

The effect of the application of the project-based learning model assisted by pop up book media on the creative thinking ability of elementary school students

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Received: 2025, 04,27 Accepted: 2026, 06,02

Available online: 2026, 06,30

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KEYWORDS	ABSTRACT
<p>Keywords: Creative Thinking Ability; Project Based Learning; Pop Up Book; Science Learning; Elementary School.</p> <p>Conflict of Interest Statement: The author(s) declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.</p> <p>Copyright © 2025 EDU. All rights reserved.</p>	<p>This study aims to analyze the improvement of the creative thinking skills of elementary school students through the application of the Project Based Learning (PjBL) model assisted by Pop Up Book media in science learning water cycle materials. The research uses a quasi-experimental method with a Non-Equivalent Control Group Design. The research sample amounted to 50 students in class V of SDIT Almanar Purwakarta which were divided into experimental classes and control classes. Data were collected through a creative thinking ability test and analyzed using a simple linear regression test, Independent Sample t-test, and N-gain. The results of the study showed that the PjBL model assisted by Pop Up Book media had a significant effect on students' creative thinking skills (sig. 0.045 < 0.05). There was a significant difference in the improvement in creative thinking skills between the experimental class and the control class (sig. 0.000 < 0.05). The average posttest score of the experimental class was 86.25, higher than the control class of 60.72. The N-gain result of the experimental class was 0.689 (medium category), while the control class was 0.358. The findings of the study show that the PjBL model assisted by Pop Up Book media can be an effective learning alternative to improve students' creative thinking skills in science learning in elementary school.</p>

Introduction

21st century education requires students to have a variety of skills known as the 4Cs (*Critical Thinking, Communication, Collaboration, and Creativity and Innovation*). One of the skills that needs to be developed in the learning process is the ability to think creatively. Creative thinking skills allow students to generate new ideas, find various alternative solutions, and develop ideas innovatively in dealing with various problems. Therefore, the ability to think creatively is one of the important competencies that need to be instilled from the elementary school level as a provision to face future challenges.

In Natural Science (IPA) learning, the ability to think creatively has an important role because students are not only required to understand scientific concepts, but also to be able to relate these concepts to phenomena that occur in the surrounding environment. Meaningful science learning can encourage students to observe, explore, analyze, and find solutions to various problems related to nature and daily life. However, various studies show that the creative thinking skills of elementary school students in Indonesia are still relatively low. Erisa (2021), reported that the level of students' creative thinking ability in science learning only reached an average of 26%. These findings are in line with Haryanti's (2020) research, which shows that students still tend to memorize material rather than developing ideas and ideas independently in the learning process.

The low ability of students' creative thinking skills is influenced by various factors, one of which is the use of learning models that have not been able to provide space for students to actively explore ideas. According to Juarsyah et al. (2023), every student basically has creative potential that can

develop if they get the right stimulus during the learning process. In contrast, teacher-centered, textbook-dependent learning tends to limit students' opportunities to develop creativity and higher-level thinking skills.

The results of observations conducted at SDIT Almanar Purwakarta show that the creative thinking skills of grade V students are still not developed optimally. Science learning is still dominated by lecture methods and limited use of learning media so that students tend to be passive during the learning process. This problem is increasingly seen in abstract water cycle materials. Students have difficulty understanding the processes of evaporation, condensation, precipitation, and infiltration because these phenomena cannot be observed directly. As a result, students memorize concepts more than understand and develop creative ideas related to the material studied.

One of the alternatives that can be used to overcome these problems is the application of *the Project Based Learning* (PjBL) model. The PjBL model places students at the center of learning through project completion activities that encourage exploration, collaboration, problem-solving, and creativity. Through project activities, students are given the opportunity to build knowledge independently while producing real products as a form of understanding of the material studied. Several studies have shown that the application of PjBL can improve students' creative thinking skills because it provides a more active and contextual learning experience.

In order for the implementation of PjBL to be more optimal, learning media support is needed that can help students understand abstract science concepts. One of the media that can be used is *the Pop Up Book*, which is a three-dimensional visual media that presents material in an interesting and interactive manner. This medium allows students to gain a more concrete learning experience through the visualization of concepts that are difficult to observe directly. Previous research has shown that the use of interactive visual media can increase student engagement in learning while supporting the development of creative thinking skills.

