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The Impact Project Based Learning of Animation-Assisted Videos on the Capability for Creative Thinking in Light of Self Efficacy

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ABSTRACT

Mathematics learning that focuses on memory has an impact on the difficulty of creative thinking in solving problems that students find in daily life. This study aims to analyze the impact of animated video project-based learning on the ability to think creatively reviewed students' self-efficacy in elementary school. This study uses a quantitative approach, an experimental method with a quasi-experimental design (pretest-postest). The experimental design uses treatment by level 2x2. The data collection technique uses cluster random sampling samples in grade IV students. Data analysis includes data processing, data presentation, calculations to describe data, and hypothesis testing using SPSS-assisted statistical tests. The results showed that students who received Project Based Learning with the help of animated videos had higher creative thinking skills compared to students who received expository learning, there was an interaction between the learning model and self-efficacy on creative thinking skills, students with high self-efficacy were more able to think creatively in Project learning assisted by animated videos compared to expository learning, Students with low self-efficacy in expository learning are more able to think creatively than in Project Based Learning assisted by animated videos. The conclusion that there is an effect of the application of Project Based Learning assisted by animation videos on the ability to think creatively reviewed by students' self-efficacy in elementary schools.

Keywords: Project Based Learning; Creative Thinking Ability; Self Efficacy

ABSTRAK

Pembelajaran Matematika yang berfokus pada ingatan berdampak pada kesulitan berpikir kreatif dalam pemecahkan permasalahan yang ditemukan siswa dalam kehidupan sehari-hari. Penelitian ini bertujuan untuk menganalisis dampak pembelajaran berbasis proyek video animasi terhadap kemampuan berpikir kreatif ditinjau efikasi diri siswa di Sekolah Dasar. Penelitian ini

menggunakan pendekatan kuantitatif, metode eksperimen dengan desain *quasi eksperimen* (*pretest-postest).* Desain eksperimen menggunakan treatment by level 2x2. Teknik pengambilan data menggunakan sampel cluster random sampling pada siswa kelas IV. Analisis data meliputi pengolahan data, penyajian data, perhitungan untuk mendeskripsikan data, dan pengujian hipotesis dengan menggunakan uji statistik berbantuan SPSS. Hasil penelitian menunjukkan bahwa siswa yang mendapat pembelajaran Project Based Learning berbantuan video animasi memiliki kemampuan berpikir kreatif lebih tinggi dibandingkan dengan siswa yang mendapat pembelajaran ekspositori, terdapat interaksi antara model pembelajaran dan efikasi diri terhadap keterampilan berpikir kreatif, siswa dengan efikasi diri tinggi lebih mampu berpikir kreatif pada pembelajaran Project berbantuan video animasi dibandingkan pada pembelajaran ekspositori, siswa dengan self efficacy rendah pada pembelajaran ekspositori lebih mampu berpikir kreatif dibandingkan pada pembelajaran Project Based Learning berbantuan video animasi. Simpulan bahwa terdapat pengaruh penerapan Project Based Learning berbantuan video animasi terhadap kemampuan berpikir kreatif ditinjau efikasi diri siswa di Sekolah Dasar.
Kata Kunci: Project Based Learning; Kemampuan Berpikir Kreatif; Self Efficacy

INTRODUCTION

21st century skills that students must have included thinking creatively and having innovation (Hendri et al., 2019). Project Based Learning is one of the learning models that can improve creative thinking skills (Laksmita Dewi et al., 2023). Mathematics is one of the subjects in elementary school. Mathematics is a science that requires creative thinking rather than memorization (Aripin, 2017). Learning mathematics plays a role in educating the nation's life in the future (Suciana Ananda et al., 2020). Learning mathematics will increase students confidence and feel challenged to solve math problems (Nasution et al., 2021)

Creative thinking skills can be trained through learning mathematics (Ibrahim & Widodo, 2020). This can be seen in mathematics learning activities which include solving mathematical problems that require various ways of solving (Sekar Ayu et al., 2020), development of students' reasoning ability in relating mathematics subject to everyday life (Andiyana et al., 2018), directed learning trains finding new solutions that can be applied in real life (Munahefi et al., 2018), and learning is directed to finding new ideas in solving mathematical problems (Maros et al., 2023).

