The effect of project-based learning model to improve the ability of HOTS on science in elementary school

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Abstract
This study aims to prove whether the effect of project-based learning model to improve the ability of Higher Order Thinking Skill (HOTS) on science learning in grade IV Elementary School. The method used is truly experimental, the form of the design is a pretest-posttest control group design. The sample used in this study is the students of class IV amounted to 52 students and divided into two classes, the sample used in this study is the students of class IV amounted to 52 students and divided into two classes, i.e., class IV A as an experiment class and class IV B as control class. As a test data collection technique is a multiple-choice question sheet, a description sheet, and a questionnaire sheet. The data analysis technique used is a t-test calculation and normalized gain test. The results of this study using t-tests indicate that there is a Higher Order Thinking Skill (HOTS) influence of students between the control class and the experiment class. The results of the research using normalized gain test showed that there was an increase Higher Order Thinking Skill (HOTS) after applying a project-based learning model in the experiment class. The student's response to project-based learning model is applied that students provide positive responses. Based on data analysis, it is proven that the application of project-based learning model has a positive effect on the improvement of the higher order thinking skill (HOTS) in the IPA IPA classroom elementary school.
Keywords: project-based learning, ability higher order thinking skill, student responses

Pengaruh model pembelajaran berbasis proyek untuk meningkatkan kemampuan HOTS IPA di sekolah dasar

Abstract
Penelitian ini bertujuan untuk membuktikan ada tidaknya pengaruh model pembelajaran berbasis proyek terhadap peningkatan kemampuan higher order thinking skill (HOTS) pada mata pelajaran IPA di kelas IV Sekolah Dasar. Metode yang digunakan adalah metode penelitian eksperimen murni, bentuk design adalah Pretest-Posttest Control Group Design. Sampel yang digunakan dalam penelitian ini adalah siswa kelas IV yang berjumlah 52 siswa dan terbagi ke dalam dua kelas, Sampel yang digunakan dalam penelitian ini adalah siswa kelas IV yang berjumlah 52 siswa dan terbagi ke dalam dua kelas, yaitu kelas IV A sebagai kelas eksperimen dan kelas IV B sebagai kelas kontrol. Teknik pengumpulan data tes adalah lembar soal pilihan ganda, lembar soal uraian dan lembar angket. Teknik analisis data yang digunakan adalah perhitungan uji-t dan uji gain ternormalisasi. Hasil penelitian ini dengan menggunakan uji-t menunjukkan bahwa terdapat pengaruh higher order thinking skill (HOTS) siswa antara kelas kontrol dan kelas eksperimen. Hasil penelitian dengan menggunakan uji gain ternormalisasi menunjukkan bahwa terdapat peningkatan kemampuan higher order thinking skill (HOTS) siswa setelah diterapkan model pembelajaran berbasis proyek pada kelas eksperimen. Adapun tanggapan siswa terhadap model pembelajaran berbasis proyek yang diterapkan yaitu siswa memberikan tanggapan yang positif. Berdasarkan analisis data, terbukti bahwa penerapan model pembelajaran berbasis proyek berpengaruh positif terhadap peningkatan kemampuan higher order thinking skill (HOTS) pada pelajaran IPA kelas IV Sekolah Dasar.
Kata Kunci: model pembelajaran berbasis proyek, high order thinking skill, respon siswa

INTRODUCTION

Along with the development of the science and technology of human resource quality and human way of thinking is increasing and progressing. The quality of human resources can increase if supported by an adequate education system so that it can create human resources that have creative, innovative, and productive resources. Another thing that is not less important in improving the quality of education is a model and learning media. In the 21st century skills focus on critical thinking ability, solving problems, communications and cooperating which is part of the Higher Order Thinking Skill (HOTS) or high-level thinking skills. One of the challenges of education in Indonesia today is how to build 21st century skills as the indicator of the global community era of the knowledgeable community. High level of thinking or higher order thinking skill (HOTS) is needed to be owned by learners as a mustache in converge a wide range of challenges in the increasingly complex globalization era. This ability to familiarize the learners solve problems, make decisions, and seek solutions wisely against the problems faced. Explained also by Santrock (2011) that few schools really teach learners to develop their critical thinking abilities.

