretest* and *posttest* scores, proceed with calculating the standard deviation (s) of the *pretest* and *posttest* scores using the formula according to Supardi (2016) as follows:

$$s = \sqrt{\frac{\sum xi^2 - \frac{(\sum xi)^2}{n}}{n - 1}}$$

5. Calculating the variance (s^2) of the *pretest* and *posttest* scores using the formula according to Supardi (2016) as follows:

$$s^2 = \frac{\sum xi^2 - \frac{(\sum xi)^2}{n}}{n - 1}$$

6. Furthermore, submitting normality using the *Kolmogorov-Smirnov test technique* is carried out if the data being tested is single data or single frequency data, not data in group frequency distributions.
7. Perform the homogeneity test with the formula according to Sundayana (2020) as follows:

$$F_{hitung} = \frac{varian\ besar}{varian\ kecil}$$

8. Performing competency improvements that occur before and after learning is calculated using the normalized gain formula according to the Sundayana (2020) formula as follows:

$$g = \frac{skor\ posttest - skor\ pretest}{skor\ ideal - skor\ pretest}$$

9. Data from the results of increasing competence which is calculated using the normalized gain formula, then categorized according to Hake's standards (in Sundayana, 2020) can be seen in the following:

Category Gain Themomalization

Normalized Gain Value	Interpretation
$-1.00 \leq g < 0.00$	There is a decrease
$g = 0.00$	No decrease
$0.00 < g < 0.30$	Low
$0.30 \leq g < 0.70$	Currently
$0.70 \leq g < 1.00$	Tall

10. Testing the comparison hypothesis with the t-test according to Supardi (2016) as follows:

$$t = \frac{Md}{\sqrt{\frac{\sum x_d^2}{n(n-1)}}}$$

Information :

t : hypothesis testing

d_i : the difference between the scores after and the scores before from each subject (i)

M_d : mean of *gain* (d)

X_d : deviation of the *gain score* to the mean ($X_d = d_i - M_d$)

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X^2_d : the square of the deviation of the *gain score* to the mean

N : number of samples (research subjects)

RESULTS

Based on the research that has been done, the results of the study were obtained from the students' skill test scores, namely the *pretest*, the *posttest*, and the increase in scores between *pretest* and *posttest* using the Project Learning model, as follows:

Initial test score analysis (*Pretest*)

Data	Number of Students (n)	Average	Standard Deviation	variance	Min Value	Max Value
<i>Pretest</i>	48	45,10	45.58	2077.67	30	70

Based on the table above, it can be seen that the average student before being given the action was 45.10 with the lowest score of 30 and the highest score of 70, and the standard deviation of 45.58 and the variance of 2077.67.

Final test score analysis (*Posttest*)

Data	Number of Students (n)	Average	Standard Deviation	variance	Min Value	Max Value
<i>Posttest</i>	48	85	85.7	7342.60	75	100

Based on the table above, it can be seen that the average student after getting the action was 85 with the lowest score of 75 and the highest score of 100, and the standard deviation of 85.5 and the variance of 7342.60.

Pretest and *Posttest* Homogeneity Test Results of Project Learning Model

Data	Homogeneity			Decision
	Variance	F count	F table	
Initial (<i>pretest</i>)	2077.67	3.53	4.05	Homogeneous
End (<i>posttest</i>)	7342.60			Homogeneous

Based on the table above, it can be seen that after the homogeneity test was carried out on the initial and final test scores, the $F_{count} < F_{table}$ or $3.53 < 4.05$.

and *Posttest* N-Gain Value Test

	Pretest	Posttest	Gain	Category
Amount	2165	4070	0.72	Tall

As for the improvement of critical thinking skills and creative thinking skills of 0.72. *The gain* of critical thinking skills and creative thinking skills of students in class IV SDN Manarap 1 and class VI SDN Kertak Hanyar 1 is 0.72 including in the high category.

T table results

N	Dk (N-1)	α	t table
48	47	0.05	2.01290

Based on the table above, it can be seen from the results of the t-test that the *pretest* and *posttest scores* can be done by testing the hypothesis, then the t-value (t_{count}) is compared with the t-value from the t-distribution table (t_{table}). The method of determining the t_{table} value is based on a certain significant level ($\alpha = 0.05$) and $dk = n-1$, then $dk = 48 - 1 = 47$, then the t_{table} is seen in the t distribution table with $dk = 47$.

t test *Pretest* and *Posttest scores*

N	Ma	xd2	T table	T count	Hypothesis	Conclusion
48	39.7	5220.31	2.01290	26.09	Tolah H_0	Significant

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Based on the table above, it can be seen that $t_{\text{arithmetic}} = 26.09$ and $t_{\text{table}} = 2.01290$ then $t_{\text{arithmetic}}$ compared to t_{table} can be concluded $t_{\text{arithmetic}} > t_{\text{table}}$, which means reject H_0 which means significant. This means that at the 95% confidence level there is a significant difference between before (*pretest*) and after (*posttest*) given the action by applying the HOTS-based *Project Learning model*.

DISCUSSION

Based on the results of this study, this is an experimental study with a One Group Pretest-Posttest Design, which is a research model that only treats one group without a comparison group. In this design, measurements were carried out twice, namely before the experiment (*pretest*) and after the experiment (*posttest*). In conclusion, students who will be the sample in this study will get the same rights, namely the initial test (*pretest*) and the final test (*posttest*), the difference is that when the initial learning test is carried out without using the *Project Learning model*, while the final test of learning uses the *Project Learning model*.

