



META-ANALYSIS: IMPLEMENTATION OF THE PROJECT BASED LEARNING (PJBL) MODEL IN INCREASING STUDENTS' CREATIVE THINKING IN SCIENCE LEARNING

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Abstract :

This research is a qualitative study that uses meta analysis methods. The aim of this meta analysis is to find out whether there is an increase in students' creative thinking in the science learning context after implementing the Project Based Learning model. The data collection process was carried out by searching for journals that had been published in national journals using the Google Scholar platform. The ten journal articles analyzed came from publications in the last three years, namely the 2021-2023 period. This research process involves data collection steps, followed by data analysis. The analytical method used is qualitative analysis by applying the Miles and Huberman techniques. Based on the results of the meta analysis in this research, it can be concluded that the application of the Project Based Learning learning model is able to improve students' creative thinking in the science context.

Keywords: Creative Thinking, Meta-Analysis, Project Based Learning, Science

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INTRODUCTION

Education today demands not only the absorption of information, but also the development of deep cognitive skills, such as creative thinking (Kivunja, 2014; Faraniza, 2021). Creative thinking is an important aspect in education because it provides a foundation for innovation, solving complex problems, and developing individual potential (Mahammadovna, 2021; Nurhanifah, 2022; Ramadhan & Hindun 2023). Increasing students' creative thinking has become the focus of attention in efforts to improve the education system (Kwangmuang et al., 2021; Riowati & Yoenanto, 2022). In the context of science learning, learning is needed that is able to stimulate and increase students' creative thinking effectively.

One of the learning models that has received widespread attention in improving creative thinking is Project Based Learning. This model emphasizes learning through projects or assignments that combine theory with practice, requiring students to collaborate, solve problems, and create concrete products or results (Matriano, 2020; Nancy, 2023). In the context of science learning, Project Based Learning offers an adequate platform for integrating knowledge, skills and problem solving in a relevant

context (Sangwan & Singh, 2022; Pratama, 2023; Rahman et al., 2023). Therefore, it is important to carry out a study regarding the application of the Project Based Learning model to students' creative thinking.

Meta-analysis research on Project Based Learning conducted by Widarbowo et al., (2023) examined the effectiveness of using the Project Based Learning model on learning outcomes. Similar research regarding the meta-analysis of the Project Based Learning model conducted by Ananda et al., (2021) examined the effect of implementing the Project Based Learning model on critical and creative thinking skills. This research is in line with previous studies. This research examines the application of the Project Based Learning model to improve students' creative thinking abilities in science learning. Although there is a lot of research supporting the success of Project Based Learning in improving creative thinking, there are variations in the results of studies conducted in various contexts. Therefore, a comprehensive review of various related studies is important to provide a comprehensive understanding and in-depth analysis of the effectiveness of Project Based Learning in increasing creative thinking in the science learning context.

In order to fill this knowledge gap, meta-analysis is an appropriate method for combining and analyzing the results of previous research. Through meta-analysis, significant data synthesis can be carried out to evaluate the extent to which Project Based Learning contributes to increasing creative thinking in the science learning context. This introduction provides a general overview of the importance of creative thinking skills in educational contexts, an introduction to the Project Based Learning learning model, as well as the need to conduct meta-analysis to support a more comprehensive understanding regarding the effectiveness of Project Based Learning in improving creative thinking in science learning contexts. Based on the background above, the aim of this meta analysis is to find out whether there is an increase in students' creative thinking in the science learning context after implementing the Project Based Learning model.

RESEARCH METHOD

The research conducted was a qualitative study that applied meta-analysis methods. This research explores data from national journals which discuss the application of the Project Based Learning model to creative thinking in the context of science learning. Data sources are taken from journals that are relevant to the topic being investigated. Data collection was carried out by searching for journals available in national journals via Google Scholar. Ten journal articles from the last three years, namely between 2021 and 2023, were used as material for analysis in this research.

The main focus of this study is to examine how the implementation of the Project Based Learning model increases creative thinking in the context of science learning. The initial process is carried out by collecting data, which is then followed by the data analysis stage. In carrying out this meta-analysis, a qualitative approach was chosen by applying the Miles and Huberman techniques as the analytical method used. After the data is collected, the next step includes efforts to simplify the data, expose the data, and finally, the process of making conclusions.

