

Systematic Literature Review the Influence of Project-Based Learning (PjBL) on Critical Thinking and Creative Thinking Skills of Vocational High School Students

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ABSTRACT

STEM or Science, Technology, Engineering, and Mathematics-based learning is one of the alternative learning methods that can be used to develop critical thinking skills and communication skills of students. STEM learning methods can be packaged in the form of project-based learning models such as Project- Based Learning (PjBL). Project- Based Learning (PjBL) is a learning model that is centered on students to work on projects in the form of a series of complex tasks so that it can stimulate critical thinking skills and communication skills of students. The purpose of this article is to provide an overview of the influence of Project- Based Learning (PjBL) on critical and creative thinking skills in Vocational High School (VHS) students. The methodology used in compiling this article is a literature study from relevant journals. The results of the study indicate that the Project- Based Learning (PjBL) is able to provide a positive impact on the development of critical thinking and creative thinking skills of students.

Keywords: Communication, critical thinking, project-based learning, vocational high school.

INTRODUCTION

The rapid development of technology in all fields brings life towards the digital transition era so that the demands of competence will also change. This situation requires new competence according to the demands of the digital transition era in the industrial revolution 4.0 era in the 21st century. The current developments need to be balanced with the provision of 21st century skills in the field of education. 21st century skills include critical thinking skills and creative thinking skills. Efforts that can be made to develop 21st century skills can be done through: (1) the application of student-centered learning methods/models, (2) learning topics in the form of problem solving, and (3) learning utilizing technology.

One of the potential learning methods for developing critical thinking skills and creative thinking skills is the Science, Technology, Engineering, and Mathematics (STEM). This learning method will use science, technology, engineering, and mathematics in the ongoing learning process so that students have technological literacy that is in accordance with the needs of the 21st century. STEM implementation can be done through project-based learning models such as Project- Based Learning (PjBL) so that it can provide real experiences for students for their future lives. This is evidenced by research conducted by (Muslim, 2017) where the PjBL learning model can improve problem-solving skills and learning independence of Vocational High School (VHS) students, research from (Manurung, Sormin, Novita, and Hutauruk, 2022) shows that the PjBL learning model can improve students' 21st Century skills, and (Fiana, Relmasira, and Hardini, 2019) state that the PjBL learning model can improve student learning outcomes.

This article has the aim of conducting a systematic Literature Reviews (SLR) regarding the Project- Based Learning (PjBL) on improving critical thinking skills and creative thinking skills of Vocational High School (VHS) students. By providing a systematic literature review, it is expected to provide an overview of the influence of the Project- Based Learning (PjBL) on the development of critical thinking and creative thinking skills of students

METHODOLOGY

This research uses the Systematic method Literature Reviews (SLR). The SLR research method is a systematic and objective research method for collecting, evaluating, and synthesizing relevant evidence through various published literature sources (Suciati, Mailili, and Hajerina, 2022). The literature sources selected according to the research keywords are then reviewed and identify the journal in a structured manner according to the procedures in Systematic Literature Reviews (SLR) (Triandini, Jayanatha, Indrawan, Putra, and Iswara, 2019). According to (Choifah, Suyitno, and Pujiastuti, 2022) there are three stages of Systematic Literature Reviews (SLR), namely:

Planning

Planning is the first step in compiling using the Systematic method. Literature Review (SLR) where this step is a step to determine the topic to be written, in this research the topic is the Project- Based learning model. Learning (PjBL) in Vocational High School (VHS) students. Article obtained through Google scholar, researchgate, sciencedirect, and JPTK UNY with the criteria of the last four years from the period 2019 to the period 2023. The keywords used in the study include Project- Based Learning (PjBL) in Vocational High Schools (VHS).

Conducting

Conducting is a step in implementing the method Systematic Literature Reviews (SLR), where at this stage it starts looking for articles that are relevant to the keywords. The search results obtained 15 articles both domestically and abroad that meet the keyword criteria and act as the research population. Then selected and obtained as many as 10 articles that meet the criteria. The criteria used include inclusion and exclusion criteria, where the inclusion criteria are articles that come from clear publications and have a publication period within the last four years. The exclusion characteristics include less relevant titles, incomplete manuscripts, irrelevant abstracts, and unclear research conclusions. The next stage is to synthesize data to analyze and evaluate research results from various articles. In this study, the data is presented descriptively.

Reporting

The last step is reporting, namely the steps to present the results of analysis and evaluation of the review articles in written form according to the format determined by the researcher.