The ability to think creatively can be acquired through developing imagination, finding various ways of solving problems, and acquiring new ideas (Permana Putry et al., 2021). Fluency, flexibility, elaboration, and originality are indicators of creative thinking ability (Gu et al., 2019). Munandar deep Harisudin (2019) elucidate the following, among other markers of creative thinking ability: (1) Fluency, or the capacity to respond to a query; (2) Flexibility, or the capacity to approach issues in a variety of ways; (3) Originality, or the capacity to come up with fresh ideas for issue-solving; (4) Elaboration, or the capacity to outline specific processes for solving a problem.

Creative thinking is very important for students, especially in elementary school. However, low student creativity is influenced by traditional school and family pedagogy. Schools limit students' creativity where students only follow the teacher's instructions referring to only books without encouraging their own ideas, while parents at home focus on exams

rather than letting their children be more creative to expand their horizons (Sun et al., 2019). In line with the results of research by Widiana et al (2023) that the creative thinking ability of elementary school students has not been maximized because the learning carried out by teachers is less innovative and varied.

Learning is still centered on memory, students tend to propose question answer ideas based on the material commonly learned. Learning that focuses on memory causes students to have difficulty solving problems that are different from the teacher's exposure (Suradika et al., 2023). Students have difficulty solving non-routine description questions (Safaria, S. A., & Sangila, 2018). Students have difficulty generating varied ideas, interpreting images, and providing different perspectives on the use of formulas in problems (Saregar et al., 2021)

The results of the creative thinking questionnaire distributed to elementary school students in Rumpin District, Bogor Regency with cluster random sampling techniques, data were obtained for the creative thinking ability of grade IV students, the volume of building space material was still very low. Based on the results of the interview, several obstacles were found in learning that hinder the development of creative thinking skills, including learning is still centered on memory and finding the right answers to the questions given, students tend to find it difficult to answer description questions with more than one way of solving, students tend to be fixated using the way of solving questions listed in the book, and students haven't been able to go into great length about solving problem. As research has been conducted by Suweni et al.,(2023) mathematics learning problems faced by students include the assumption that students learning mathematics is boring, lack of use of learning media, low learning motivation, learning tends to direct students to memorize formulas instead of solving problems, so that students do not understand the meaningfulness of mathematics learning. The learning carried out must familiarize students with solving non-routine problems to hone and develop ways of thinking (Jediut et al., 2023)

This research was carried out in grade IV mathematics learning material on the volume of cubes and blocks. In addition, the learning mathematics carried out is more teacher centered. Teacher-centred learning in expository learning does not motivate students to develop ideas and think creatively (Hermita et al., 2023). Expository learning in Mathematics emphasizes more on delivering material verbally carried out by teachers (Rizal et al., 2016) . In expository learning, teachers tend to be more active than students (Saifi Hasbiyalloh et al., 2017).

The problem of students' creative thinking is low, various efforts have been made to improve learning by providing opportunities for students to be able to develop ideas and motivate students to be able to think creatively. One of the learning innovations is through the application of Project Based Learning (PjBL) (Khauzanah et al., 2023). Project Based Learning (PjBL) uses fundamental questions as a starting point for learning activities to produce a project by involving students actively in seeking information, providing decisions, and investigating a problem or question independently (Furqon Al Hadiq et al., 2022). Project Based Learning provides opportunities for students to express opinions (Lubis et al., 2022).

The author will use animated videos to support Project Based Learning in this study. In this study, the author will apply Project Based Learning assisted by animated videos. In PjBL learning, the use of animated videos can support every stage of learning and influence creative thinking. Wirahayu et al (2022) it was discovered that Project Based Learning, with the help

of animated videos, had an impact on students' capacity for creative thought. The use of animated videos helps students determine the fundamental questions that will lead to the determination of the project. The ability of learners to determine fundamental questions contributes to fluency. Fluency is one indicator of creative thinking. In the development of project plans carried out by students direct students to find several ways of solving problems, this contributes to one of the indicators of creative thinking, namely flexibility. In schedule development activities, students are directed to be able to determine the allocation of time needed to complete the project and convey the reason. This supports one of the indicators of creative thinking, namely elaboration or detail. At the monitoring stage, the teacher directs students to come up with their creative ideas. This supports one of the indicators of creative thinking, namely original thinking. At the stage of testing the results, students are directed to present the findings in making projects from beginning to end in detail. This trains students to have one of the indicators of creative thinking, namely elaboration or detail.