In the learning process in schools usually, it is only spent to teach learners then give the correct answer, at school learners receive more material from Master. So also found in UPTD SDN Sukadadi Indramayu Director. Based on the observation of class IV classes in the school in the process of learning teachers are still a central figure of learning. In the class of IV that 52 students and divided into two rooms, class A 29 students, and class B Number 23 students, only 30% of students have reached minimum completeness criteria (KKM). This is seen from the grades of the study examiners still under KKM, which are 36 students, and 16 other students are stated to reach the KKM value.

Seeing the conditions that the can be done is to change the learning strategy, because in the curriculum 2013 is a lot of models and methods of learning is very effective to improve the higher order thinking skill on the critical thinking skills of students, especially in elementary school students, as well as project based learning model. According to Abidin (2014) Project Based Learning Next (PjBL) is called MBMP which is a learning model that directly involves students in the learning process through research activities to work and complete a particular learning project. In accordance with the research conducted by (Asmi et al., 2022) PjBL is able to involve students directly and actively will produce more effective learning compared to an approach that only conveys knowledge. The implementation of PjBL proven that the learning model makes students meaningful learning process, namely learning that is raised based on constructivism (Muwaffaqoh et al., 2021).

The purpose of this study is to know the effect of project-based learning model to improve the highest order of thinking outer skills (HOTS) on IPA subjects in the elementary school class IV, and to know the student's response to the project-based learning model that has been used. Widyantini (2014) explains that project-based learning is a learning strategy that furthermost the students to gain new knowledge and understanding based on their experiences through various achievements. Project-based learning model is a learning model involving students directly to develop student skills and learning skills through planning activities, implement, and produce certain products in a learning project. According to Ariyana, et. al. (2018) It is said that the high-level thinking ability is the complexity of the in-depth in the outcome of material, making conclusions, build representation, analyze, and build relationships by involving the most basic mental activity.

Based on research conducted by Wahida (2015) that project-based learning model has significant effect on creative bread-skills and student learning outcomes.

Based on research conducted by Yahya (2014) that project-based learning model assistant network of culture media can increase student activity of XII class IPA2 SMA Negeri 1 Bangsri, and

the project-based learning model assistant network of culture media can enhance the creativity of students of class XII IPA2 SMA Negeri 1 Bangsri.

Based on research conducted by Fauzia, et. al. (2018) said that project-based learning with portfolio was significantly able to increase the management of the concept of students on the Angiospermae material and can improve the student's attitude towards science significantly.

Based on research conducted by Aninda, et. al. (2020) said that the use of project-based learning model is effective in increasing Stite Literacy of high school students on environmental pollution materials.

Based on the above explanation, the purpose of this research is 1) to prove how the effect of project-based learning model to the improvement of higher order thinking skill (HOTS) students, 2) to know how the improvement of the higher order thinking skill (HOTS) students after applied project-based learning model, 3) to find out how student responses to project-based learning applied in the classroom.

METHOD

In this study used is quantitative research with the true experiment method. According to Sugiyono (2013) that True experimental (true experiment), because in this design, researchers can control all the variables of the iuar that affect the path of the experiment. Rukminingsih, et. al. (2020) said that experimental research is one quantitative study where researchers manipulate one or more independent variables, control other relevant variables and observe the effects of manipulation in dependent variables. The research design used in this research is pretest-posttest control group design. Rukminingsih, et. al. (2020) In this design there are two randomly selected random, then given pretest to know the initial state there is a difference between experimental groups and control groups. Before the sample was treated, the pretest value needs to be analyzed first through the normality test and homogeneity test. This is done to know whether both sample groups are from the same initial condition or not. Reset Research Design-Posttest Control Group Design is as follows (Sugiyono, 2013).
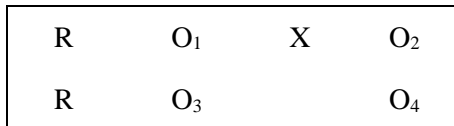
| R | O_1 | X | O_2 |
| R | O_3 | | O_4 |

Figure 1. Pretest-posttest control group design

In this design there are two groups randomly selected, then given pretest to know the initial state there is a difference between experimental groups and control groups. Good pretest results when the value of the experimental group does not differ significantly. The effect of treatment is (O_2-O_1) - (O_4-O_3).

