HOTS-Based PjBL Model Development to Increase Children's Creativity in Elementary School

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ABSTRACT: The PjBL (Project Based Learning) model is important to develop in learning at elementary schools, because the PjBL model provides opportunities for students to develop creativity and improve learning outcomes. The PjBL model involves higher order thinking skills, or HOTS. One of the current learning demands in the 4.0 era requires students to be able to develop their creativity. Creativity is needed by students now and in the future to overcome various challenges in life. The observation results show that SD Kertak Hanyar has not implemented learning using the HOTS-based PjBL model yet. The purpose of this research is to find learning model steps that are able to develop creativity, as well as to analyze students' learning outcomes. The combination of PjBL model steps and higher order thinking skills (HOTS) is a learning strategy that is expected to be implemented effectively. The method used in this research is Research and Development, to produce a product. The research stages can be broken down as follows: (1) the preparation stage, (2) the HOTS-based PjBL Model Development stage, (3) the model effectiveness analysis stage. The results of the HOTS-based PjBL Model development research obtained an increase in students' creativity of 42.50, and learning outcomes with an average score of 86.14 (2) the HOTS-based PjBL Model Development stage, (3) the model effectiveness analysis stage. The results of the HOTS-based PjBL Model development research obtained an increase in students' creativity of 42.50, and learning outcomes with an average score of 86.14 (2) the HOTS-based PjBL Model Development stage, (3) the model effectiveness analysis stage. The results of the HOTS-based PjBL Model development research obtained an increase in students' creativity of 42.50, and learning outcomes with an average score of 86.14 student creativity score of 0.75. The achievement at SDN Kertak Hanyar is in the high category. The conclusion from the results of the study is that the HOTS-based PjBL model is effectively implemented in learning at SDN Kertak Hanyar, in other words it is able to increase students' creativity and learning outcomes. As a follow-up to the results of this research, a model step socialization will be carried out to teachers at SD Kertak Hanyar.

KEYWORDS: PjBL Model, HOTS, Creativity, Learning Outcomes.

INTRODUCTION

Facing the intense challenges in the 21st century, humans are required to have three important abilities in thinking, namely: critical thinking, being creative, and being able to solve problems (Radiansyah, et al., 2022), so that in current learning students must be equipped with 4 skills in the form of critical thinking , creativity and innovation, communication, collaboration. These four skills are needed, especially the ability to think critically and be creative to deal with more complex problems for students in the future in producing superior human resources.

One of the educational problems that is in the spotlight in the 21st century is the model used by teachers in schools, especially in elementary schools, most of them still use the conventional model which is teacher centered. While the expected learning is student-centered. In realizing student centered learning in the 21st century, according to Nisa & Prasetyo (2018), that is by changing the view of learning from teacher centered to student centered learning. Teachers must make changes in patterns in conventional learning models by carrying out learning transformations in the form of updating learning models that can develop creative thinking skills so that students can be trained in facing more complex challenges in the future.

The ability to think creatively is included in the ability to think at a higher level (Davidi, Sennen, & Supardi, 2021). This ability is very much needed in the 21st century now, because with the ability to think creatively we are able to create something that is very necessary in learning in schools. Elementary school age is a golden period for children to develop their creativity. They can make a work or by doing an experiment. Therefore educators must find appropriate learning models to develop the creativity of students.

The learning model that has been used so far at the elementary school level has not developed much of students' creative thinking abilities, so a different learning model is needed that can provide opportunities for students to develop their thinking skills. The HOTS-based PjBL model is an answer to a model that can be used to develop the creative abilities of elementary school students.

HOTS-Based PjBL Model Development to Increase Children's Creativity in Elementary School

PjBL is an innovative learning that is student-centered, placing the teacher as a motivator and facilitator, where students are given the opportunity to work autonomously to construct their learning (Trianto, 2014). The PjBL model facilitates students to use thinking skills in producing a useful product or work. (Radiansyah, et al., 2022). This model is process-centered, relatively time-framed, problem-focused, meaningful learning units by integrating concepts from a number of components, could be knowledge, disciplines or fields (Kristanti & Subiki, 2017). In PjBL the teaching system is provided by incorporating project work into the process, thus encouraging students' thinking skills to solve existing problems. (Anggraini & Wulandari, 2021). The PjBL model can be a place to develop students' creative thinking skills and higher thinking skills (Pramudya, Kristin, & Anugraheni, 2019). To develop students' creative thinking abilities, it is necessary to have the PjBL model in learning activities. The PjBL model is learning model that facilitates students to use thinking skills in producing a product or work that has uses. PjBL is learning model 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 a concrete thinking stage, therefore the use of the PjBL model will provide meaningful experiences to students in the learning process, so that their higher-order thinking skills and creativity are awakened. Higher Order Thinking Skills (HOTS) are high-order thinking skills that demand creativity, analytical thinking about information and data in solving problems (Radiansyah, et al., 2022). The main purpose of implementing HOTS in learning is to improve students' thinking skills at a higher level, especially those related to the ability to think critically in receiving various types of information, to think creatively in solving a problem, and to be able to make decisions in complex situations. (Jannah, et al., 2022)

