IMPLEMENTATION OF PjBL ASSISTED BY 3D DIORAMA MEDIA TO IMPROVE STUDENTS' CREATIVE THINKING ABILITIES IN GEOGRAPHY LEARNING

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ABSTRACT

Students' creative thinking ability in Geography subjects is still not optimal. This is reflected in the lack of students' ability to generate new ideas and limited ability to analyze geographical phenomena in depth. This study aims to determine how much influence the implementation of Project Based Learning (PjBL) assisted by 3D Diorama media has on improving students' creative thinking abilities in geography subjects at SMAN 1 Padang Panjang. This study uses the Quasy Experiment method with a quantitative approach and the design of this study uses the Pre-Test - Post-Test Control Group Design. The study population was students of class X Phase E of SMAN 1 Padang Panjang in the 2024/2025 Academic Year. The research sample consisted of class X.9 as the experimental class and class X.6 as the control class selected using purposive sampling techniques. Data collection techniques include observation, documentation, and tests. The data obtained from this study were processed with the help of IBM SPSS 27. The results of the research analysis showed an average Pre-Test of the experimental class of 58.03 and Post-Test of 86.03, while the control class obtained a Pre-Test of 55.36 and Post-Test of 71.19. There was a significant increase in the experimental class. The results of the Paired Sample T-Test showed a significance level (sig) of 0.000. because this significance value is less than 0.05, then H0 is rejected and H1 is accepted while for students' creative thinking skills showed an average of 71.72%. The aspect of fluency with a percentage of 74% is categorized (creative), flexibility with a percentage of 70% is categorized (creative), and originality with a percentage of 78% is in the category (creative), while the aspect of elaboration with a percentage of 65% is in the category (quite creative). Thus, the application of 3D Diorama media based on the Project Based Learning (PjBL) model has been proven to have a positive effect on improving students' creative thinking skills in geography subjects at SMAN 1 Padang Panjang.
Keywords: Project Based Learning Model, 3D Diorama Media, Creative Thinking Ability, Geography Learning, Quality Education.

ABSTRAK

Kemampuan berpikir kreatif siswa pada mata pelajaran Geografi masih belum optimal. Hal ini tercermin dari kurangnya kemampuan siswa dalam memunculkan

ide-ide baru dan keterbatasan kemampuan menganalisis fenomena geografi secara mendalam. Penelitian ini bertujuan untuk mengetahui seberapa besar pengaruh penerapan *Project Based Learning* (PjBL) berbantuan media Diorama 3D terhadap peningkatan kemampuan berpikir kreatif siswa pada mata pelajaran geografi di SMAN 1 Padang Panjang. Penelitian ini menggunakan metode *Quasy Eksperiment* dengan pendekatan kuantitatif dan desain penelitian ini menggunakan *Pre-Test - Post-Test Control Group Desaign*. Populasi penelitian adalah siswa kelas X Fase E SMAN 1 Padang Panjang Tahun Pelajaran 2024/2025. Sampel penelitian terdiri dari kelas X.9 sebagai kelas eksperimen dan kelas X.6 sebagai kelas kontrol yang dipilih menggunakan teknik *purposive sampling*. Teknik pengumpulan data meliputi observasi, dokumentasi, dan tes. Data yang diperoleh dari penelitian ini diolah dengan bantuan IBM SPSS 27. Hasil analisis penelitian menunjukkan rata-rata *Pre-Test* kelas eksperimen 58,03 dan *Post-Test* 86,03, sedangkan kelas kontrol memperoleh *Pre-Test* 55,36 dan *Post-Test* 71,19. Terdapat peningkatan signifikan pada kelas eksperimen. Hasil uji *Paired Sample T-Test* menunjukkan taraf signifikansi (sig) sebesar 0,000. karena nilai signifikansi ini lebih kecil dari 0,05, maka H0 ditolak dan H1 diterima sedangkan untuk kemampuan berpikir kreatif siswa menunjukkan rata-rata 71,72%. Aspek kelancaran (*Fluency*) dengan persentase 74% dikategorikan (kreatif), keluwesan (*Flexibility*) dengan persentase 70% dikategorikan (kreatif), dan keaslian (*Originality*) dengan persentase 78% berada pada kategori (kreatif), sementara aspek elaborasi (*Elaboration*) dengan persentase 65% pada kategori (cukup kreatif). Dengan demikian, penerapan media Diorama 3D berbasis model Project Based Learning (PjBL) terbukti berpengaruh posistif terhadap peningkatan kemampuan berpikir kreatif siswa pada mata pelajaran geografi di SMAN 1 Padang Panjang.

