Journal of Pedagogy and Online Learning
Volume 3 Number 2 Tahun 2024, pp 11-27
ISSN Online: 2830-3814
DOI: https://doi.org/10.24036/jpol.v3i2.58
Terbit online pada laman web jurnal: https://jpol.ppj.unp.ac.id/index.php/jpol

Effectiveness of Project Based Learning (PjBL) in Improving Student Creativity: Literature Review

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Abstract: *Creativity and the ability to think creatively are important 21st century skills. This research aims to evaluate the effectiveness of Project Based Learning (PjBL) in increasing student creativity. The research method used is literature study to collect information about the PjBL concept and student creativity. The research sample consists of middle class students from various school backgrounds. It is hoped that the results of this research can provide a better understanding of the effectiveness of PjBL in increasing student creativity, as well as providing input for educational practitioners to improve innovative and effective learning approaches. Student creativity shows thinking skills during the process of product planning, producing, demonstrating and evaluating*

Keywords: *Keywords: Creative thingking skill, Creativity, project-based learning.*

Abstrak: Kreativitas dan kemampuan berpikir kreatif merupakan keterampilan abad ke-21 yang penting. Penelitian ini bertujuan untuk mengevaluasi efektivitas Pembelajaran Berbasis Proyek (PjBL) dalam meningkatkan kreativitas siswa. Metode penelitian yang digunakan adalah studi literatur untuk mengumpulkan informasi tentang konsep PjBL dan kreativitas siswa. Sampel penelitian terdiri dari siswa kelas menengah dari berbagai latar belakang sekolah.Diharapkan hasil penelitian ini dapat memberikan pemahaman yang lebih baik tentang efektivitas PjBL dalam meningkatkan kreativitas siswa, serta memberikan masukan bagi praktisi pendidikan untuk meningkatkan pendekatan pembelajaran yang inovatif dan efektif, Kreativitas siswa menunjukkan pemikiran keterampilan selama proses perencanaan produk, memproduksi, mendemonstrasikan dan mengevaluasi produk.
Kata kunci: *3-5 kata atau frase yang penting, spesifik, atau representatif bagi artikel ini*

INTRODUCTION

Judul Kedua

Judul Ketiga

The development of Science and Technology (IPTEK) is currently growing rapidly. This is characterized by the large use of laptops or computers connected to the internet network, or multimedia classrooms equipped with electric whiteboards, tablet computers, iPADs, PDAs, smartphones and other sophisticated devices equipped with high-speed internet networks. Various things can be done easily using these facilities, including in the world of education. In the 21st century, students are required to be able to master various skills, therefore education must be able to prepare students to become individuals who are in accordance with the principles of Pancasila (Zubaidah, 2016). Characteristics of 21st century students required to have learning and innovation skills, digital literacy skills and life and career skills. Apart from these skills, students in the 21st century are also required to have 4C competencies, namely Critical Thinking, Communication, Collaborative, Creativity).

Creativity is one of the assets that students must have to achieve academic success.Creativity is the ability to produce new ideas that can be implemented The ability to solve problems or find new relationships between existing things Before. Student creativity does not mean having to create something completely new;But you can also apply it by combining existing ideas Become something different than before. A person's creativity can start from Creative actions or activities (Kartiningrum, 2015). It is important to understand that student creativity does not always have to produce something completely new, but can also be applied by combining existing ideas into something different. The role of creative actions or activities in developing one's creativity is also emphasized. This reflects the view that creativity can be learned and developed through practice and experimentation.

Creative thinking encompasses the mental processes involved in generating novel ideas and solutions to problems, thereby enhancing self confidence, academic performance, and career advancement. This multifaceted attribute is assessed through various dimensions, including flexibility, originality, fluency, elaboration, sensitivity, and imagination. Cultivating creative thinking skills involves fostering the capacity to produce new, diverse, and unique concepts while encouraging individuality. Education plays a pivotal role in nurturing creativity by fostering environments that prioritize innovation over conformity.Teachers serve as

facilitators, empowering students to explore their creativity and contribute original ideas. Creativity manifests in the form of innovative responses to challenges, reflecting individuals' propensity for self-actualization and personal growth (Fajrina,2020). The cultivation of creative thinking skills involves the ability to generate new, diverse, and unique concepts while encouraging individuality. Education is considered to play an important role in fostering creativity by creating an environment that prioritizes innovation over conformity. Teachers are identified as facilitators who empower students to explore their creativity and contribute original ideas. Creativity is viewed as an innovative response to challenges that reflects an individual's capacity for self-actualization and personal growth.