RESULTS AND DISCUSSION

Based on the results of a literature study from 10 journal articles, it was found that the application of the Project Based Learning model played a role in increasing participants' creative thinking in the science learning context. The results obtained are listed in detail in table 1.

Table 1. Results of Meta Analysis of Implementation of the Project Based Learning Model on Creative Thinking

Author	Year	Research result
Permana et al.	2023	Learning by applying the Project Based Learning model can improve students' creative thinking and science learning outcomes.
Suryaningsih et al.	2023	Learning using the Project Based Learning model assisted by Talking Stick makes students' creative thinking increase.
Hidayatulloh et al.	2023	Learning by applying the Project Based Learning model is effective in increasing students' creative thinking.

Author	Year	Research result
Wanggi et al.	2023	The use of the Project Based Learning model which is integrated with ethnoscience concepts has an impact on increasing creative thinking in the context of science learning.
Husein et al.	2023	Learning with the Project Based Learning model can improve students' creative thinking.
Khauzanah et al.	2023	Implementation of the Project Based Learning model can improve creative thinking in science learning.
Handoko et al.	2022	Learning by applying the Trello-based Project Based Learning model has an influence on students' creative thinking.
Dayana et al.	2021	The application of the Project Based Learning model to science learning has an influence on increasing students' creative thinking.
Sulistiyowati et al.	2023	The Project Based Learning model has succeeded in improving students' creative thinking.
Fahrurrozi et al.	2022	At the basic education level, the Project Based Learning model in science lessons can be used to stimulate students' creative thinking by relating lesson material to everyday life situations.

From the literature analysis in table 1, it is concluded that the application of the Project Based Learning model can improve creative thinking. This indicates that the application of the Project Based Learning model in the context of science learning can improve creative thinking. Projects in Project Based Learning challenge students with complex tasks and require innovative solutions. This triggers students to think creatively, find new ideas, and present solutions that they may not have thought of before. Students will learn to find unique and creative solutions to complete the projects they face.

The Project Based Learning model encourages students for teamwork and collaboration. In solving project problems, students need to collaborate with groups, share ideas, and communicate effectively. This hones creative thinking because often new and innovative ideas emerge from interactions and discussion processes. Projects in Project Based Learning give students the opportunity to explore interests, and develop new ideas. It stimulates their creativity by giving them the freedom to experiment and innovate.

The application of the Project-based Learning model in natural science learning has great potential to improve students' creative thinking. Projects in Project Based Learning are often designed to challenge students with complex, real-world problems in natural science contexts. This challenge forces students to think creatively to find innovative solutions that have never been considered before. Project Based Learning encourages students to work together in groups to complete projects. This collaboration not only enriches the problem solving process with various points of view, but also provides opportunities for students to exchange ideas and discuss creative solutions. Interaction between group members can trigger the emergence of new ideas that were not previously thought of.

The Project Based Learning model gives students the freedom to explore their interests and develop project ideas that they find interesting. Thus, students have the opportunity to bring their creativity to the design and implementation of unique and original projects. Project Based Learning often uses a problem-based learning approach, where students are faced with real challenges or problems that require solving. It encourages students to think creatively in identifying and designing effective solutions, as well as encouraging them to consider innovative and unconventional approaches.

In Project Based Learning, students are typically evaluated based on their performance in completing projects and their ability to produce creative and effective solutions. This evaluation process encourages students to reflect on the strategies and approaches they use, and stimulates them to continue developing their creative thinking abilities. Thus, the application of the Project Based Learning model in science learning can be an effective means of improving students' creative thinking, through presenting complex project challenges, collaboration between students, exploration of interests and creativity, problem-based learning approaches, as well as performance evaluation and continuous reflection.

CONCLUSION

Based on the meta analysis, it can be concluded that creative thinking in science learning can improve after implementing the Project Based Learning learning model. The Project Based Learning learning model can be used as an innovative learning activity to improve creative thinking through project-based learning activities. The Project Based Learning model can be an effective means of improving students' creative thinking abilities, helping them become creative, innovative individuals and ready to face future challenges.

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