Some relevant research realted to this research include: 1) research conducted by (Albar & Southcott, 2021) found th influence of the application of Project Based Learning on the creative thinking ability of elemntary school students; 2) research conducted by (Ramadhini & Kowiyah, 2022) found that self efficacy has a very strong influence on the success of mathematics learning; 3) research conducted by (Wardani et al., 2023) found that self efficacy is very influential on the creative thinking ability of students.

Project-based learning applied in learning by teachers has benefits. Among the benefits of the Project Based Learning paradigm are: 1) students are trained to find and solve problems; 2) encourage learners to come up with project ideas; 3) learners are trained to have courage in making presentations and expressing opinions; 4) learners are trained to estimate the time needed to complete a project (Suryaningsih et al., 2024). PjBL involves students directly in solving problems that are relevant to every day life., in making projects students usually have a sense of ownership so that they will naturally be involved in problem solving, decision making or investigative activities, so that students have the opportunity to be independent in producing realistic products and presentations (Nawangsari et al., 2022). Through innovative learning, teachers have a positive impact on students so that they can develop insights and be able to solve problems in different ways.

Self-efficacy is one of the influential aspects in mathematics learning. Good self-efficacy possessed by students can fosters confidence in solving math problems (Ramadhini & Kowiyah, 2022). Self-efficacy is the conviction that one can finish a task (Putra, 2013). Self-efficacy must be possessed by students in order to succeed in learning (Sunaryo, 2017). The application of the Project Based Learning model, students are able to construct their own knowledge and reflect on their learning projects, there by increasing motivation and self-efficacy (Shin, 2018). The self-efficacy possessed by students can affect students' creative thinking abilities through learning prepared by teachers innovatively (Sutjonong et al., 2022).

The novelty in this study is the application of Project Based Learning assisted by animated videos in math classes using cube and block volume content. The use of animated videos in Project Based Learning in the first syntax helps students understand fundamental question that will make it easier to plan, schedule, and implement project reaction. Penelitian ini bertujuan

untuk menganalisis dampak pembelajaran berbasis proyek video animasi terhadap kemampuan berpikir kreatif ditinjau efikasi diri siswa grade IV at SD N Kampung Sawah 01.

METHODS

Type and Design

This study used a quantitative approach, an experimental method with a quasi-experimental design (pretest-postest). The experimental design used treatment by level 2x2. The data collection techniques include data processing, data presentation, calculations to describe data, and hypotesis testing using statistical test. In order to perform this research, two distinct treatments were offered to the classes: expository learning was given in the control class and the experimental class received the Project Based Learning model treatment with the use of animated videos. Prior to receiving therapy, place students with high and low levels of self-efficacy in experimental and control groups. For more details, please see Table 1 of the following 2x2 factorial research design.

Table 1. Factorial Research Design 2x2

Self-Efficacy	Animated video assisted Pjbl models (A1)	Expository Model (A2)
High (B1)	A1B1	A2B1
Low (B2)	A1B2	A2B2

Information:

A1: Animated video assisted Pjbl models	A1B1: Experimental class with the application of the PJBL model based on animated videos and has high self-efficacy
A2: Expository Model	A1B2: Experimental class with the application of the PJBL model based on animated videos and has low self-efficacy
B1: Self-Efficacy High	A2B1: Expository model and has high self-efficacy
B2: Self-Efficacy Low	A2B2: Expository model and has low self-efficacy

Data and Data Sources

The population in this study was all grade IV students in elementary schools in Rumpin District, Bogor Regency. The determination of research samples through cluster random sampling techniques. The study was conducted on grade IV students of SD N Kampung Sawah 01, Rumpin District, Bogor Regency, totalling 66 students. A total of 33 learners in the experimental class and 33 learners in the control class. Data collection in this study used two instruments arranged based on predetermined indicators. Creative thinking ability instruments in the form of essays are used to measure creative thinking skills and questionnaires to measure self-efficacy. Creative thinking ability consist of: (1) Fluency, or the capacity to respond to a query; (2) Flexibility, or the capacity to approach issues in a variety of

ways; (3) Originality, or the capacity to come up with fresh ideas for issue-solving; (4) Elaboration, or the capacity to outline specific processes for solving a problem. Before being used in research, both instruments are validated by experts and then tested for validity, reliability, difficulty and differentiation.

