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SYSTEMATIC REVIEW OF PROBLEM-BASED LEARNING (PBL) TO IMPROVE CREATIVE THINKING ABILITIES IN SCIENCE MATERIALS

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Abstract

One of the important skills in the 21st century is creative thinking skills. The use of certain learning models can encourage creative thinking skills. The results of the study showed that the Problem Based Learning (PBL) learning model was able to encourage students' creative thinking skills. The purpose of this study was to review articles from indexed journals that explore how well the PBL model develops creative thinking skills in materials science. This paper discusses the purpose of describing research findings that have been published in reputable daily articles in the last 5 years (2019-2024), while still considering the importance of creative thinking skills. The data in this study focuses on data related to problem-based learning models and creative thinking skills from various science materials. This study uses the Systematic Literature Review (SLR) method with PRISMA guidelines. A total of 125 journals were found by Google Scholar, Scopus, and Web of Science, but after analysis based on abstracts, keywords and discussions, 11 articles were finally selected. Based on the results of the journal review, it can be seen that the PBL model can foster creative thinking skills in science materials.

Keywords: Creative Thinking Skills; Problem Based Learning (PBL); Science Material

1. Introduction

Learning in the 21st century students are expected to be able to face various demands and global challenges. The Framework Partnership of 21st Century Skills, states that the demands in the 21st century as "The 4C Skills," namely Critical Thinking, Communication, Collaboration and Creativity (Trilling and Fadel, 2009). Creativity is one of the skills that students must have in facing the demands of the 21st century based on the Partnership Framework of 21st Century Skills. The Learning Model is a form of learning that is depicted from beginning to end (starting from the application of an approach, method, strategy and learning technique) presented by the teacher (Helmiati, 2012).

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Creative thinking is one of the most important 21st century skills. Creative thinking is defined as the ability to use the mind with the aim of producing something new. There are four aspects of creative thinking ability, namely fluency of thought, flexibility of thinking, original thinking, and elaboration of thinking (Torrance E.Paul, 1969). The reality in the field shows that students' creative thinking skills are still low, as found in the research results in the flexibility indicator. Subjects in the low category are not yet able to understand the problem well, are unable to solve the problem fluently and are still confused about the steps used. (Hidayah et al., 2021).

Teachers in the learning process are expected to train students in developing creative thinking skills. Creative thinking skills can be developed through student-centered learning. The learning model that is suitable for improving creative thinking skills in students is Problem Based Learning (PBL). The PBL learning model teaches students that information does not only come from teachers but can come from anywhere and at any time. Students must find out and conduct investigations through various sources. (Desriyanti and Lazulya, 2016).

The term science comes from the Latin scientia which means knowledge. However, this statement is too broad in everyday use. In a narrow sense, science is a discipline consisting of physical sciences and life sciences (Billah, 2016). The objects of scientific study are objects that can be seen and studied by science, namely nature, plants, animals, humans and events in the natural environment (Saifullah, 2017).

This article examines more deeply the Problem Based Learning (PBL) learning model to improve creative thinking skills in science materials. Therefore, the purpose of this literature review is to examine articles from indexed journals that explore how well the PBL model develops creative thinking skills in science materials.

2. Methods

The method used in this study is Systematic Literature Review (SLR). The guideline in this study is PRISMA. PRISMA provides methodological standards for selecting literature that can be used (Rethlefsen, 2021). The use of SLR to identify, analyze, and interpret all available data. The SLR stage begins with determining the formulation of the research problem. The formulation of this research problem is: How is the use of the Problem Based Learning (PBL) learning model in developing creative thinking skills?

Literature search was conducted by determining the criteria related to the PBL learning model, creative thinking skills and science materials. The initial literature obtained was selected based on the predetermined criteria, criteria, namely: 1) Articles in Indonesian and English that have a good reputation; 2) Articles are collected from electronic databases (Google Scholar, Scopus, and Web of Science) using the following keywords: Keywords: Problem Based Learning (PBL), Creative Thinking Skills; 3) The search is limited to articles published from 2019-2024; 4) Articles are further limited by keywords, namely science materials, and articles contain clear identities such as title, author and year.