Students completing higher education must possess the following Qualifications Framework, These qualifications include the ability to make different alternatives, the ability to use science and technology in one's own field condition. There are several criteria in designing the learning process, including (1) skills:Attitudes, knowledge and skills according to the Indonesian National decisions based on information and data analysis,The ability to choose between and the ability to adapt to the current situation. Student creativity is a must Encourage students to be more creative and improve through effective learning activities. Effective learning can be achieved primarily through learning design and model selection study. In this case, the ability to select and use a learning model is required Taking into account the characteristics of the material, the availability of learning materials and intellectual development and the student’s physical existence interaction between teachers, students, and learning resources; (2) mutual inspiration between teachers and students; (3) activities interesting and engaging learning; (4) encouraging active student participation; (5) availability opportunities for students to work and be creative; and (6) develop independence based on students' interests, talents, and physical and mental development (Sari, 2017). In today's educational landscape, students often lack innovation and creativity both in their studies and daily lives.

Project-Based Learning (PjBL) offers a solution by emphasizing contextual problem-solving rooted in students' experiences, fostering creativity and innovation.(Fitri,2024). There are several criteria that must be considered in designing the learning process, including skills, attitudes, knowledge and skills that are in accordance with Indonesian national decisions based on information and data analysis. Student creativity is considered important to encourage students to be more creative and develop through effective learning activities. Effective learning can be achieved primarily through learning design and selecting appropriate learning models, taking into account the characteristics of the material, availability of learning materials,

interactions between teachers, students and learning resources, as well as developing independence based on students' interests, talents and physical and mental development.

Project-based learning (PjBL) represents a shift towards student-centered learning approaches. Within PjBL, students are guided through problem-solving processes, thereby fostering the development of their scientific inquiry skills. As a result, students equipped with these skills engage in questioning, idea exchange, observation, prediction, experimentation, and data analysis to address scientific challenges. The initiation of project work involves selecting a topic that presents a problem amenable to experimentation or observation. Subsequently, each individual or group embarks on researching information pertinent to their chosen topic, as outlined by Kizapan and Bektas (2016). Thus, PjBL not only provides knowledge about the material being taught, but also helps students develop critical skills that are important in science and in everyday life. In addition, PjBL also promotes collaboration between students and the application of social skills required in a professional environment. Overall, this approach offers a rich and involved learning approach that can increase students' interest and understanding of science.

The integration of project-based learning with creative thinking has been actively applied in computer science education, particularly in the development and deployment of learning platforms. Through an experimental-control design, Gunawan et al. (2017) investigated the impact of virtual media-assisted models on student creativity, revealing a notably higher increase in creativity within the experimental group compared to the control group.

Similarly, Sari et al. (2017) conducted a study employing an experimental and control class design, which unveiled significant disparities in creative thinking skills—specifically in fluency, flexibility, novelty, and detail—between the two groups. These findings underscore the efficacy of such pedagogical approaches in enhancing students' creative capacities.

In recent decades, there has been a notable shift in the field of education towards prioritizing learning processes that enable students to actively construct their own knowledge. This shift has spurred continuous adjustments and innovations in learning strategies and approaches, tailored to address the immediate needs of students as well as prepare them for future challenges. At the heart of this transformation lies the constructivist philosophy, which fundamentally alters the traditional learning paradigm from one centered around the teacher to a more student-centered approach. As a result, constructivism has emerged as a highly influential educational philosophy in the 21st century(Krahenbuhl , 2016). Constructivism entails a learning process wherein students are tasked with constructing their own understanding through engaging in a series of activities. This methodology prompts students to

compare and synthesize information rather than passively receiving knowledge from the teacher, thereby placing the focus on student-centered learning. However, it's essential to recognize that the concept of constructivism can vary in interpretation among individuals, including educators. A multitude of methods, strategies, and approaches are employed to implement constructivist learning, driving innovation in the learning process. Moreover, drawing from the visual classification system, commonly referred to as Dale's Cone of Experience or the learning pyramid, students greatly benefit from absorbing knowledge through direct experiences.

This demonstrates how PjBL is a method to learning that is supported by a series of hands-on exercises. As a result, this instructional approach immediately equips students to create their own understanding through group projects. Furthermore, PjBL is highly valuable in the context of Indonesia's present curriculum, especially the 2013 curriculum. (Aristiyaningsih & Budiharti 2016). Apart from conforming to the existing educational standards, PjBL is an excellent fit for teaching mathematics. It is a useful model for studying mathematics because of its ability to improve mathematical representation skills. (Ranthanasari et al,2018). PjBL has advantages in many academic domains, but it is particularly beneficial for developing higher-order thinking skills and strengthening mathematical representation abilities.