Data Collection Technique

Data analysis techniques include descriptive statistical analysis and inferential statistical analysis. Descriptive analysis includes calculating looking for mean, median, mode, standard deviation, maximum value and minimum value. Inferential analysis includes normality tests and homogeneity tests, to find out the data obtained are homogeneous and normally distributed. After the data is declared homogeneous and normal, then a hypothesis test is carried out the help of SPSS.

Data Analysis

Data on creative thinking skills obtained from the research were then carried out descriptive analysis including determining the mean, median, mode, standard deviation, maximum, and minimum. Furthermore, inferential analysis is carried put, namely the normality test and the homogeneity test. After the research data was declared normal homogeneos, then a 2-line ANAVA hypothesis test was carried out with the help of SPSS with significant α=0,05. The following are the hypotheses of this study: 1) Students who learn with the Project Based Learning model assisted by animated videos have different creative thinking skills from students who learn with expository models; 2) Students' creative thinking skills are influenced by the interaction between the Project Based Learning model assisted by animated videos and Self Efficacy; 3) Students who learn with the Project Based Learning model assisted by animated videos and students who learn with expository models have different creative thinking skills from students who learn with high self-efficacy; 4) Students who study using the Project Based Learning model with animated films assistance and students who learn using expository models have different levels of creative thinking skills.

RESULTS AND DISCUSSION

The description of students' creative thinking ability based on the learning model and self-efficacy is presented in table 1 below:

Table 1. Description of creative thinking skills

Class	Level of Self Efficacy	N	Mean	Median	Modus	Standard Deviation
Experiment	Tall	10	86,5	87,5	90	6,69
	Low	10	74	75	75	4,59
Control	Tall	10	66	67,5	70	7,38
	Low	10	82,5	85	85	3,54

Based on table 1, in the experimental class, students who had high self-efficacy obtained an average value of creative thinking ability, which was 86.5, greater than students who had high self-efficacy in the control class, which was 67.5. For students who had low self-efficacy

in the experimental class had the ability to think creatively, which was 74 smaller than students who had low self-efficacy in the control class, which was 82.5. This proves that there is a difference in the creative thinking ability of students between experimental classes and control classes that have high and low self-efficacy.

Based on the description above, it can be concluded that the value of creative thinking ability of students who have high self-efficacy is higher using Project Based Learning (PjBL) learning assisted by animated videos and creative thinking skills that have low self-efficacy are higher using expository learning. This corresponds to (Ratnasari et al., 2022) that there is an influence on the use of project-based learning models assisted by animation media on the creative thinking ability of elementary school students. The PjBL model has a significant effect on creative thinking skills on the material concepts learned by students (Fajri et al., 2023).

The normality test and homogeneity test are prerequisite tests for data analysis before a two-way analysis of variance is carried out. The Shapiro-Wilk test is used for normality testing with a significance level of >5% or 0.05. The normality test results are presented in the following table2:

Table 2. Normality Test (Shapiro-Wilk)

Statistic	df	Sig
0.954	40	0,102

In table 2 described the results of the normality test with Shapiro-Wilk obtained a statistical value = 0.954 with a value of Sig = 0.102 > 0.05. This means that the data is normally distributed.

For homogeneity testing on this data is done with the help of SPSS by looking at the results in the variance homogeneity test section (Levene's) presented in table 3 below:

Table 3. Homogeneity of Variances Test (Levene's)

Levene Statistic	df1	df2	Sig
2,462	3	36	0,078

Based on the data in table 3, homogeneity test results were obtained with sig values = 0.078 > 0.05. This means that the data sample comes from a homogeneous population. After the data is declared normal and homogeneous, the next step is to test the hypothesis with a two-track variance analysis technique (ANOVA 2x2). The following test results with ANOVA are presented in table 4 below:

Table 4. ANOVA Test

	Sum of Squares	df	Mean Square	F	Sig
Learning Model	360	1	360	10,845	0,002
Self Efficacy	40	1	40	1,205	0,280
Learning Model * Self Efficacy	2102,5	1	2102,5	63,339	<0,001

Based on the results of the two-track ANOVA test in table 4, it is known that:

1. It is explained that the acquisition of the significance value of the < α learning model is 0.002. Sig values g of 0.002 < 0.05 mean that there is a difference between experimental class students who learn with Project Based Learning assisted by animated videos and control class students who learn with exposure to creative thinking skills.