Kata Kunci: Model Pembelajaran *Project Based Learning*, Media Diorama 3D, Kemampuan Berpikir Kreatif, Pembelajaran Geografi, Kualitas Pendidikan

A. Introduction

Education is a journey that takes students to their environment. The goal is to create transformation in it. Through the educational process, it is hoped that students can develop their potential and acquire the knowledge and skills needed to become active and productive members of society. The quality of education is the main focus in efforts to improve the quality of human resources. Quality education can be obtained through various efforts, ranging from formal and informal education to improving the quality of the learning process and equal and adequate access. Good quality education pays close attention to the process of creating quality standards and how to achieve them, where these quality standards involve planning, control, and continuous improvement in the entire education process consistently (Hartini, et.al, 2025).

The digital transformation era has presented a new paradigm in the world of education known as 21st-century learning. Wijaya et al. (2023) explained that 21st-century learning is characterized by massive technology integration and fundamental changes in how students learn, interact, and process information. The 21st Century Learning Framework developed by 21st Century Learning and Reviewed by (Suhelayanti et al., 2023) has identified four primary skills called 4C: Critical thinking, Communication, Collaboration, and Creativity. These skills are the main foundation in facing increasingly complex global challenges. In line with this, the Indonesian Government is responding to this global challenge by working on its education system. One of the positive initiatives carried out is the implementation of the Merdeka curriculum, which emphasizes student-centered learning. This Independent Curriculum aims to improve educational capabilities in Indonesia through diverse intracurricular learning (Y. Hidayat, 2023). In this context, a culturally responsive teaching approach has also been widely used in implementing learning. This approach recognizes and integrates cultural backgrounds into the learning process. Thus, student-centered learning improves both creative thinking skills and soft and social skills, as well as students' self-awareness, such as empathy, responsibility, discipline, and social concern.

Implementing an independent learning program is an effort to meet the demands of the 21st century, as initiated by UNESCO. 21st-century education based on independent learning adheres to the principles of efficiency and effectiveness, is student-oriented, and pays attention to the readiness, interests, and learning needs of students in the classroom so that learning can be carried out to achieve optimal goals (Wijoyo, 2018). The main objective of implementing this program is to support improving the quality of student learning outcomes, especially in values that include innovation, creativity, independence, and life. Skills that are starting to be lost due to the lack of student abilities due to the learning model not being contextual. In addition, students are also very minimally faced with current problems, especially in geography learning. Geography learning occupies a strategic position in students' understanding of human interaction with their environment. According to Sumarmi and Amirudin (2023), geography learning aims to develop spatial thinking and the ability to analyze complex geography in local and global contexts. Longitudinal research conducted by Hidayat et al. (2023) revealed that modern geography learning must have three main dimensions: conceptual understanding, practical skills, and environmental awareness. Therefore, to achieve 21st-century learning goals, geography requires teachers to play a role in students' creative thinking by implementing 3D

Diorama media through the Project Based Learning learning model.

It is expected that the implementation of 3D Diorama media based on the Project Based Learning learning model in schools, especially in geography subjects, can currently be adapted to 21st-century learning, namely being able to improve the abilities, skills or abilities, and also the attitudes that students must achieve as a result of the learning process. However, based on initial observations and preliminary studies at SMAN 1 Padang Panjang, several fundamental problems were found in geography learning, namely that students' creative thinking skills in Geography subjects were still not optimal. This is reflected in the lack of students' ability to generate new ideas, provide alternative solutions to geographical problems, and the limited ability to analyze geographical phenomena in depth.