This demonstrates the effectiveness of PjBL as a flexible strategy that has numerous beneficial effects on the learning outcomes of students (Yulianti et al,2020). PjBL develops better mathematical communication skills in addition to strengthening mathematical representation capabilities. Furthermore, it enhances academic rigor by encouraging precision in academic endeavors. Together, these features demonstrate the all-encompassing advantages of PjBL in promoting rich learning experiences in a range of academic subjects. (Pratiwi et al,2020). The integration of PjBL into STEM learning yields improvements in students' cognitive, affective, and psychomotor abilities, which are essential for comprehensive mastery of learning. The efficacy of this approach lies in its capacity to address these crucial requirements, thereby nurturing well-rounded students. Moreover, the learning process itself plays a pivotal role in shaping students' proficiency levels. For further insight into the effectiveness of implementing PjBL in STEM education, the sixth literature (Susanti & Kurniawan, 2020) offers valuable perspectives. Research has delineated a structured learning trajectory integrating the PjBL model with the STEM approach. This amalgamation has been shown to elevate student engagement and enthusiasm within the learning process. Moreover, it fosters a conducive environment for creativity, active participation in discussions, and adeptness in completing group projects. As the culmination of this trajectory, students exhibit

refined communication skills, particularly in articulating findings relevant to everyday challenges.

In the latest literature (Mukaromah & Wusqo, 2020), it is concluded that this combined approach significantly enhances students' creativity and communication proficiencies. Evidence of enhanced creativity is demonstrated through post-test results and the creation of posters following learning sessions, showcasing originality and elaborate problem-solving efforts. Given the multitude of positive outcomes and the heightened efficacy of this combined approach, the integration of the PjBL model with STEM learning emerges as a pivotal innovation crucial for contemporary educational development. According to (Baran et al.2018), PjBL demonstrates a positive impact on student learning outcomes, particularly evident in physics lessons focusing on Newton's law concepts.

The study reveals a significant increase in average test scores among participants in both the experimental and control groups ($p < 0.05$), ndicating the influence of the PjBL learning model on student learning. Moreover, given the contemporary emphasis on developing 21st-century skills in education,PjBL is recognized as a potent tool for cultivating these essential competencies. Surya et al. (2018) stated that the lack of a platform for students to express and explain in a way that suits individual creativity is the cause of low levels of creativity and student learning outcomes. Therefore, educators must design interesting and inventive learning activities that inspire children to voice their opinions. Project-based learning or PjBL is a learning paradigm that can increase students' enthusiasm for learning and their scientific processing abilities.

According to Roziqin et al (2018), the PjBL approach assigns instructors to act as facilitators and encourages students to play an active role in their education. In their role as educators, teachers play a more active role than they often do in the preliminary planning that comes before learning, including the use of media, gadgets, and other resources to ensure that instruction is efficient and focused (Apriliani & Panggayuh, 2018). Project Based Learning (PjBL) is considered a learning paradigm that can increase students' enthusiasm for learning and their scientific processing abilities. In the PjBL approach, teachers act as facilitators who encourage students to take an active role in their education.

In pursuit of achieving learning objectives that prioritize equipping students with 21st-century competencies, a teaching-learning approach that emphasizes thecultivation of creativity is imperative. The task of enhancing students' creativity within the classroom setting poses a significant challenge for educators, especially considering the diverse learning styles among students. In response to this challenge, learning models that facilitate the development of

creativity have gained widespread adoption. One such model is PjBL. PjBL aligns well with the demands of the twenty-first century education as it not only enhances higher-order thinking skills but also specifically nurtures creativity among students. (Fajrina,2023). PjBL appears to be a promising approach for fostering creativity in students, addressing the contemporary need for 21st-century competencies. Its focus on higher-order thinking skills and creativity aligns with the demands of modern education.

Project-based learning (PjBL) is a form of learning activity in which students produce goods or services that function as a means of acquiring skills (Kemdikbud, 2022). According to Chen (2019), project-based learning has a significant positive impact on students' academic achievement, compared to conventional teaching models. In PjBL, students are guided to carry out a project that produces a product or solves a problem. as a fundamental branch of science, plays a crucial role in understanding life, particularly within the realm ofscience and technology. PjBL.is a learning paradigm that has the potential to inspire students and enhance their creativity in learning.

This study aims to investigate the influence of the PjBL learning paradigm on students' creativity in biology. Employing a posttest-only control design technique, this research adopts a quasi-experimental approach to explore the impact of PjBL on students' biological creativity (Parwati, et all.2023). The study's focus on investigating the impact of PjBL on students' creativity in biology through a quasi-experimental approach is commendable. Such research is vital for understanding the effectiveness of innovative teaching paradigms in enhancing specific skills like creativity within subject domains.