   Based on the results of data analysis, the creative thinking ability of students who learn to apply Project Based Learning assisted by animated videos is higher than students who learn with expository models. As research has done Muhammad Rafik et al., (2022) It was found that Project Based Learning had a significant effect on the ability to think creatively on every indicator of fluency, flexibility, original thinking and detail.

   Researchers observed several differences in learning in experimental and control classes. In the experimental class, students seemed enthusiastic about participating in learning with the Project Based Learning model which uses animated videos in the first syntax, namely determining fundamental questions. Learners are given fundamental questions related to the volume material of cubes and blocks so that learners can develop ideas for project creation. Learners are directed to have the confidence to present and display project results. Students are given the opportunity to be actively involved in every stage of learning activities. So that this learning can develop the ability to think creatively well.

   In control classes that apply expository models, students tend to passively listen to material explanations from teachers and are not directed to have the confidence to express opinions or convey the results of working on questions. Learners tend to wait for direction and instruction from the teacher. This causes the ability of creative thinking abilities of students is not well trained.
2. The acquisition of the significance value of the interaction of the learning model and self-efficacy < α which is 0.001. A sig value of 0.001<0.05 means that there is a significant interaction between learning methods and self-efficacy together can affect the ability to think creatively.

   Based on the results of data analysis on table 4 , it was also obtained that there was an interaction between the Project Based Learning model assisted by animated videos with Self Efficacy on the creative thinking ability of students. Such research conducted by Pramusinta & Suciati (2023) students who learn with Project Based Learning have high self-efficacy compared to students who learn with the discussion method. Model Berbasis proyek dapat memotivasi siswa sehingga memiliki kepercayaan diri yang tingga dalam memecahkan permasalahan (Wijnia et al., 2024).

After obtaining an interaction between the learning model and self-efficacy, then the post hoc test with a level of α = 0.05. The results of post hoc with Tuckey test for learners who have high self-efficacy in Project Based Learning assisted by animated and expository videos are described in table 5 below:

Table 5. Post Hoc with high Tuckey Self Efficacy test on animated and expository video-assisted Project Based Learning

SE High PjBL /	Mean Difference	St. Error	Sig	Lower Bound	Upper Bound
SE High Expository	20,50	2,577	<0,001	13,56	27,44

Based on table 5 data, the results of post hoc with Tuckey test obtained a sig value of <0.001< 0.05, meaning that there are differences in creative thinking ability that learning with Project Based Learning assisted by animated videos with expository in students who have high self efficacy.

The students who have low self-efficacy in Project Based Learning assisted by animated and expository videos are described in table 6 below:

Table 6. Post Hoc with low Tuckey Self Efficacy test on animated and expository video-assisted Project Based Learning

SE low PjBL /	Mean Difference	St. Error	Sig	Lower Bound	Upper Bound
SE low expository	-8,5	2,577	0,011	-15,44	-1,56

Based on the data in table 6, the results of the hoc post with Tuckey test obtained a sig value of 0.011 < 0.05. This means that there are differences in the ability to think creatively who learn with Project Based Learning assisted by animated videos with expository in students who have low self-efficacy.

The creative thinking ability of students who learn with Project Based Learning assisted by animated videos is higher than students who learn with expository models in high self-efficacy students. Such research conducted by Suciawati (2019) It was found that students who have high self-efficacy who learn with Project Based Learning have a more persistent attitude and do not give up easily when they find difficulties in learning. This affects the acquisition of the value of creative thinking ability. So that his creative thinking ability is higher than in expository classes.

This study also found that the creative thinking ability of students who learned with expository models was higher than students who learned with Project Based Learning assisted by animated videos in students with low self-efficacy. Research that has been conducted by Ferdyansyah et al., (2020) explained that low self-efficacy is because students feel pressured by the demands of tasks in learning that are not in accordance with their abilities. Therefore, expository learning is more suitable for learners who have low self-efficacy. Low self-efficacy of students is less accurate in learning if under teacher pressure (Cifuentes-Férez et al., 2024).

Based on the explanation above, it is proven that there is an influence of Project Based Learning assisted by animated videos on the ability to think creatively in terms of the self-efficacy of grade IV students of SD N Kampung Sawah 01 in mathematics subjects of cube and block volume material.

CONCLUSION

The use of Project Based Learning assisted by animated videos affects the ability to think creatively in terms of the self efficacy of elementary school students in grade IV mathematics subjects cube and block volume. The next researcher is expected to be able to examine PjBL on the ability to think creatively in other subjects.

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