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Systematic review of literature: Advantages and challenges in implementing the Project-Based Learning (PjBL)

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ABSTRACT

This research aims to explore the advantages and challenges of the Project Based Learning (PJBL) learning model in developing higher-order thinking skills among students. This research uses the Systematic Literature Review (SLR) method. This research analyzes search results originating from the Scopus, Erics, and Google Scholar databases, spanning the last 10 years. The limitation of this research is that the articles used consist of a period of 10 years. It is hoped that in future research the data can be further improved. Based on the article data that was searched, 10 articles were taken which were used as study material. The results of the analysis of the review of this article can draw conclusions and findings that the learning model (PjBL) has the following advantages: 1) can increase student motivation and involvement in the learning process, 2) develop real skills, 3) increase learning outcomes and collaboration and communication skills, critical thinking, and creative thinking; 4) active and student-centered learning. Meanwhile, the weaknesses of the Project Learning Model (PJBL) are: 1) implementing PjBL the teacher must prepare a project that will be used in learning so it requires a lot of time; 2) This PjBL requires complete facilities to be implemented well so several schools have limited resources; 3) in implementing PjBL, it is difficult to involve all students in group work because not all students are active; 4) the costs of implementing PjBL require a lot of money so the use of this PjBL learning model needs to be considered.

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INTRODUCTION

The curriculum is very closely related to educational development. The curriculum also functions to develop the goals of the learning process to be achieved. Based on Law No. 20 of 2003 concerning the National Education System, a competency-based curriculum is an instrument that guides students to: a) make students become human beings who can respond to the challenges of

the times with technological advances; 2) form students who are devoted to God Almighty; 3) form students who have a sense of responsibility(Padilah et al., 2022).

The development of science and technology from time to time is increasingly rapid. This phenomenon results in interest in other areas of life. One of them is in the field of education, to produce quality human resources, it is necessary to improve the quality of education which cannot be separated from the role of schools in implementing learning(Riska, Imran, & Makmur, 2022). The development of technology nowadays means that the curriculum in educational units is required to be dynamic from time to time. The existence of the curriculum is used as a tool or as a basis for carrying out the teaching process. Over time the curriculum has undergone development from the 2013 curriculum to an independent curriculum. Currently, educational staff, including teachers or educators, can direct and assess students using the curriculum used at the education unit level. The independent curriculum currently used directs the development of students to be able to understand essential material and character development, as well as being able to master technological developments (Hawati, Anisa, & Rustini, 2023).

In the current educational era, the learning model that supports curriculum objectives that focus on students is the project-based learning model or Project-Based Learning (PjBL) which emphasizes learning through projects or assignments. Project Based Learning (PjBL) is a learning approach that actively involves students in solving real problems by utilizing certain projects or assignments. In implementing PjBL, students work independently or in groups to complete a project within a certain time limit, which is then presented to others. This learning model aims to enable students to produce products or projects as part of the learning process. There are six stages in the PjBL learning model, starting from planning to evaluating learning outcomes. PjBL can also be implemented in various subjects, such as chemistry, arts and culture, and science. Examples of research show that PjBL can improve students' critical thinking skills in certain subjects(M. R. Dewi, 2023).

The project-based learning model is a learning model that provides teachers with the opportunity to manage classroom learning by involving project work (Hasan, 2022).PjBL is project-based learning that provides students with new information and understanding based on their observations of various information. This is one of the learning models that is widely used in the 21st century, because with this model learning takes place interactively.(Kamal & Khusna, 2023). It can be concluded that the STEM-based PjBL model influences critical thinking skills and science learning outcomes. This model can be used to create varied learning(N. N. S. K. Dewi, Arnyana, & Margunayasa, 2023).The use of a PJBL-based STEM approach influences learning outcomes in students' science learning(Israwaty & Syam, 2021).Implementing a good PjBL learning model will increase student creativity in working on planned projects (Hartono & Asiyah, 2018). The use of the PJBL model in science learning makes it easier for students to actively participate in task-based projects that are adapted to students' real-life practices. The use of the PJBL model in science learning makes it easier for students to actively participate in task-based projects that are adapted to students' real-life practices(Siregar, Siregar, Suma, Rambe, & Dalimunthe, 2023).

This research makes a significant contribution to science by presenting comprehensive systematic literature observations regarding the advantages and disadvantages of project-based learning models. By summarizing the findings and patterns emerging from various sources, this research not only provides in-depth insight into the framework, and concept of project-based learning but also identifies knowledge areas that require further research. Additionally, by highlighting limitations and shortcomings in the existing literature, this research stimulates critical reflection and creative thinking in the development of more effective project-based learning practices. Thus, the contribution of this research lies not only in expanding our understanding of this topic but also in opening the door to further research and innovation in instructional design. These findings can be the basis for the development of new methods, innovative approaches, or better educational policies in the future. By providing in-depth understanding and critical analysis,

this research has the potential to lead to improvements and improvements in project-based learning practices, making a significant contribution to the advancement of educational science.