Several previous studies have proven the effectiveness of *Project Based Learning* and *Pop Up Book* media in learning. Research by Wulandari, Koeswanti, and Giarti (2019) shows that the implementation of *Project Based Learning* assisted by *Pop Up Book* media is able to improve the creative thinking skills of elementary school students. Research by Anggraini and Wulandari (2021) also found that *Project Based Learning* can increase student activity and involvement during the learning process. In addition, research by Amnawati (2023), shows that the use of *Pop Up Book* media is able to improve student learning outcomes through more interesting and interactive learning activities. These findings show that *the Project Based Learning* model and *the Pop Up Book* media have the potential to improve the quality of learning in elementary schools.

Although various studies have proven the effectiveness of the PjBL model and *Pop Up Book* media separately, research that integrates the PjBL model with *Pop Up Book* media to improve students' creative thinking skills in learning science water cycle materials in elementary schools is still limited. In addition, there have not been many studies that specifically examine the effectiveness of the combination of these two components in improving the creative thinking skills of elementary school students. Therefore, the novelty of this research lies in the integration of the PjBL model with *Pop Up Book* media as a three-dimensional visual media in science learning to support the development of students' creative thinking skills.

Based on this description, this study aims to analyze the improvement of the creative thinking skills of elementary school students through the application of *the Project Based Learning* (PjBL) model assisted by *Pop Up Book* media. In addition, this study also analyzes the effect of the application of the model on students' creative thinking skills and compares the improvement of creative thinking skills between students who learn using the PjBL model with the help of *Pop Up Book* media and students who learn using the *Picture and Picture* model assisted by PowerPoint media in learning science of water cycle materials.

Research Design and Methodology

This study uses a *quasi experimental research* method with a *Non-Equivalent Control Group Design*. The research was carried out at SDIT Almanar Purwakarta in the even semester of the 2025/2026 school year. The research population is all students in grade V of SDIT Almanar Purwakarta.

The sampling technique used *saturated sampling*, so that the entire population was used as a research sample of 50 students, consisting of 25 students in the experimental class and 25 students in the control class. The experimental class obtained learning using *the Project Based Learning (PjBL)* model with the help of *Pop Up Book* media, while the control class used *the Picture and Picture* model with the help of *PowerPoint* media.

The research instrument is in the form of a creative thinking ability test given before (*pretest*) and after treatment (*posttest*). The test is based on four indicators of creative thinking ability, namely *fluency, flexibility, originality, and elaboration*. Before use, the instrument has gone through validity, reliability, difficulty, and differentiating power tests. Research data is collected through tests, observations, and documentation.

Data analysis is carried out with the help of SPSS software. Prerequisite tests include normality and homogeneity tests. Furthermore, a simple linear regression test was used to analyze the effect of the application of the PjBL model assisted by *Pop Up Book media* on students' creative thinking skills. The difference in the increase in creative thinking skills between the experimental class and the control class was analyzed using *the Independent Sample t-Test*, while the effectiveness of the increase in creative thinking skills was analyzed using the N-Gain test. The research design used can be described as follows.

Table 1 Descriptive Analysis Results of Pretest and Posttest Experimental and Control Class

Groups	Pretest	Treatment	Posttest
Eksperimen	O ₁	X	O ₂
Controls	O ₁	-	O ₄

Description: O₁ = Experimental class pretest

O₂ = Posttest kelas experiment

O₃ = Control class pretest

O₄ = Posttest kelas control

X = Learning using the Project Based Learning (PjBL) model with the help of Pop Up Book media

Findings and Discussion

Findings

1. Description of Pretest and Posttest Results of Creative Thinking Ability

The measurement of students' creative thinking skills was carried out through the provision of pretests before treatment and posttests after treatment. The results of the average pretest and posttest scores in the experimental class and the control class are presented in Table 2

Table 2 Average Pretest and Posttest Scores of Creative Thinking Ability

Classes	Pretest	Posttest	Improvement
Eksperimen	36,20	86,25	44,52
Control	37,92	60,72	22,80

Based on Table 2, the average *pretest score of the* experimental class was 36.20 and the control class was 37.92. These results show that the initial creative thinking ability of students in both groups is relatively equal before being given treatment. After the learning process was implemented, the average *posttest score of the* experimental class increased to 86.25, while the control class increased to 60.72.

The increase in creative thinking skills in the experimental class reached 44.52 points, while in the control class it was only 22.80 points. These results show that students who participated in learning using *the Project Based Learning (PjBL)* model assisted by *Pop Up Book media* obtained a higher increase in creative thinking skills compared to students who participated in learning using *the Picture and Picture* model assisted by *PowerPoint media*.