As in this study which is a sample of research is all students of class IV year of teaching 2021/2022 which amounted to 52 students who are divided into 2 classes, is class A and class B. Class A becomes an experiment class taught by researchers by using project-based learning model and class B be a Class Control taught researcher using conventional learning model. The data collection techniques used are 23 points of multiple-choice tests, 5 items of description, and questionnaire. According to Hamid (2011:197) said that the written test is a test where matter and answers are given to students in the form of writing. The previously tested test has been tested to its national and its feasibility through validity and reliability tests. After the test of validity to the dual selection instrument of 40 questions with the number of respondents 30 people, obtained 23 is valid and 17 is unvalid, while the reliability is obtained by Cronbach's Alpha value of 0.836 which is in the very high category. Test the validity of the test instrument of description testing 10 concerning the number of respondents 30 people, obtained all valid, with the reliability of the obtained Cronbach's Alpha value of 0.830 which is in the very high category. Test validity in questionnaire instruments of 20 questions with the number of respondents as many as 30 people, obtained valid about 16 questions and 4 unvalid, while reliability obtained Cronbach's Alpha value of 0.817 which is in very high category.

The data analysis technique used is normality test, homogeneity test, hypothesis test, gain normality test, and descriptive analysis to calculate questionnaire. Normality test is used to know

whether data is normal to distribute or not. The normality test used in this research is the Shapiro-Wilk test because much data is less than 50. This homogeneity test aims to know the similarity between two circumstances or populations. Hypothesis test is used to determine the effect of learning model to improve the higher order thinking skill (HOTS) students' ability. This hypothesis test is done to see the difference in the results of the student test of the control group and the experimental group, in this hypothesis test using the independent formula sample t-test. Test normality gain is a test that can provide an overview of the learning score of the results between before and after the appliance of the treatment. Analysis of student responses to project-based learning that has been done is measured by questionnaire. The analysis used is descriptive analysis with responses or responses to each statement, after all the grains about the student's answer are given the score, the next step is to calculate the percentage score answers from each item or grain about using the formula (1).

$$X\% = \frac{\Sigma SA}{\Sigma SI} \; x \; 100 \; ………………………. \; (1)$$

Treatment which is a project-based learning model is implemented with the following steps as Figure 2.
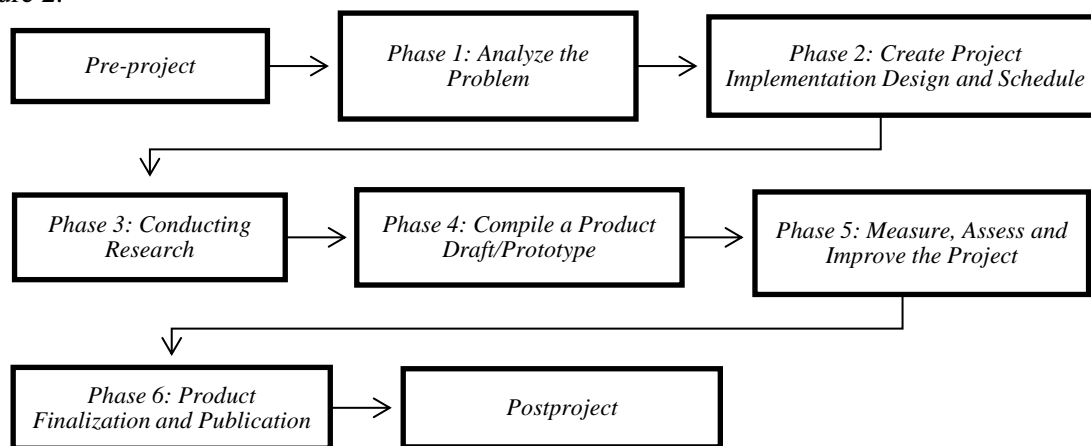

Figure 2. Project-based learning model steps

After data collection is done, the data is processed using SPSS V.25. Questionnaires are used to determine the student's response to the learning model that has been implemented in the classroom. After learning activities are implemented, students are required to charge the questionnaire of the response.