This study aims to determine the effect of implementing the *Project Learning model* on students' critical and creative thinking skills. The discussion of the results of this study was made based on data analysis of the results of the initial test (*pretest*), the results of the final test (*posttest*), the increase in the score of the results of critical and creative thinking skills, and the magnitude of the influence on the use of the *Project Learning model* in SD Lahan Basah, Banjar Regency. This critical thinking skill is one of the students' cognitive processes in analyzing systematically and specifically the problems faced carefully and thoroughly, and can identify and review information in order to solve the problem (Azizah, Sulianto & Cintang, 2018).

pretest assessment, students' scores were still low, where the average *pretest* was 45.10 with the lowest score on the initial test (*pretest*) of 30 and the highest of 70, so it needs to be improved. In the *pretest* students have not yet received the *Project Learning model* action, learning in the classroom is still low and for students' critical thinking and creative thinking skills they have not.

1. Students' critical and creative thinking skills before being given action (*pretest*)

This *pretest* activity was conducted on August 10, 2022 and August 11, 2022, the aim is to determine students' critical and creative thinking skills in learning. The results of the study can be seen that the acquisition of the average value of the ability of students in class before being given action by applying the HOTS-based *Project Learning model* is 51.7 which means that it is included in the low category in critical thinking and creative enough in creative thinking skills. For researchers, this average value is still low and requires action. The low critical thinking ability of students can be caused by several factors (Wiyoko, 2019). This is because the learning methods taught by teachers have not been able to improve students' critical and creative thinking skills.

Before the *pretest* was conducted, students were conditioned to sit quietly, and the researcher explained the purpose and objectives of this meeting. Each student is given a *pretest* question sheet and told the steps in doing it. Then students are asked to do it. After the test ended, the researcher checked the *pretest* question sheet and the result was that many students had low scores. When examined, there were still many errors in the answers and there were still many students who had not been able to develop answers to answer the questions given. To overcome these problems, it is necessary to have a *Project Learning Model* to help improve students' critical and creative thinking skills. Because it is so important, critical thinking can be considered as the main goal of the learning process (Sulianto, 2008). Creative thinking skills are also needed by students to study and understand objects or natural phenomena (Anjarsari, 2014). Therefore, the importance of teachers in optimizing students' creative thinking competencies in the learning process (Dewi et al., 2019)

2. Students' critical and creative thinking skills after being given treatment (*posttest*)

This *posttest* activity was carried out on August 10, 2022 and August 11, 2022, after being given an action using the HOTS-based *Project Learning Model*, the result was that the average score of students' abilities was 85, which means that they are included in the category of being in the category of critical thinking and creative in creative thinking skills. The average score at the time of the implementation of the HOTS-based *Project Learning Model* on critical and creative thinking skills using the *Project Learning model* has increased compared to before the implementation of the *Project Model Learning*, where the *posttest* mean score is higher than the *pretest* mean.

Based on the average difference between the initial test (*pretest*) and the final test (*posttest*), it can be seen that there is an increase in critical and creative thinking skills using the *Project Learning model* of 39.9, this difference is based on the results of the t-test. Obtained $t_{\text{arithmetic}} > t_{\text{table}}$ or $26.09 > 2.01290$. This shows that H_0 is rejected, meaning that there is a significant difference in the improvement of students' critical thinking skills and creative thinking between the *pretest* and *posttest* results. This increase is due to the use of the HOTS-based *Project Learning Model*. After the *pretest* and *posttest* were conducted, to determine the increase in the value of students' critical thinking and creative thinking skills, an analysis of the increase in scores before and after the action was carried out which was calculated by the normalized gain test. From the analysis of the normalized gain value has an average of 0.72 with a high category.

Based on this description, it can be concluded that there are differences in the *pretest* and *posttest* and there is also an increase in the *pretest* and *posttest*, thus the HOTS-based *Project Learning Model* improves students' critical and creative thinking skills. Learning outcomes that increase or scores above the KKM illustrate that students have succeeded in their learning process (Agnafia, 2019).

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CONCLUSION

Based on the results of the analysis and discussion that have been carried out, it can be concluded that the implementation of the Model *Project* This HOTS-based *learning* affects critical thinking skills and creative thinking skills for fourth grade students at SDN Manarap 1 and grade VI students at SDN Kertak Hanyar 1. This can be seen from the following data:

1. There was a significant increase, including the class average score on the pretest (*pretest*) of 45.10 and the class average value of the final test (*posttest*) of 85. Based on the average score of the test there was a change in students' critical thinking skills. and think creatively. On the critical thinking skills of students who were initially low to moderate, and on the creative thinking skills of students who were initially quite creative they became creative.
2. Based on the gain index, there are differences in students' critical thinking skills and creative thinking skills before and after being given action with an increase of 0.72 in the high category.

RECOMENDATION

Based on these conclusions, the researchers would like to provide suggestions, namely for classroom teachers to apply the HOTS-based *Project Learning* Model in learning in grades IV and VI. As for researchers, it can be used as a reference in providing information about the implementation of learning with the HOTS-based *Project Learning Model*.

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