Optimization is still lacking in overcoming geography learning problems at SMAN 1 Padang Panjang, which will have serious consequences. In geography learning, creative thinking is an aspect that students must have to understand the problems of the geosphere in the environment and adapt by proposing the necessary solutions (Setyawarno et al., 2024). The author proposes a solution to overcome this by implementing 3D Diorama media based on the Project Based Learning learning model. The support of 3D Diorama Media offers an innovative solution to overcome geography learning problems. According to research by Sari et al. (2023), it was revealed that the use of 3D Dioramas increases the understanding of geographical concepts by up to 85% compared to conventional media, especially in the visualization of geomorphological and spatial phenomena. Integrating 3D dioramas with Project Based Learning has proven effective in increasing student engagement. Research by Azizah et al. (2023) showed that learning motivation increased by 78% and active student participation increased by up to 82% in geography learning. An experimental study by Nurhayati et al. (2023) proved that the combination of 3D dioramas with Project Based Learning (PjBL) created a learning environment that supports the development of creative thinking skills, with an average increase in creativity scores of 76%.

Applying 3D diorama media to water cycle material can foster students' creative thinking in a collaborative idea space to understand the process of water circulation in the environment (Melinda & Ariyani, 2024). This is reinforced by research conducted by Lailiyah & Widiyono (2023), which explains that the 3D diorama-making project allows students to gain meaningful experiences to think creatively and independently in producing projects. 3D diorama media has the advantage of providing a concrete learning experience. According to Ahmad et al. (2023), Dioramas can present three-dimensional representations, making

it easier for students to understand complex geographical concepts. Research by Rasyid et al. (2023) showed that 3D Diorama increased students' long-term memory retention by up to 75% better than conventional learning media. Based on the findings above, this study is important because it offers concrete solutions to geography learning problems at SMAN 1 Padang Panjang. The interest in conducting this research is driven by the potential of 3D diorama media in creating meaningful learning and improving students' creative thinking skills. This research is also in line with the demands of 21st-century learning and the need to develop innovative learning media. This is supported by the findings of Prasetyo et al. (2023), which emphasize the importance of transforming traditional learning methods towards more contextual project-based learning. The uniqueness of this research lies in integrating 3D diorama media with the Project Learning model, which has not been widely studied in Indonesia, especially in the context of geography learning at the high school level.

B. Research Methods

This study uses a quantitative approach with a research method using quasi-experiments derived from the development of true experiments. The population of this study was all Phase E students of SMAN 1 Padang Panjang in the 2024/2025 Academic Year, made a population of 331 students. Part of the number and characteristics of the population is the definition of a sample according to Sugiyono (2019). The sample must have a representative value (representing) the population taken. The type of sample determination in this study is the Purposive Sampling technique. The sample in this study was Phase E class X.9 totaling 36 students who were used as the experimental class and Phase E class X.6 totaling 36 students who were used as the control class. Data collection techniques were observation, documentation and testing. The data obtained from this study were processed with the help of IBM SPSS for the T and N-gain tests.

C. Results and Discussion

Results

Table 1. Results of Student Creative Thinking Analysis

Aspect	Average Percentage	Remarks
Fluency	74%	Creative
Flexibility	70%	Creative
Originality	78%	Creative
Elaboration	65%	Quite Creative
Overall	**71.72%**	Creative

Sumber: Pengolahan Data Primer, 2025

Based on the data and diagrams on the side, from 36 students studied in the experimental class, the results of the analysis per aspect of creative thinking ability show: Fluency with an average percentage of 74% is categorized as (creative), Flexibility with an average percentage of 70% is categorized as (creative), Originality with an average percentage of 78% is categorized as (creative), and Elaboration with an average percentage of 65% is categorized as (quite creative). However, overall, the average creative thinking ability of students reached 71.72% which is included in the creative category.