RESULT AND DISCUSSION

Result

In this study, the sampling technique used was probability sampling, using Simple Random Sampling. It is said to be simple because the sampling of members of a population is carried out randomly without regard to the strata present in that population. The sample used in this study was class IV students totaling 52 students and divided into two classes, namely class IV A totaling 29 students and class IV B totaling 23 students. Based on research that has been carried out by applying a project-based learning model to improve students' Higher Order Thinking Skills (HOTS) in science lessons. This research consisted of two groups, namely the experimental group in class A, and the control group in class B. In the experimental class using a project-based learning model and in the control, class using a conventional learning model. The hypotheses in this study are:

H_0: There was no significant difference in Higher Order Thinking Skill (HOTS) ability between experimental class students and control class students.

H_a: There is a significant difference in Higher Order Thinking Skill (HOTS) ability between experimental class students and control class students.

Normality

The normality test is used to find out whether the data is normally distributed or not. The normality test used is the Shapiro-Wilk test because many data are less than 50. In calculating the normality of the data, then use the SPSS V.25 program with the provision that if the value of Sig. > 0.05 then the data is normally distributed while if the value of Sig. < 0.05 then the distributed data is abnormal. The results of the calculation of the normality test of students' Higher Order Thinking Skill (HOTS) ability are as Table 1.

Table 1. HOST Capability Normality Test Results

		Tests of Normality					
	Kelas	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	Df	Sig.	Statistic	df	Sig.
Kemampuan HOTS	EKS	0,133	29	0,2	0,948	29	0,159
	Kontro	0,164	23	0,111	0,938	23	0,162

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

From Table 1 of the normality test of Higher Order Thinking Skill (HOTS) ability, it can be seen the value of Sig. in the experimental class of 0.159 and in the control class of 0.162, the value of Sig. Both are expressed > from 0.05. So, it can be concluded that the Higher Order Thinking Skill (HOTS) Ability data is declared normally distributed.

Homogeneity test

The homogeneity test is a test carried out to determine whether the data from the research sample in the experimental class and the control class have the same variance or not. A distribution is said to be homogeneous if the value of Sig. > 0.05, while if the value of Sig. < 0.05 then the distribution is said to be inhomogeneous. The calculation results of the homogeneity test of Higher Order Thinking Skill (HOTS) ability are as Table 2.

Table 2. HOTS Capability Homogeneity Test Results

	Test of Homogeneity of Variances				
		Levene Statistic	df1	df2	Sig.
Kemampuan HOTS	Mean	1,037	1	50	0,313
	Media	0,745	1	50	0,392
	Median and adjusted df	0,745	1	39,04	0,393
	trimmed mean	0,924	1	50	0,341

From Table 2 of the homogeneity test of Higher Order Thinking Skill (HOTS) ability, the value of Sig. in the Based on Mean data is 0.313. Based on the decision-making criteria if Sig. > 0.05 means homogeneous. So, it can be concluded that the Higher Order Thinking Skill (HOTS) ability data in the experimental class and control class are declared homogeneous.

Hypothesis test

This test is used to determine whether there is a significant influence on the use of project-based learning models on the Higher Order Thinking Skill (HOTS) ability of grade IV students between experimental and control classes. Based on the data that has been obtained, the data is normal and homogeneous, so it is continued using the t test. The hypothesis of this study is:

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H[0]: There was no significant difference in Higher Order Thinking Skill (HOTS) ability between experimental class students and control class students.

H[a]: There is a significant difference in Higher Order Thinking Skill (HOTS) ability between experimental class students and control class students.

The results of the analysis of the Higher Order Thinking Skill (HOTS) ability t test of students can be seen as Table 3.

Table 3. HOTS Capability T-test Results

Independent Samples Test								
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
1,037	0,313	-2,271	50	0,027	-2,978	1,311	-5,611	-0,344
		-2,183	38,1	0,035	-2,978	1,364	-5,739	-0,216

From table 3 the value of t = -2.271 with a Sig.(2-tailed) value of 0.000. From the above problem because the value of Sig. (2-tailed) is 0.027 which means the value of Sig. < 0.05, then Ha is accepted and H0 is rejected. So, there is a significant influence on the use of project-based learning models on the Higher Order Thinking Skill (HOTS) ability of grade IV students between the experimental class and the control class. Supported by the research of Utami, N. R., Andayani, Y (2016) who said that the project-based learning model has a better influence compared to conventional models (lectures and discussions) on student chemistry learning achievement.