RESULTS AND DISCUSSION

Results

The research results are presented in descriptive form from the results of the analysis of articles on the Project- Based Learning (PjBL) in Vocational High School (VHS) students seen from the aspect of developing critical thinking and creative thinking so that conclusions can be drawn about the effectiveness of the learning model in improving critical thinking and creative thinking skills. From the results of the analysis, 11 articles were obtained that focused on developing critical thinking skills and creative thinking skills. The results can be described as follows:

Project- Based Learning (PjBL) to improve critical thinking skills

From the analysis results, 9 articles were obtained that discussed Project- Based Learning (PjBL) to improve critical thinking skills of Vocational High School (VHS) students. The list of articles that meet the criteria is as follows:

Table 1. Results of PjBL Analysis on Critical Thinking Skills

Developed Skills	Publication Year	Number of Articles
Critical thinking in productive subjects	2023	
	2022	3
	2021	1
	2020	2
Critical thinking in normative/adaptive subjects	2022	
	2021	1
	2020	2

Project- Based Learning (PjBL) to improve creative thinking skills

From the analysis results, 8 articles were obtained that discussed Project- Based Learning (PjBL) to improve the creative thinking skills of Vocational High School (VHS) students. The articles that meet the following criteria:

Table 2. Results of PjBL Analysis on Creative Thinking Ability

Developed Skills	Publication Year	Number of Articles
Creative thinking in productive subjects	2023	
	2022	1
	2021	2
	2020	2
Creative thinking in normative/adaptive subjects	2022	1
	2021	1
	2020	1

Discussion

Project- Based Learning (PjBL) to improve critical thinking skills

Based on the analysis results from table 1, the results can be categorized into two, namely PjBL in productive subjects (vocational) and normative/adaptive subjects (general subjects). Articles discussing PjBL in productive subjects number 6, while articles discussing normative/adaptive subjects number 3. Here is one example of the research:

Table 3. Example of PjBL Research on Critical Thinking Skills

Writer	Surti, et al. (2022)
Article title	Project- Based Learning with STEM Approach in Automotive Engineering: A Study of Increasing Students 21st Century Skills
Source	JOURNAL OF EDUCATION AND TEACHING, 55 (2): 299-312. https://doi.org/10.23887/jpp.v55i2.44725
Method	Quasi-experimental

Results	The results of the study showed that the PjBL -STEM model was proven to improve 21st century skills. The 21st century skills in question include the ability to think critically, think creatively, and student learning outcomes. This is evidenced by the posttest scores of the experimental class treated with the PjBL -STEM model having higher scores than the control class scores using conventional learning models.
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Review results from several articles shows that the PjBL is able to improve students' critical thinking skills, both in productive subjects and normative/adaptive subjects. These results are supported by research from (Triningsih and Mawardi, 2020; Kristiyanto, 2020; Saputro and Rayahub , 2020; Lestari, 2021; Baran., et al. 2021; Dewi, 2022; Qadafi, Jamaluddin, and Hastuti. 2022).

Project- Based Learning (PjBL) to improve creative thinking skills

Based on the analysis results from table 2, 8 articles were obtained that discussed Project- Based Learning (PjBL) to improve the creative thinking skills of Vocational High School (VHS) students, the articles can also be categorized into two, namely productive subjects (vocational) and normative/adaptive subjects (general). In productive subjects there are 5 articles, and in normative/adaptive subjects there are 3 articles. Here is one example of the research:

Table 4. PjBL Research on Creative Thinking Skills

Writer	Baran., et al. (2021)
Article title	The Influence of Project- Based STEM (PjBL-STEM) Applications on the Development of 21st-Century Skills
Source	Journal of Turkish Science Education, 18(4): 798-815. DOI no: 10.36681/tused.2021.104
Method	Pretest-posttest pre-experimental design without control group
Results	The results of the study showed that the PjBL model was proven to improve 21st century skills. The 21st century skills in question include communication skills, collaboration, problem solving, creativity, critical thinking, responsibility, environmental awareness, and information technology literacy. This is evidenced by the pretest and final test scores. posttest showed significant differences in scores.

These results are supported by several research results on the same topic, where the PjBL improves students' creative thinking skills. These studies include: (Surti, et al. 2022; Qadafi, Jamaluddin, and Hastuti. 2022; Widana and Septiari, 2021; Lestari, 2021; Octaviyani, Kusumah, and Hasanah, 2020; Hikmah and Agustin, 2020).

CONCLUSION

Based on Systematic Literature Reviews (SLR), it can be concluded that the Project- Based Learning (PjBL) is able to provide a positive impact on the development of critical thinking and creative thinking skills in Vocational High School (VHS) level students.

Suggestion

Suggestions for further research related to the Project- Based Learning (PjBL) including:

1. Expansion of the sample population to compare the effectiveness of the Project- Based Learning (PjBL) at different levels of education such as elementary school, middle school, or college.
2. Compare with other learning models to find out how effective the Project- Based Learning (PjBL) to develop 21st Century skills.
3. Analysis of factors influencing the implementation of the Project- Based Learning (PjBL) in the learning environment.

With the above considerations, it is hoped that subsequent research can provide a more in-depth contribution to the implementation of the Project- Based Learning (PjBL).

IMPLICATIONS

The author uses previous research as a reference, which uses the same topic and theory but is different in subject. This research is more focused on implementing Project-Based Learning (PjBL) in Vocational High Schools. The study's results indicate that the Project-Based Learning (PjBL) is effective in improving the competence of students in vocational high schools.

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