Hypothesis Test

1. N-gain Tes

The N-Gain test was conducted to provide an overview of the improvement in learning outcomes between before and after learning in the class; the gain test was conducted on the pre-test and post-test of the experimental class; in this study, the researcher used SPSS 27 to process the data. The following are the results obtained from the N-Gain test:

Table 2. Experiment Class Pretest Posttest N-gain Test

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation

NGain_Score	36	,00	1,00	,6600	,24224
NGain_Persen	36	,00	100,00	65,9965	24,22401
Valid N (listwise)	36				

Based on the table above, Ngain's average score in the experimental class is 0.6600. In the range of score values , 0.6600 is in the medium value category, which means its effectiveness is moderate. Then, for Ngain, the average value obtained is 65.99%. This value in the category of effectiveness interpretation in the form of a percentage is in the range of 56 - 75, which means that the use of a method or a treatment is quite effective.

Table 3. N-Gain Test of Control Class and Experimental Classes

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
NGain_Score	72	-,37	1,00	,5899	,29275
NGain_Persen	72	-36,84	100,00	58,9965	29,27485
Valid N (listwise)	72				

Based on the results of the N-Gain analysis on the pre-test and post-test values, the average N-Gain score in the experimental group was 0.5899, which is in the moderate category, meaning its effectiveness is moderate. Then, for the NGain percentage, the average value obtained was 58.99%. This value is in the category of effectiveness interpretation in the form of a percentage in the range of 56 - 75, which means that the use of a method or treatment is quite effective.

2. T Test

Hypothesis testing is carried out after normality and homogeneity tests are conducted, and hypothesis testing can then be used. This study hypothesizes that the implementation of Project Based Learning (PjBL) assisted by 3D Diorama media has an effect on students' creative thinking skills at SMAN 1 Padang Panjang. The hypothesis test used in this study is a parametric statistical test, namely the Paired Sample T-test on the SPSS 27 For Windows program. It compares the average of two related/paired groups with both samples receiving two treatments. The following are the results obtained from the Paired Sample T-test.

Table 4. Paired Sample T-test

Paired Samples Test

		Paired Differences					t	df	Significance	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			One-Sided p	Two-Sided p
Pair 1	Pre eks - Posteks	-28,000	13,213	2,202	-32,470	-23,530	-12,715	35	,000	-28,000

Table 5. Paired Sample Statistics

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PretesEks	58,03	36	14,770	2,462
	PosttestEks	86,03	36	9,823	1,637

H1: The average value of the creative thinking learning outcome test of students who use the Project Based Learning (PjBL) model assisted by 3D Diorama media is higher than that of students who use the conventional model.

H0: There is no difference in the average value of the creative thinking learning outcome test of students who use the Project Based Learning (PjBL) model assisted by 3D Diorama media.

The basis for decision making is based on the calculated t value with the t table. If t table > calculated t, then H0 is accepted, and H1 is rejected. If t table < t count, then H0 is rejected, and H1 is accepted.

Based on the table about the t-test (Paired Sample T-test) above, it shows a significant difference between the results before and after being given the Project Learning (PjBL) model treatment assisted by 3D Diorama media. To see the t-table value, this is based on the level of significance. If the significance> 0.05 then H0 is accepted. If the significance <0.05 then H0 is rejected.

Based on the table above, it shows that the significance of 0.000 <0.05, then H0 is rejected and H1 is accepted, meaning that the hypothesis states that there is a significant difference before and after the implementation of the Project Based Learning (PjBL) Model assisted by 3D Diorama media in improving Students' Creative Thinking Skills at SMAN 1 Padang Panjang.

Table 6. T-test of Control Posttest and Experiment Posttest

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Hasil Belajar MD3D	Equal variances assumed	1.653	.203	5.847	70	.000	14.833	2.537	9.773	19.893
	Equal variances not assumed			5.847	68.095	.000	14.833	2.537	9.771	19.896

The hypothesis test in the table above is an independent sample t-test. The test is to determine whether there is a difference in the average of two unpaired samples. The main requirement in the independent sample t-test is that the data is normally distributed and homogeneous. From the analysis of the normality test and the homogeneity test, it was concluded that the data was normally distributed and homogeneous. Based on the test results shown in the table above, the Sig. (2-tailed) value was obtained at 0.001 <0.05 so that it can be concluded that there is a significant difference before and after the implementation of the Project Based Learning (PjBL) model assisted by 3D Diorama media in improving students' Creative Thinking skills at SMA N 1 Padang Panjang.