RESEARCH METHODOLOGY

The research method in this research is Systematic Literature Review (SLR), a research method for identifying, evaluating, and interpreting all relevant research results related to certain research questions, topics, or phenomena of concern in conducting research. Literature study or literature study is a method of collecting data in research that uses library materials as a data source. Library study involves reading, recording, and processing research materials from libraries, such as books, journals, encyclopedias, magazines, and non-print works such as audio, video, and film recordings as data sources. A literature study is carried out to obtain information that is relevant to the topic or problem that is the object of research or the topic of the story that is presented in a non-scientific written work, to deepen understanding of the chosen topic and expand knowledge(Yanti & Novaliyosi, 2023).

The steps in library research include topic selection, information exploration, determining research focus, collecting data sources, preparing data presentation, and preparing reports. This research uses three systematic literature review (SLR) steps(Hormadia & Putra, 2021), namely:

a) Preparation phase:

At this preparation stage, the following are: a) Formulating Research Questions: namely regarding the strengths and weaknesses of PjBL. b) Identification of Inclusion and Exclusion Criteria: the type of literature used is the project-based learning model or PjBL for the last ten years. c) A literature search was carried out using the keywords project-based learning and the specified search terms advantages and disadvantages of project-based learning.

b) Implementation

Implementation stages in SLR research: a) Literature selection and data extraction Apply inclusion criteria, search for articles related to project-based learning at all levels of education including elementary, middle, and high school, and exclude search results to filter relevant literature. The 40 articles that had been obtained were then filtered again into 20 articles and determined to be 10 articles that were relevant to the desired keywords; b) Evaluation of Literature Quality: Assess the quality of research methodology from the selected literature of 10 articles and then identify the weaknesses and strengths of each article.

c) Final Stage:

At this final stage what is done is: a) Synthesis and Analysis: Synthesize findings from selected literature, and find patterns, similarities, differences, and trends that emerge in the advantages and disadvantages of implementing project-based learning models. b) Report Writing: Compile a systematic report that includes an introduction, methodology, findings, and conclusions. Detail the research process and present findings in a systematic and easy-to-understand manner. c) Preparation of Recommendations: Based on research findings, formulate recommendations or suggestions for developing project-based learning models in the future.

RESULTS AND DISCUSSIONS

The results of the research data included in this literature review are a tabulation of article data documented regarding creative thinking skills in 10 articles. It is described in detail in.

Table 1. Research related to Project-Based Learning (PjBL)

Research and year	Journal	Research result
(Hera Erisa, Agnes Herlina Dwi Hadiyanti, & Albertus Saptoro, 2021)	JPD: Jurnal Pendidikan Dasar	Based on the results of this research, show that the project-based learning model can improve students' creative thinking abilities and science learning outcomes in science learning content in class VI A of

Research and year	Journal	Research result
		SDN Bakalan.
(Maghfiroh, Qomariyah, & Syafiq, 2023)	Rabbani: Jurnal Pendidikan Agama Islam	Implementation of the learning process can create students who are independent, active, and creative and make class conditions more enjoyable.
(Tindige, Rende, & Komansilan, 2021)	Jurnal Pendidikan Matematika dan Sains	The results of the research in this article are 1) The application of the PjBL learning model to the main material of business and energy can improve the physics learning outcomes and science process skills of class X students at SMA N 1 Banguntapan.
(Haryani, Wardani, & Prasetya, 2018)	Jurnal Inovasi Pendidikan Kimia	This descriptive research involved 12 high school/MA chemistry teachers, both public and private, as respondents representing 146 MGMP chemistry teachers in the city of Semarang. In general, teachers still have difficulty combining material content in depth with the PBL and PjBL models, so they need more careful assistance because each material has different characteristics. The main difficulty in PjBL-based worksheets lies in writing basic questions, followed by steps to enter the material in a constructivist manner before project implementation
(Ramadhana, Norra, & Rasyida, 2022)	Jurnal Pendidikan Volume	Study of the effectiveness of online learning tools in the form of RPP, LKPD, and assessment instruments developed using the STEAM integrated PjBL model on environmental teaching materials in increasing environmental literacy.
(Rineksiane, 2022)	Jurnal Pendidikan Manajemen Perkantoran	The results of this research have two impacts, namely a) the positive impact that arises is making students process better and enabling students to learn to always think critically when facing a problem. Meanwhile, b) the negative impact that arises, in general, is that the application of this method requires large costs for props and a long time for preparing the concept until its realization.
(Wahyudi, Rokhmaniyah, & Suryandari, 2021)	Dwija Cendekia Jurnal Riset Pedagogik	The results of this research are (1) Steps for implementing PjBL in learning including (a) presenting problems, (b) project planning, (c) preparing project activity schedules, (d) monitoring project implementation, (e) presenting project results, (f) evaluation of project results; (2) The implementation of PjBL can improve Geometry learning and (3) The obstacles to implementing PjBL are (1) learning resources are still lacking, (2) student learning independence is not optimal. Alternative solutions are (1) providing adequate learning resources, and (2) monitoring learning activities periodically. The research conclusion is that PjBL can improve online geometry learning for students. The implication of this research is to increase student motivation and activity and create more varied learning.