2. Prerequisite Test Results

Table 3 Results of Normality Test of Experimental and Control Classes

Classes	Test Type	P-Value	Signifikan	Interpretasi
Eksperimen	Pretest	0,455	0,05	Normal
	Posttest	0,719	0,05	Normal
Control	Pretest	0,056	0,05	Normal
	Posttest	0,719	0,05	Normal

Based on Table 3, all *p-values* in the *pretest* and *posttest* data, both experimental and control classes, are greater than 0.05. Thus, all research data are normally distributed and meet one of the requirements for parametric statistical testing.

The homogeneity test was performed to determine the similarity of variance between the experimental group and the control group. The data is declared homogeneous if the *p-value* is greater than 0.05.

Table 4 Pretest and Posttest Homogeneity Test Results

P-Value	Significant (a)	Interpretasi
0,401	0,05	Homogeneous

Based on Table 4, a *p-value* of 0.401 was obtained which is greater than 0.05. These results show that the data variance in the experimental class and the control class is homogeneous. Thus, the research data has qualified for hypothesis testing using parametric statistics.

3. Simple Linear Regression Test Results

A simple linear regression test was carried out to determine the effect of the application of the *Project Based Learning* (PjBL) model assisted by *Pop Up Book* media on students' creative thinking skills.

Table 5 Simple Linear Regression Test Results

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Say.
1	Regression	5281.624	1	5281.624	165.379	0.000b
	Residual	1564.886	49	31.936		
	Total	6846.510	50			
a. Dependent Variable: Posttest						
b. Predictors: (Constant), Model						

Based on Table 5, a significance value of 0.000 was obtained. The value is less than 0.05 ($0.000 < 0.05$), so H_0 is rejected and H_1 is accepted. Thus, it can be concluded that the application of the *Project Based Learning* (PjBL) model assisted by *Pop Up Book* media has a significant effect on students' posttest results.

In addition, an F value of 165.379 was obtained, which shows that the regression model used is feasible to explain the relationship between the application of the *Project Based Learning* (PjBL) model assisted by the *Pop Up Book* media and the results of students' posttests.

4. Hasil Independent Sample t-Test

Table 6 Hasil Independent Sample T-Test

<i>P-Value</i>	Signifying cover (a)	Interpretasi
0,000	0,05	H1 accepted

Based on Table 6, a *p-value* of 0.000 was obtained. This value is smaller than the significance level of 0.05 ($0.000 < 0.05$), so H_0 is rejected and H_1 is accepted. These results show that there is a significant difference in the improvement of creative thinking skills between students who learn using *the Project Based Learning* (PjBL) model assisted by *Pop Up Book* media and students who learn using *the Picture and Picture* model assisted by PowerPoint media.

The findings show that *the Project Based Learning* (PjBL) model assisted by *Pop Up Book* media has a better impact on improving students' creative thinking skills compared to the learning model applied to the control class.

5.N-Gain Results

Table 7 Experimental and Control N-Gain Test Results

Classes	Number of Students	Overnight <i>non-gain</i>	Interpretasi	<i>N-Gain</i> Percent	Interpretasi
Eksperimen	25	0,689	Medium	68,92	Quite effective
Controls	25	0,358	Low	35,84	Ineffective

(Source: Researcher, 2026)

Based on Table 7, the average N-Gain value in the experimental class was 0.689 which was included in the medium category with a percentage increase of 68.92% and was in the category of quite effective. Meanwhile, the control class obtained an average N-Gain value of 0.358 which was also included in the medium category, but only had a percentage increase of 35.84% so it was in the ineffective category.

These results show that the increase in students' creative thinking skills in the experimental class is higher than in the control class. Thus, the application of *the Project Based Learning* (PjBL) model assisted by *Pop Up Book* media is more effective in improving students' creative thinking skills compared to learning that uses *the Picture and Picture* model assisted by PowerPoint media. These findings indicate that student involvement in project activities and the use of interactive media can provide a more meaningful learning experience and encourage the development of students' creative thinking skills.

Discussion

1. Improving Students' Creative Thinking Skills through the Implementation of PjBL Assisted by Pop Up Book Media

The results of the study showed that students' creative thinking skills improved after participating in learning using the Project Based Learning (PjBL) model assisted by Pop Up Book media. This can be seen from the average posttest score of the experimental class which reached 80.72, higher than the control class which obtained an average of 60.72. In addition, the results of the Independent Sample t-Test showed a significance value of 0.000 (<0.05), which indicated a significant difference in the increase in creative thinking skills between the experimental class and the control class.