Table 7. T-test statistics for control posttest and experimental posttest

Group Statistics					
	Kelas	N	Mean	Std. Deviation	Std. Error Mean
Hasil Belajar MD3D	Posttest Eksperimen (MD3D)	36	86.03	9.823	1.637
	Posttest Kontrol (Konvensional)	36	71.19	11.630	1.938

It can be seen in the table above that there is an average or mean value in the post-test of the experimental class of 86.03 and 71.19 in the post-test of the control class. This value can be interpreted as the average of the experimental class being higher when compared to the average of the control class. So, it can be concluded that there is a English: There is a significant difference before and after the implementation of the Project Based Learning (PjBL) model assisted by 3D Diorama media on students' Creative Thinking skills at SMA N 1 Padang Panjang, the conclusion of the hypothesis above shows that the average learning outcomes of students using the Project Based Learning (PjBL) model assisted by 3D Diorama media are 86.03 while for

social studies learning outcomes are 86.03. conventional learning methods it is 71.19.

Discussion

Based on the research that has been conducted at SMAN 1 Padang Panjang in class X 9 which is designated as the experimental class and class X 6 as the control class. The implementation of learning in class X 9 using the Project Based Learning (PjBL) Model assisted by 3D Diorama media aims to create a conducive learning environment to develop creative thinking skills because students can share with each other. Based on idea data, provide feedback, and together find solutions to various problems in completing the project.

The Effect of the Project Based Learning (PjBL) Model assisted by 3D Diorama media on Learning Outcomes Based on the results of the research data analysis, a significant difference was found between student learning outcomes in the experimental class using the Project Based Learning (PjBL) Model assisted by 3D Diorama media and the control class using the conventional learning model. This difference can be seen from the average post-test score of the experimental class which is higher than the control class and is supported by the results of the hypothesis test which shows a significant difference.

These results are in line with research conducted by Pratama et al. (2021) who found that the use of three-dimensional media in geography learning can significantly improve students' conceptual and cognitive abilities. spatial understanding. 3D Diorama Media provides a more realistic and contextual visualization of the Water Cycle material, making it easier for students to understand abstract concepts more concretely. This improvement in learning outcomes is also inseparable from the use of the Project Based Learning (PjBL) model which is applied together with 3D Diorama Media.

According to Suryandari et al. (2023), the Project Based Learning (PjBL) model facilitates students to actively participate in learning through activities to design, develop, and create products. In the context of this study, students were invited to create a three-dimensional diorama about the water cycle, which indirectly helped them build a deeper understanding of the concept through project-making activities. In their research, Widianingrum and Hartini (2022) also emphasized that the project-based learning approach encourages students to develop collaboration, communication, and problem-solving skills, which are very important in geography learning. Students not only receive information passively but are also involved in constructing their knowledge.

The Influence of the Project Based Learning (PjBL) Model assisted by 3D Diorama Media on Creative Thinking Skills The results of the study show that the application of the Project Based Learning (PjBL)

Model assisted by 3D Diorama Media has a positive influence on Creative Thinking Skills. effect on students' creative thinking skills. This can be seen from the distribution of student's creative thinking skills in the experimental class, most of which were in the creative category.

Improving creative thinking skills through the use of the Project Based Learning (PjBL) Model assisted by 3D Diorama media is supported by research by Rahmat et al. (2020) which states that project-based learning can stimulate students' creativity through designing, making decisions, and solving real problems. In this study, students were required to design and create a three-dimensional diorama about the water cycle which requires creative thinking skills in concept visualization, material selection, and manufacturing techniques. When viewed from the aspect of creative thinking skills, it was found that fluency, flexibility, and originality were in the creative category, while the elaboration aspect was in the somewhat creative category.