HOTS in the field of education in relation to Bloom's Taxonomy is included in the category of analyzing, evaluating, and creating from a student. In relation to PjBL the HOTS criteria will stimulate students to think creatively. Creative thinking is a brain's ability 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, so researchers need to develop a HOTS-based PjBL learning model.
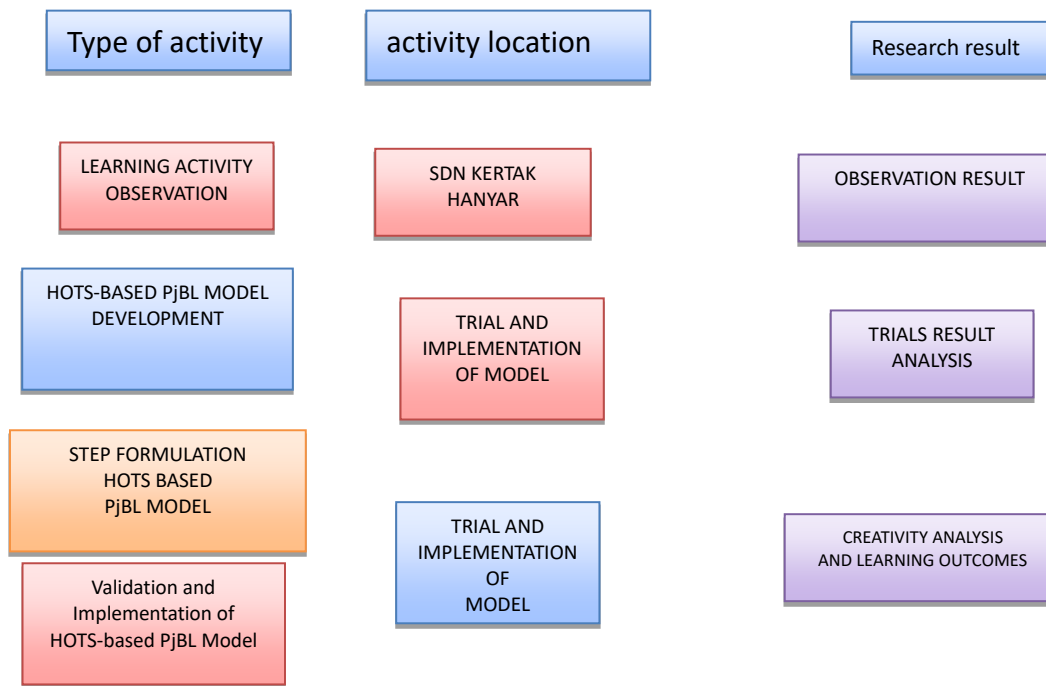
METHOD

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

R&D steps can be seen in the following figure.

(Borg and Gall, 2003:81).
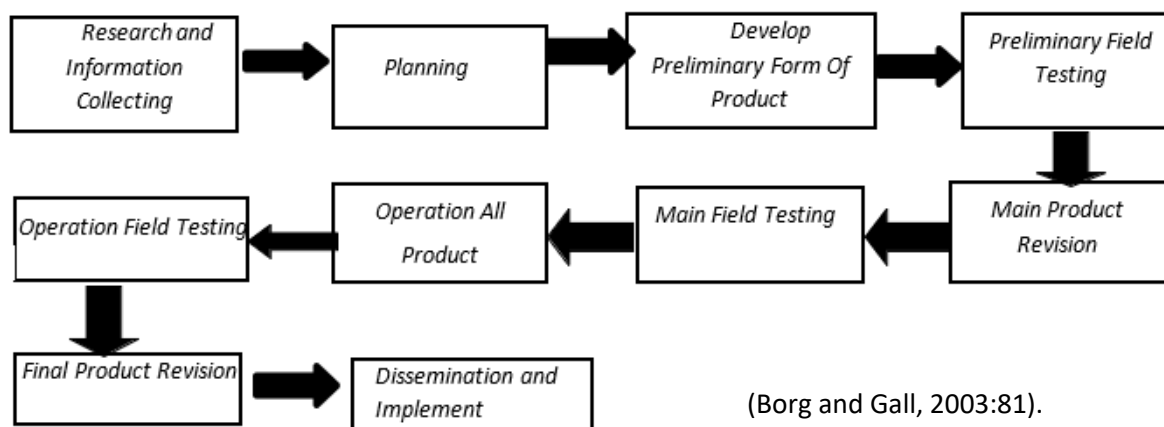
This research was conducted over a period of one year with independent funding. The aim is to develop a new learning model, namely HOTS-based PjBL at SDN Kertak Hanyar, Banjar Regency. SDN Kertak Hanyar is one of the SDNs located in the wetland area. The stages of the research were as follows: (1) the learning observation stage, (2) the HOTS-based PjBL model development stage, (3) the stage for formulating the HOTS-based PjBL model steps. and (4) Validation and Implementation. The research chart is as follows:

HOTS-Based PjBL Model Development to Increase Children's Creativity in Elementary School

Type of activity	activity location	Research result
LEARNING ACTIVITY OBSERVATION	SDN KERTAK HANYAR	OBSERVATION RESULT
HOTS-BASED PjBL MODEL DEVELOPMENT	TRIAL AND IMPLEMENTATION OF MODEL	TRIALS RESULT ANALYSIS
STEP FORMULATION HOTS BASED PjBL MODEL	TRIAL AND IMPLEMENTATION OF MODEL	CREATIVITY ANALYSIS AND LEARNING OUTCOMES
Validation and Implementation of HOTS-based PjBL Model		

The research was conducted at SDN Kertak Hanyar, with a total of 22 students. It means that the subject of this study is 22 people. This research was conducted in the Banjar Regency, South Kalimantan.

This research is a development research. Development research is research that aims to produce research products in the form of learning models. The data collection technique used in this study was carrying out the pretest (initial test), giving treatment, carrying out the posttest (final test). After the model steps have been formulated, then validated by experts, then revisions are carried out. To see the legibility of the model steps, it was tested on a limited basis to the teacher, then necessary improvements were made. Data analysis techniques are carried out in the following stages: 1). Giving pretest and post-test scores on learning outcomes using the HOTS-based PjBL model according to Uno's opinion, 2017. 2) creating intervals for learning outcomes to think creatively. Based on Ridwan's opinion, 2015. 3). Calculating the average pretest and posttest scores follows the Supardi formula, 2016. 4). Calculate the standard deviation and variance using the formula from Supardi, 2016. 5). Conduct normality and homogeneity tests and calculate gain and then categorize the calculation results using the Hake standard according to Sundayana's opinion, 2020. can be seen in part I.

I. Category Gain Normalization

Normalized Gain Value	Interpretation
$-1.00 \leq g < 0.00$	There was a decline
$g = 0.00$	No decline
$000 < g < 0.30$	Low
$0,30 \leq g < 0.70$	Medium
$0.70 \leq g < 1.00$	High

6). Testing the comparative hypothesis with the t-test according to Supardi (2016) with the formula:

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

RESULTS

Based on the research that has been done, the research results are obtained from the scores of students' skill tests, namely the initial test (pretest), final test (posttest), and an increase in scores between the pretest and posttest using the PjBL model using HOTS.

HOTS-Based PjBL Model Development to Increase Children's Creativity in Elementary School

II. Analysis of Pretest (Pretest) Scores

Data	Number of Students (n)	Average	Standard Deviation	Variance	Min Value	Max Value
Pretest	22	43,64	44,66	1994,81	30	60

Based on the table above, it can be seen that the average student before being given the action was 43.64 with the lowest score being 30 and the highest score being 60, as well as the standard deviation of 44.66 and the variance of 1994.81.

III. Analysis of Final test scores (Posttest)

Data	Number of Students (n)	Average	Standard Deviation	Variance	Min Value	Max Value
Posttest	22	86,14	88,16	7772.78	75	100

Based on the table above, it can be seen that the average student after receiving the action was 86.14 with the lowest score of 75 and the highest score of 100, and the standard deviation of 88.16 and the variance of 7772.78.

IV. Homogeneity Test Results Pretest and Posttest Project based learning model

Data	Homogeneity			Decision
	Variance	F_{count}	F_{table}	
Initial (pretest)	1994,81	3.90	4.35	Homogeneous
End (posttest)	7772.78			Homogeneous

Based on the table above, it can be seen that after the homogeneity test was carried out on the pre-test and post-test values, $F_{count} < F_{table}$ or 3.90 < 4.35.

V. Pretest and Posttest N-Gain Value Test

	Pretest	Posttest	gains	Category
Amount	960	18895	0.75	Tall

As for increasing high-level thinking skills (HOTS) and creativity of 0.75. The skill gain of the students at SDN Kertak Hanyar was 0.75, which was included in the high category.

VI. t_{table} results

N	Dk (N-1)	α	t_{table}
22	21	0.05	1.72472

Based on the table above, it can be seen from the results of the t-test on pretest and posttest scores that can be done by testing the hypothesis, then the t-value (t_{count}) is compared with the t-value of the t distribution table (t_{table}). The way to determine the value of t_{table} is based on the significant level α = 0.05 and dk = n-1, then dk = 22 – 1 = 21, then t_{table} is seen in the t distribution table with dk = 21.