The improvement of students' creative thinking skills is also shown by the results of the N-Gain test. The experimental class obtained an N-Gain value of 0.689 in the medium category, while the control class obtained a value of 0.358. These results show that the application of the PjBL model assisted by Pop Up Book media is more effective in improving creative thinking skills than learning using the Picture and Picture model assisted by PowerPoint media.

The increase occurred because the PjBL model provides opportunities for students to actively engage in the learning process through investigation activities, project planning, product creation, and presentation of results. During the process, students are required to put forward

ideas, look for various alternative problem solving, and develop products according to learning objectives. These activities directly train aspects of creative thinking skills, namely fluency (fluency in thinking), flexibility (flexibility in thinking), originality (originality of thinking), and elaboration (development of ideas).

In addition, the use of Pop Up Book media helps students understand abstract water cycle material through more concrete and interesting three-dimensional visualizations. The media allows students to connect the concepts learned with the project they are working on so that learning becomes more meaningful. This condition encourages students to participate more actively and generate various creative ideas during the learning process.

The findings of this study are in line with the research of Wulandari, Koeswanti, and Giarti (2019) which showed that the implementation of PjBL with the help of Pop Up Book media was able to improve the creative thinking skills of elementary school students. The results of this study also support the research of Anggraini and Wulandari (2021) who stated that the PjBL model can increase student activity and involvement in learning. Thus, the application of the PjBL model assisted by Pop Up Book media can be an effective learning alternative to improve the creative thinking skills of elementary school students.

The findings of this study show that the integration of the PjBL model and Pop Up Book media not only improves learning outcomes, but is also able to develop students' creative thinking skills through student-centered learning activities.

2. The Effect of the Implementation of PjBL Assisted by Pop Up Book Media on Students' Creative Thinking Ability

In addition to improving students' creative thinking skills, the application of the PjBL model with the help of Pop Up Book media has also been proven to have a significant influence on creative thinking skills. The results of the simple linear regression test showed a significance value of 0.045 (<0.05), so it can be concluded that the application of the PjBL model assisted by Pop Up Book media has an effect on the creative thinking ability of elementary school students.

These influences show that project-based learning supported by interactive visual media is able to create a learning environment that encourages students to think more actively and creatively. In the PjBL model, students not only receive information from the teacher, but also build knowledge through hands-on experience in completing projects. The process provides students with the opportunity to explore various possible solutions, develop new ideas, and produce products that fit the learning objectives.

These findings are in line with constructivist theories that knowledge is actively constructed by students through learning experiences. Through project activities, students gain the opportunity to construct knowledge based on the experiences and interactions they have during the learning process. Therefore, students' creative thinking skills develop as their involvement in learning activities increases.

The results of this study also strengthen the findings of Wulandari, Koeswanti, and Giarti (2019) who stated that the implementation of PjBL with the help of Pop Up Book media can improve the creative thinking skills of elementary school students. In addition, research by Amnawati (2023) shows that Pop Up Book media is able to create more interesting and interactive learning so as to support student involvement in the learning process. Thus, the integration of the PjBL model and Pop Up Book media has been proven to make a positive contribution to the development of students' creative thinking skills in science learning in elementary school.

Conclusion

This study shows that the application of the Project Based Learning (PjBL) model assisted by Pop Up Book media is able to increase the creative thinking skills of elementary school students in learning science water cycle materials. The results showed that the increase in students' creative thinking skills in the experimental class was higher than in the control class, which was shown by the posttest score, the result of the Independent Sample t-Test, and the N-Gain score. In addition, the results of a simple

linear regression test showed that the application of the PjBL model assisted by Pop Up Book media had a significant effect on students' creative thinking skills.

The findings of this study contribute to the development of science learning in elementary schools through the integration of project-based learning models with interactive three-dimensional visual media. The combination of PjBL and Pop Up Book media not only helps students understand abstract concepts, but also provides a more active, meaningful, and development-oriented learning experience for creative thinking skills. The novelty of this research lies in the application of Pop Up Book media in the PjBL syntax to improve students' creative thinking skills on water cycle materials in elementary schools.

This research has limitations on the relatively limited number of samples and the implementation of research is only carried out on one science learning material in one school. Therefore, further research is recommended to involve a wider number of samples, different levels of education, and test the application of the PjBL model assisted by Pop Up Book media in other materials and subjects. Further research can also examine the influence of the model on other 21st-century skills, such as critical thinking, collaboration, and problem-solving.

Acknowledgment

The author would like to thank SDIT Almanar Purwakarta for providing permits and facilities during the implementation of the research. Gratitude was also expressed to the supervisors, class V teachers, and all students who have participated and supported the smooth running of this research.

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