Enhanced Higher Order Thinking Skill (HOTS)

After teaching and learning activities were carried out by applying a project-based learning model in the experimental class, it was seen that the Higher Order Thinking Skill (HOTS) ability of students in the class increased. The results of the calculation of the increase in the ability of Higher Order Thinking Skill (HOTS) of UPTD students at SDN Sukadadi in learning Table 4. The results of the IPA Normalized N-Gain Test are as Table 4.

Table 4. Normalized N-Gain Test Results

Average	Expriment	Control
Pre-test	29,39	32,42
Post-test	39,61	36,51
N-Gain	0,554	0,256
Interpretation	Keep	Low

From table 4, the results of the N-Gain test are normalized that in the experimental class of 55.44 with a medium category is higher than in the control class, which is 25.68 with a low category. Based on the N-Gain effectiveness category, higher order thinking skill (HOTS) increased students, who used a project-based learning model in the experimental class were quite effective. Meanwhile, control classes that use conventional learning models are not effective. This is supported Lawe (2021) which says that there are differences in science learning outcomes between students who are taught with an LKS-assisted project-based model and students who are taught with a conventional learning model.

Student responses to project-based learning models

After the learning activities are completed, the experimental class uses a project-based learning model, then distribute questionnaires in the form of student responses to the learning that has been carried out. A summary of student responses to the implementation of project-based learning can be seen in the following Figure 3.

The results of the questionnaire analysis showed that the largest percentage of student responses to the project-based learning model was the enthusiasm indicator in participating in learning, which was 90% with a very good category. While the smallest percentage, namely in the indicator of ease of understanding the material, is 69% with a good category. This shows that most students are enthusiastic about participating in learning using the project-based learning model.
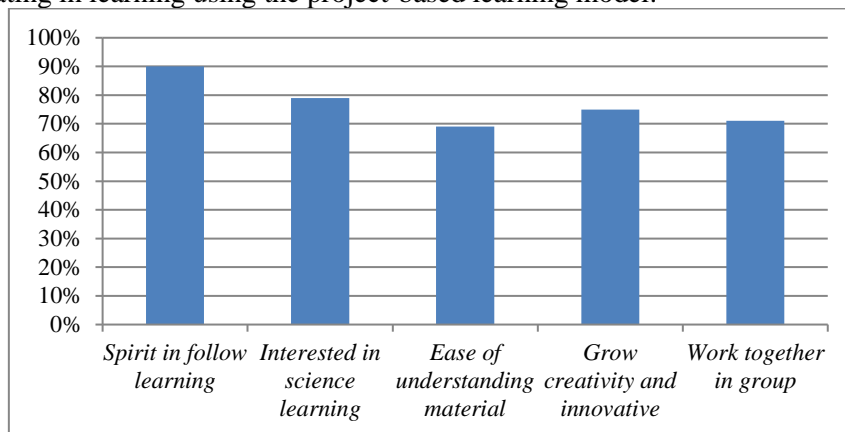

Figure 3. Recapitulation of questionnaire calculation results

Discussion

The effect of the project-based learning model on increasing students' High Order Thinking Skills (HOTS) abilities

After the teaching and learning activities were carried out by applying the project-based learning model in the experimental class, it was seen that the students' Higher Order Thinking Skill (HOTS) abilities in that class increased. Based on the results of the t-test using the project-based learning model, it showed significant results, with a Sig.(2-tailed) value on the t-test of 0.027. Based on the decision making criteria 0.027 <0.05 then H0 is rejected and Ha is accepted. So it can be concluded that there is a significant influence on the use of project-based learning models on the Higher Order Thinking Skill (HOTS) ability of fourth grade students between the experimental class and the control class. The learning process using a project-based learning model makes students active in the learning process, so that the learning process can have a positive influence on students. At the time of the research, it was found that several factors had the influence of the project-based learning model on the first student's Higher Order Thinking Skill (HOTS) ability, namely the direct involvement of students during the learning process. Supported by research conducted by Putri et al (2019) the project-based learning model emphasizes student-centered learning activities by directing students to carry out hands-on practical tasks related to the environment. According to Arisanty et al., (2020) The project-based model encourages direct student involvement, independent study to construct knowledge of study material, student-centred learning, and creative thinking skills. This is in line with the research of Tumuyu et al. (2021) which says that there is an influence of teaching steps in using a project-based learning model compared to using the discovery-learning model with various lecture methods, which makes students bored with the learning that takes place because students are not involved in it, while in method-based project nearly 80% of students are directly involved. The second is active interaction between students and students and between students and teachers, implementing learning models that can stimulate students' creative thinking. The project-based learning model involves problem solving assignments or projects that train students to actively build and manage their learning, and make students more realistic (Utami & Andayani, 2016). The third factor is that students are more active in learning activities using a project-based learning model. This is supported by research by Baidowi & Amirudin (2015) that students actively participate in project activities from the beginning to the end of learning. At the beginning of learning students were seen to be active in identifying environmental problems and preparing project plans for writing geography scientific papers. Students in the experimental class were also facilitated to become active learners. During project activities, they were