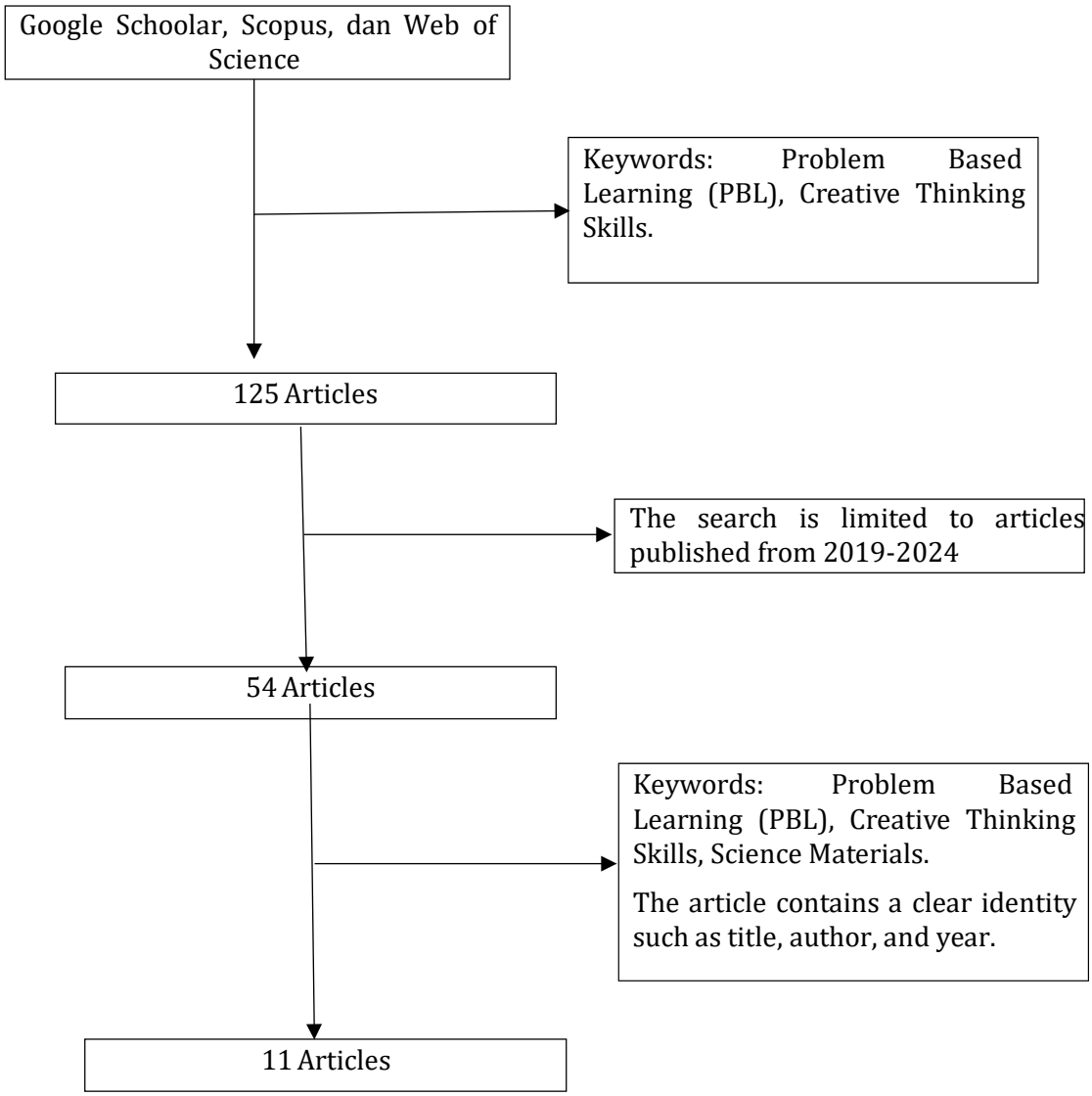

Figure 1 Flow Chart of Literature Search

The selection of articles that meet the criteria is done by filtering the title, abstract and keywords. The results of the literature review based on the requirements amounted to 125 articles from Google Scholar, Scopus, and Web of Science. However, after being analyzed based on the discussion, finally 11 articles were selected that could be used as study materials for research purposes (see Figure 1). This article discusses the use of the PBL learning model in developing creative thinking skills in science material.

3. Results and Discussion

3.1 Literature Review Results

`This study discusses the use of the PBL learning model in developing creative thinking skills in science materials.

A list of the study articles used for the study can be seen in the table below (Table 1).

Table 1 Article Review

No	Author	Title	Year	Review
1.	Dwi Maharani and Dea Mustika	The Influence of the Problem Based Learning Model on Students' Creative Thinking Skills in Science Learning for Class V SDIP YLPI Pekanbaru	2024	There is an influence of the PBL model on students' creative thinking skills. The highest level of the indicator of students' creative thinking skills is the indicator of elaboration thinking skills of 88.5%.
2.	Ari Ardiansyah, Taupik Sopyan, and Lia Yulisma	The Influence of Problem Based Learning Model on Creative Thinking Ability of Students of Al-Falah Tasikmalaya Plus High School	2024	The PBL model has a significant effect on students' creative thinking skills in biology subjects. Proven by the N-Gain value and in accordance with the results of the hypothesis test with the Z test at a significance level of 5% that Zcount > Ztable.
3.	Hikmawati Usaman, Nurul Azmi and Yenni	Implementation of Problem Based Learning (PBL) Model to Improve Students' Creative Thinking Skills on the Theme of Growth and Development of Living Things in Grade III of Elementary School 147 Pelali, Curio District, Enrekang Regency.	2024	Cycle I is in the less category. Cycle II is in the sufficient category. While cycle III is in the good category. In conclusion, the PBL model has an effect on creative thinking skills.
4.	Nafisatin Awwalin Saidah, Guntur Trimulyono, and Ziyadatul Hikmah	Improving Students' Creative Thinking Skills with the PBL Model for Class VII	2024	The final result showed an increase of 80%, so that the application of the PBL learning model was proven to improve creative thinking skills in ecology and biodiversity material.