This finding is in line with research by Zahro et al. (2021) which identified that elaboration skills are often the most challenging aspect in developing students' creative thinking because they require skills to develop, detail, and enrich an idea in depth. Nurfitriani and Sumarmi (2022) in their research on the development of creativity in geography learning also emphasized the importance of a learning approach that provides space for students to express their ideas and thoughts. The 3D Diorama Media and Project-Based Learning (PjBL) Model in this study has provided opportunities for students to develop their creativity in the context of water cycle material.

Effectiveness of Project Based Learning (PjBL) Model Assisted by 3D Diorama Media The results of the N-Gain test show that the application of 3D Diorama Media Based on the Project Based Learning (PjBL) Model is quite effective in improving students' creative thinking skills. This finding strengthens the research results of Dewi et al. (2022) which concluded that project-based learning with three-dimensional media can improve students' conceptual understanding and high-level thinking skills. The effectiveness of the Project Based Learning (PjBL) Model Assisted by 3D Diorama media can be explained through several factors. First, three-dimensional media provides a more realistic and concrete visualization of water cycle material, making it easier for students to understand abstract concepts. According to Pratiwi and Asrizal (2020), three-dimensional learning media can improve students' understanding because it involves many sensors that help the cognitive process. Second, the Project Based Learning model encourages students to actively participate in learning through designing, developing, and making products. This is in line with the research of Kurniawan and Masjudin (2023), which found that a project-based learning approach can increase student motivation,

engagement, and learning outcomes. Third, combining 3D Diorama Media and the Project Based Learning (PjBL) model creates a conducive learning environment for developing creative thinking skills. Students not only receive information passively but are also involved in the process of constructing their knowledge through project-making activities. According to Ismawati and Prasetyo (2021), learning that actively involves students in constructing knowledge will be more effective in developing high-level thinking skills, including creative thinking. Pedagogical Implications The findings of this study have several important pedagogical implications.

First, the Project Learning (PjBL) Model assisted by 3D Diorama media can be an alternative effective learning strategy to improve students' creative thinking skills in geography subjects. This is in line with the recommendations of the Independent Curriculum which emphasizes the importance of activity-based learning and the development of high-level thinking skills. Second, educators need to pay attention to the elaboration aspect which is still less effective. According to research by Puspitasari and Abidin (2021), the elaboration aspect can be improved through structured reflection, discussion, and feedback activities. Educators can integrate these activities in the implementation of the Project Learning (PjBL) Model assisted by 3D Diorama media to optimize learning comprehensively. development of students' creative thinking skills. Third, the use of the Project Based Learning (PjBL) Model assisted by 3D Diorama media not only has an impact on learning outcomes and creative thinking skills, but also has the potential to develop other skills such as collaboration, communication, and problem solving. According to Widyaningsih and Hartono (2023), a project-based learning approach can facilitate the development of 21st century skills which are very important for students' future success.

D. Conclusion

Based on the results of the research and discussion that has been conducted regarding the implementation of the Project Based Learning (PjBL) Model assisted by 3D Diorama media on the Creative Thinking Ability of Geography Students of Class X Phase E of SMAN 1 Padang Panjang, the following conclusions can be drawn. The implementation of the Project Based Learning (PjBL) Model assisted by 3D Diorama media has a positive and significant effect on students' creative thinking abilities in geography subjects at SMAN 1 Padang Panjang. This is evidenced by the results of the hypothesis test which shows a significant difference between the results of the pre-test and post-test in the experimental class. Students' creative thinking abilities after the implementation of the Project Based Learning (PjBL) Model assisted by 3D Diorama media are in the practical category with an average overall percentage reaching

71.72%. Reviewed from the aspect of creative thinking abilities, fluency, flexibility, and originality are in the creative category, while the elaboration aspect is in the fairly creative category. Based on the results of the N-Gain test, the use of the Project Based Learning (PjBL) Model assisted by 3D Diorama media is quite effective in improving students' creative thinking skills with an average N-Gain value in the experimental class of 65.996% included in the fairly practical category. There is a significant difference between student learning outcomes in the experimental class using the Project Based Learning (PjBL) Model assisted by 3D Diorama media and the control class using conventional learning models. This shows that the Project Based Learning (PjBL) Model assisted by 3D Diorama media is more effective in improving student learning outcomes compared to conventional learning models.

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