encouraged to actively reflect their knowledge and have the awareness to collaborate in groups (Rahardjanto & Fauzi, 2019).

After teaching and learning activities were carried out at the UPTD SDN Sukadadi by applying a project-based learning model to the experimental class and conventional learning to the control class, there was a significant difference in ability between the control class and the experimental class. Supported Nurhayati & Suherman (2021) which says that there is an interaction effect between project-based learning models and critical thinking skills on Civics learning outcomes in class VII SMP Negeri 11 Kota Serang. This is also in line with research by Lidi & Daud (2021) who said that project based learning assisted by Google Classroom during the Covid 19 pandemic had an effect on student learning outcomes in the biology education study program as seen from learning outcomes that were above the completeness criteria and categorized as very good and kind. The results of data analysis show that there are differences in HOTS between students who take Online Project-based Learning integrated quizzes as a formative assessment and HOTS of students who take regular online learning (Mahendra, 2022).

Improving students High Order Thinking Skills (HOTS) abilities

After the teaching and learning activities were carried out by applying the project-based learning model in the experimental class, it was seen that the Higher Order Thinking Skill (HOTS) ability of the students in that class had increased. This increase can be seen in the results of the N-Gain test that the experimental class was 55.44 in the moderate category higher than the control class, namely of 25.68 with the low category. Based on the effectiveness of the N-Gain category, the improvement of the Higher Order Thinking Skill (HOTS) ability of students using project-based learning models in the experimental class is in the quite effective category. Meanwhile, in the control class, the conventional learning model was not effective. At the time the research was carried out, there were several factors that influenced the increase in students' Higher Order Thinking Skill (HOTS) abilities between the control class and the experimental class, namely first, students were more active in learning activities using a project-based learning model. It is supported by research by Baidowi & Amirudin (2015) which says that students actively participate in project activities from the beginning to the end of learning. During the use of interactive multimedia based on PjBL, students were seen to be active and more enthusiastic in completing projects (Habib et al., 2021). Second, the students are more active in communicating and interacting with their group mates to complete the project they are working on. This is supported by research by Puspitasari et al. (2018) which states that students can directly plan activities, solve problems and communicate the results of activities or products. In line with research Crespí et al. (2022) who said The EG significantly developed their interpersonal skills generally, and specifically teamwork (cooperative work, climate management and results orientation) and communication (verbal communication, non-verbal communication, and social communication), as a result of PBL in the context of a transversal subject in all cases (η2 large). Third, the project assignment to students will awaken all the senses of students to complete a given project. In line with the research of Kumalasari et al. (2017) who said that giving assignments in project-based learning such as designing, finding sources, making, presenting and assessing, will stimulate all student senses to complete assignments. assignments and problems found by students during learning. who said that giving assignments in project-based learning such as designing, finding sources, making, presenting, and assessing, will stimulate all student senses to complete assignments. assignments and problems found by students during learning.

Based on the description of the research results above, it appears that there is an increase in the students' Higher Order Thinking Skill (HOTS) abilities in the experimental class. It is supported by Iswantari (2021) which says that the application of a project-based learning model can improve science learning outcomes in grade 7 students of SMPN 2 Kayangan for the 2020/2021 academic year. According to Khulel, (2022) All of the preceding elaborations confirmed that combining project-based learning with process writing and Instagram might improve XI IBB students' capacity to write hortatory exposition prose. This shows that there has been a significant increase in student learning outcomes using the PjBL model and the Edmodo application (Handayani et al., 2021). Likewise with research conducted by Lapase (2021) which concluded that the project-based learning model can improve student learning outcomes in mathematics.