No	Author	Title	Year	Review
5.	Nafizatunni'am, AA Sukarso, Tri Ayu Lestari, and Jamaluddin	The Influence of Problem Based Learning Model on Creative Thinking Skills and Students' Biology Learning Outcomes.	2024	The results of the research on creative thinking skills obtained a Sig. (α) value = 0.000 < 0.05. The conclusion is that the PBL model has a significant effect on creative thinking skills and students' biology learning outcomes.
6.	Dewi Fitriana, Nurul Septiana, and Nur Inayah Syar	Students' Creative Thinking Ability on Static Fluid Material Using Problem Based Learning (PBL) Model	2023	There was an increase in the pretest posttest score from an average score of 61 to 69. These results indicate that the application of the PBL model to students' creative thinking abilities.
7.	Murni Sabilu, Lili Darlian, and Wa Ode SuriantiNur	The Influence of the PBL (Problem Based Learning) Model on Creative Thinking Skills of Students of SMAN 1 Wangi-Wangi	2022	The PBL learning model has an effect on students' creative thinking skills in the digestive system material. This is proven by the average N-gain value of the experimental class of 0.68, which is higher than the control class of 0.58.
8.	Endang Sulastri, Supeno, and Lilik Sulistyowati	Implementation of Problem-Based Learning Model to Improve Elementary School Students' Creative Thinking Skills in Science Learning	2022	The increase in creative thinking skills occurred in 2 schools with high criteria in all aspects. Another school's results were in the medium criteria in the originality aspect and high criteria in the fluency, flexibility, and elaboration aspects.
9.	Izaak Hendrik Wenno, Jamaludin, and John Rafafy Batlolona	The Influence of Problem-Based Learning Models on Creative and Critical Thinking Skills in Static Fluid Material	2021	The average value of the experimental class regarding students' creative and critical thinking skills was higher than that of the conventional class.
10.	Hartati, Fahruddin, and Nikman Azmin	Implementation of Problem-Based Learning in Science Subjects on Creative Thinking Skills and Student Learning Outcomes	2021	In cycle I, there were 17 students in the creative category, and in cycle II, there were 18 students in the very creative category.
11.	Lailatur Rohmah	Improving Students' Creative Thinking Skills through the Application of Problem Based Learning Models in Science Lessons for Grade VII.	2020	The average percentage of creative thinking ability increased in cycle I by 74.4%, cycle II by 77.7%, and cycle III by 81.5%.

3.2 Discussion

Table 1 shows that 11 reviewed articles stated that the use of the PBL learning model can develop creative thinking skills in science materials. This research is in line with research from Surahman and Fitri (2016) which states that the PBL learning model can stimulate students to be more active and able to think creatively in responding to learning and focus on problem solving and because the problems observed are real problems, this makes the learning process more meaningful for students. So that the PBL learning model has an effect on students' creative thinking skills in environmental pollution material for class X.

The advantages of the PBL learning model according to (Zainiyati, 2010) are: 1) Providing challenges to students in their abilities and satisfaction in discovering new knowledge, 2) PBL is a great way for students to understand the learning content, 3) Helping students transfer knowledge that aims to understand problems in their lives, 4) Helping students develop new knowledge and being responsible for the learning that has been done, 5) Providing students with knowledge that learning resources do not only come from teachers and books, 6) Helping students develop new knowledge and being responsible for the learning that has been done, 5) Providing students with knowledge that learning resources do not only come from teachers and books.

The role of teachers is very important in empowering student creativity, with creative thinking students can have high learning motivation and will facilitate teachers in the learning process. Creativity facilitates teachers in guiding students and the achievement of student learning outcomes will be maximized because students have the motivation within themselves to achieve maximum results (Saputra et al., 2021). There are several factors that inhibit creativity, namely: 1) Not daring to take risks, not having ideals or goals in life, 2) Incompatibility with friends and also having pressure in life, 3) Having low courage in exploration, imagination and research, 4) Having negative prejudices towards sex and the opposite sex, 5) Differentiating between work and play, 6) Not being involved in the social environment, 7) Not appreciating and understanding imagination and fantasy (Budiarso et al., 2023).

4. Conclusions

This literature review-based research aims to determine the effect of implementing the PBL (Problem Based Learning) learning model on students' creative thinking skills, which is carried out by reviewing 11 research articles. The results obtained indicate that there is a positive influence on increasing students' creative thinking skills in science material using the PBL learning model. This increase occurs due to several factors, namely PBL is able to increase students' activeness and creative thinking skills in solving problems or finding solutions to real problems that exist around them. Based on the findings in this study, it is suggested that other researchers who are interested in conducting research related to the PBL learning model can pay attention to the shortcomings and obstacles in this study as a reference for improving and developing further research.

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