Research and year	Journal	Research result
(Cipwati & Trisiana, 2023)	Pedadaktika Jurnal Ilmiah Pendidikan Guru Sekolah Dasar	The results of this research are: 1) The implementation of learning using the PJBL model using water cycle media in the science subject material on the water cycle for class V went well and smoothly. 2) The role of the class teacher in implementing learning using the PJBL model using the water cycle media in the classroom is to carry out the entire series of learning activities and as a facilitator, leading, providing learning materials, providing learning media, supervising and giving direction or guiding to students. 3) The response of students when implementing learning using the PJBL model using the water cycle as a medium in class V is very good.
(Martina Lona, 2019)	Jurnal Teori dan Praksis Pembelajaran IPS 2019	The results of this research show that learning outcomes have increased significantly, marked by the average in Cycle I reaching 65, which comes from a learning outcome test of 64 and a project assignment of 66 in the sufficient category. Cycle II increased to 76 which came from a learning outcome test of 74 and project assignments of 78 in the good category.
(Fahlevi, 2022)	Jurnal Sustainable	This research concludes that the majority of PjB2L implementation was declared successful and had a positive impact on improving learning outcomes. The factors that need to be considered include: (1) modification of the PjBL and blended learning phases into PjB2L, the phases described in this paper contain two types, namely eleven and six phases, (2) the characteristics of the students who will be involved in implementation of PjB2L, which can involve elementary, middle school, high school, college students, and teachers, then the final factor, (3) selecting the platform that will be used in blended learning, so that PjB2L is successfully implemented and has a positive impact on learning

The Project-Based Learning Model (PjBL) is a learning approach that emphasizes learning through practical experience and collaborative projects. In PjBL, students not only acquire theoretical knowledge, but are also actively involved in planning, designing, and executing real projects. These projects are usually designed to reflect real-world situations or relevant problems, so students can relate their learning to the context of everyday life. PjBL encourages collaboration between students, often involving the division of tasks within teams. This not only develops social skills and the ability to collaborate but also prepares students for real-world challenges where the ability to collaborate is highly valued. Through the application of PjBL, learning objectives are not only limited to understanding concepts, but also include the development of 21st-century skills such as problem-solving, creativity, critical thinking, and communication skills. In this way, PjBL aims to create a deeper and more relevant learning experience for students, preparing them to face real-world challenges with holistic skills (Ayundyah, Noor, & Handini, 2022).

Although the Project-Based Learning Model (PjBL) offers an experiential and relevant learning approach, several weaknesses need to be considered. One of the main obstacles is the time required to plan, implement, and evaluate projects, which can be challenging in educational environments that have resource constraints and tight schedules. Additionally, monitoring individual student progress in the context of collaborative projects can be difficult, requiring extra effort to ensure active participation and understanding of the material. The high degree of freedom provided by PjBL can also be uncomfortable for some students who need a clearer learning structure. In large classes, implementing PjBL may face obstacles because it requires greater resources and individual attention. Meanwhile, there are likely to be varying degrees of student

involvement, with some students perhaps not being fully engaged, leaving the responsibility to the more proactive students. Therefore, the implementation of PjBL needs to be considered carefully, taking into account the needs and dynamics of the class to achieve optimal learning outcomes.

CONCLUSION

Based on the results and discussion presented above, it can be concluded that Implementing the Project-Based Learning Model (PjBL) has several advantages and disadvantages. PjBL's main advantage lies in the practical experience it provides students, allowing them to apply knowledge in real contexts through collaborative projects. Collaboration between students is also emphasized, enriching social skills and the ability to work in teams. Additionally, PjBL fosters the development of 21st-century skills, such as problem-solving and creativity, while increasing student motivation through engaging projects.

However, there are also several shortcomings in implementing PjBL. This process requires more time than conventional learning methods due to complex project preparation, implementation, and evaluation. Monitoring and evaluating student progress can be challenging, and the high degree of freedom in PjBL may not suit the preferences of some students who require a more rigid structure. Additionally, in large classes, PjBL may be difficult to implement effectively because it requires greater resources and individual attention. However, long-term benefits such as ongoing skills development must be considered in choosing whether to implement PjBL according to the needs and characteristics of the class and learning objectives.

Project-based learning, identifying its advantages and disadvantages. Although it provides valuable insights, library research has certain limitations. Information may not always be up to date, resulting in the potential to miss the latest trends or innovations in project-based learning approaches. Additionally, the literature may be general and may not necessarily reflect local contexts or changes in practice at the level of specific educational institutions. Limitations in providing a direct perspective of practical experience can also reduce the depth of understanding of actual implementation. Nonetheless, a literature study remains a valuable stepping stone for detailing theoretical foundations before engaging in further research or designing a more contextual and effective project-based learning approach.

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