Student responses to the project-based learning model

After the learning activities were completed in the experimental class using a project-based learning model, questionnaires were then distributed in the form of student responses to the learning that had been carried out. The results of the student response questionnaire analysis showed that 90% of students were enthusiastic about participating in learning using the project-based learning model because according to them project-based learning was more interesting and able to integrate skills into the learning process. It is supported research by Iswantari (2021) which says that the application of a project-based learning model can improve student learning outcomes, because in practice students are required to be enthusiastic and active in learning, both individually and in groups, so that each student can master the lesson. In line with the research of de Oliveira Biazus & Mahtari (2022) that The advantages of the PjBL model implemented in the experimental group caused students to be more active in constructing knowledge through experimental activities than students in the control group. Student interest in participating in learning using the project-based learning model is 79%, because according to them project-based learning is something new that has never been done before. Based on research by Roziqin et al. (2018) which said that indicators of interest in learning on aspects of student interest, in the experimental class were higher than the control class. According to (Harnas et al., 2021). E-learning content for the development of e-learning chemistry learning in SMA / MA project-based learning on colloid material using the Moodle application can be said to be valid and practical so that it can increase student motivation in the learning process.

Students' responses to the ease of understanding the material they got during learning took place in the good category with a percentage of 69%, students felt that the teaching and learning process using project-based learning made them better understand the material presented because they intervened directly to solve problems. This finding is in line with the findings Keleman et al. (2021) who said that they understand and are more interested in learning Science when they do project-based group activities. This is supported by research by Utami & Andayani (2016) which explains that through the many activities carried out by students during the learning process, it can further enhance students' understanding of the material, because students are directly involved in their learning activities and can provide direct experience. for students so that the knowledge gained can be more meaningful. The project-based learning model has implications for increasing learning activities, encouraging students to be active in scientific activities and thinking so that students gain a better understanding and meaningful experience during the learning process (Suteja & Setiawan, 2022).

Student responses to project-based learning models in fostering creativity and innovation are in the good category with a percentage of 75%. In line with the research of Wulandari et al. (2019) which states that during the learning process students are creative and thorough in expressing their ideas, this is caused by the learning model used so that students can more smoothly express ideas which are owned. Students' responses to the project-based learning model in working with groups were in the good category with a percentage value of 71%, because through the project-based learning model students were involved in project work and problem solving in groups which made students active and independent. Sugiarto (2016) said that the project-based learning model is effective in improving aspects of students' independent learning attitudes. Overall the project-based learning model received positive responses from students with a percentage of 78% which was in the good category.

Based on the description and results of the research data analysis above, it can be stated that the implications of student responses regarding the project-based learning model show a positive response. Overall, the project-based learning model received positive responses from students with a percentage of 78% which was in the good category. This is supported research by Andri (2013) which says that based on student responses regarding the learning process when using project-based learning models in technical drawing subjects the students responded quite well because students felt interested and were able to learn to work in groups. The results of the student response questionnaire to the learning used were very positive (Handayani, D. et al., 2021). This shows that the project-based learning model can be applied in elementary school classes.

CONCLUSION

Based on the discussion of the results of research on The Effect of Project-Based Learning Model to Improve the Ability of HOTS on Science in class IV Elementary School, namely: 1) There is a significant difference in Higher Order Thinking Skill (HOTS) ability in students class IV between the experimental class students and control class students in class IV Elementary School with a Sig. (2-tailed) score on the t-test of 0,027, based on deision-making criteria $0,027 < 0,05$ so H_0 is rejected an H_a is accepted. 2) There is an improve in the Higher Order Thinking Skill (HOTS) ability which is quite effective after the application of the project-based learning model in class IV Elementary School with an N-Gain score of 0,554 in the experimental class and an N-Gain score of 0,256 in the control class. 3) Students give positive responses to the project-based learning model that has been implemented in class IV of Elementary School with a percentage of 78% which is included in the good category.

From the results of the analysis and conclusions, the researcher provider recommendation, namely research using a project-based learning model has a positive impact and changes occur in the learning process, to the school (SD) should develop similar learning models that can contribute positively and support success learning. In connection with this research which is very limited both in taking the subject and the material, the researcher suggests to other parties to carry out further research on this project-based learning model on a broader subject and material so that generalization can be made.

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