VII. Test t Score Pretest and Posttest

N	Md	Σxd2	ttable	tcount	hypothesis	Conclusion
22	42.5	2388	1.72472	8,22	Take H0	Significant

Based on the above table it can be seen that t_{count} = 8.22 and t_{table} = 1.72472 then t_{count} compared to t_{table} it can be concluded that $t_{count} > t_{table}$, meaning 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 PjBL model.

DISCUSSION

Based on the results of this study, it was an experimental study with a one-group pretest-posttest design, namely a research model that gives treatment to only one group without a comparison group. In this design, measurements were made 2 times, namely before the experiment (pretest) and after the experiment (posttest). In conclusion, the students who will be the sample in this study will get the same rights, namely the initial test (pretest) and the final test (posttest). This study aims to determine the increase in Creativity and Learning Outcomes in the application of the HOTS-based PjBL model to student creativity. The discussion of the results of this study was made based on the analysis of data on the results of the initial test (pretest), the results of the final test (posttest), the increase in the results of creativity abilities, learning outcomes, and the magnitude of the influence on the use of the HOTS-based

HOTS-Based PjBL Model Development to Increase Children's Creativity in Elementary School

PjBL model at SD Kertak Hanyar, Banjar Regency. HOTS is one of the students' cognitive processes in analyzing systematically and specifically the activities they face (Azizah, Sulianto & Cintang, 2018).

Assessment on the pretest, the student's score is 43.64 with the lowest pretest score of 30 and the highest is 60 so it needs to be improved. In the pretest, the students had not received the action of the HOTS-based PjBL model, the learning in the class was still low and for students' creative abilities.

1. Creativity Ability of students before being given action (pretest)

This pretest activity was carried out on August 10, 2022 and August 11, 2022, the aim was to determine students' critical and creative thinking skills in learning. The results of the study show that the average score of students' abilities in class before being given action by applying the HOTS-based PjBL model is 43.64, which means that it is included in the low category in creative thinking and quite creative in creative thinking skills. For researchers this average value is still low and action is still needed. The low ability to think critically in students can be caused by several factors (Wiyoko, 2019). This is due to the learning methods used by teachers so far have not been able to improve students' creative thinking skills.

Before the pretest was carried out, the students were conditioned to sit quietly, and the researcher gave an explanation of the intent and purpose of this meeting. Each student was 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 results were 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 HOTS-based PjBL Model to help improve students' creative thinking abilities. Because it is so important, the ability to think creatively can be considered as the main goal of the learning process (Sulianto,Creative thinking skills are also needed by students to study and understand objects or natural phenomena (Anjarsari, 2014). Therefore, teachers need to optimize students' creative thinking competencies in the learning process (Dewi et al., 2019)

2. Students' creative thinking ability after being given treatment (posttest)

This posttest activity was carried out on August 10, 2022 and August 11, 2022, after being given action using the HOTS-based PjBL Model the result is that the average value of students' abilities is 86.14 which means that they are included in the medium category of creative thinking skills. The acquisition of the average score when the HOTS-based PjBL Model was applied to the ability to think creatively using the PjBL model experienced an increase compared to before the implementation of the Project based learning Model, the posttest average score obtained was higher than the pretest average score.

Based on the difference in the average pretest (pretest) and posttest (posttest), there was an increase in the ability to think creatively using the HOTS-based PjBL model of 42.50. t test results obtained tcount > ttable or 26.09 > 2.01290. This shows that H0 is rejected, which means that there is a significant difference in the increase in students' creative thinking skills between the pretest and posttest results. This increase is due to the use of the HOTS-based PjBL Model. After the pretest and posttest were carried out, to find out the increase in the value of students' 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, it has an average of 0.75 in the 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 PjBL Model improves students' creative thinking skills. Learning outcomes increase or scores above the KKM illustrate that students have succeeded in their learning process (Agnafia, 2019).

CONCLUSION

Based on the results of the analysis and discussion that has been carried out, it can be concluded that the application HOTS-based PjBL model influences the creative thinking of fourth grade students at SDN Kertak Hanyar 1. This can be seen from the following data:

1. There is a significant increase in learning outcomes, the class average score on the pretest (pretest) with the class average score on the final test (posttest).
2. Based on the average score of the test there is a change in students' skills in creative thinking. In the creative thinking skills of students who were initially quite creative to be creative.
3. Based on the gain index, there are differences in students' creative thinking skills before and after being given action, thus the result category is high.

RECOMMENDATION

Based on these conclusions, the researcher wants to provide suggestions, namely for class teachers to apply the HOTS-based PjBL model in learning in elementary schools. As for researchers, it can be used as a reference in providing information about the implementation of learning with the HOTS-based PjBL Model.

HOTS-Based PjBL Model Development to Increase Children's Creativity in Elementary School

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