It is critical that the PjBL model evolve in order to give biology students the life skills they need. Prior to the pandemic, PjBL deployment was found to be extremely beneficial in improving student engagement and learning results. However, when remote learning became popular during the pandemic, there were several obstacles to overcome, including inadequate facilities and low technological competency among teachers and students. As a result, there is an urgent need for more learning assistance for pupils and a greater focus on improving their digital literacy (Morin & Herman, 2022). The focus of biology education is on studying nature, using a variety of resources, such as the immediate surroundings (Alimah, 2019). Beyond just comprehending biological ideas, students are required to apply their biology knowledge in practical settings and actively participate in societal contributions (Anazifa & Hadi, 2016). In biology education, practical activities are essential because they provide students with experiential learning opportunities that complement their academic understanding. (Alimah, 2019). The acknowledgment of practical activities as crucial in biology education is well-

founded. Hands-on experiences offer students a deeper understanding of theoretical concepts and help bridge the gap between theory and real-world application.

The independent curriculum encourages learning that provides space for students to learn in a calm, relaxed and enjoyable manner, without excessive pressure or stress (Rahayu et al., 2022). Through this curriculum, it is hoped that students can develop themselves according to their potential and abilities. This school program is designed with the aim of creating a generation that has a personality in accordance with the values of Pancasila, namely having faith, being devoted to God Almighty, having noble character, respecting global diversity, implementing a spirit of mutual cooperation, being independent, able to think critically and creatively. (Syafmitha, et all 2024). The independent curriculum prioritizes the development of problem-solving skills, placing teachers in the role of facilitators for student learning. A valuable tool for analyzing problems within this curriculum is the student worksheet. A learning model aligned with the principles of the Independent Curriculum is problem-based learning. The objective of this study is to create problem-based learning worksheets that are both valid and practical for student use. (Lufri, L., Ardi, A., & Fajrina, S. (2023). The focus on problem-solving skills in the independent curriculum is commendable, as it prepares students for real-world challenges. The utilization of problem-based learning worksheets in alignment with this curriculum philosophy seems promising for fostering student engagement and critical thinking.

This study focuses on combining PjBL and STEM in learning to increase scientific literacy, especially about animal life cycles. To improve student learning outcomes, STEM is expected to help students work together, increase teacher efficiency, and support the curriculum (Margot & Kettler, 2019). With technology, students can improve their abilities in STEM fields and solve environmental problems in everyday life. This research uses a combination of PjBL and STEM.

The research objectives are: (1) evaluate how effective PjBL and STEM are in environmental literacy; and (2) evaluate how literacy components of attitudes correlate with each other. PjBL characteristics help students gain understanding based on a problem or challenge, which helps them design, make decisions, explore, and conclude projects. Additionally, the PjBL approach is suitable for use in conjunction with interdisciplinary frameworks such as STEM. The contribution of PjBL can increase higher-order thinking skills from students to achieve 21st century abilities.

Using the item-objective congruence index (IOC), a group of five experts evaluated the PjBL model's validity in the areas of scientific education, educational advice, educational measurement and evaluation, and psychology education. Four main areas were examined in the

evaluation: the alignment of metacognitive skills with PjBL steps; the alignment of metacognitive skills with learning plan activities; the alignment of strategies to support students' metacognitive skill development with learning plan activities; and the alignment of strategies to support students' metacognitive skill development with instructor roles and tasks. The IOC was utilized to validate the PjBL model in two stages: (a) to ensure the content validity of the model and (b) to ascertain the overall quality and effectiveness of the model. (Grossman,et al.2019). The utilization of the item-objective congruence index (IOC) by a group of experts to evaluate the validity of the PjBL model across various educational domains is methodologically robust. The examination of alignment between metacognitive skills, learning plan activities, and instructor roles highlights a comprehensive approach to assessing the model's effectiveness. Such validation efforts are crucial for ensuring the reliability and applicability of pedagogical frameworks in diverse educational contexts.

The analysis of the literature turned up a number of contradictions: (1) To improve students' metacognitive abilities, PjBL is more frequently used in secondary school than in higher education (Guo et al., 2020). (2) Pre-service teachers (PSTs) do not currently have access to a PjBL model that is expressly intended to improve their metacognitive abilities. (3) PjBL reports place more of an emphasis on STEM education and engineering training than they do on the humanities and social sciences. (4) Metacognitive skills are essential for encouraging students to pursue lifelong learning, which helps them become better teachers who have a lasting effect on their teaching careers and a thorough understanding of the learning process. The purpose of this study is to create a PjBL model using Susan A. Ambrose's metacognitive conceptual framework in light of these findings.

This framework includes five key competencies: analyzing the job at hand, assessing one's own strengths and weaknesses, organizing a suitable strategy, putting plans into practice and keeping track of results, and reflecting on and modifying one's strategy as necessary. The development of students' metacognitive skills will be supported by tactics that complement each of these abilities. (Guo et al., 2020). The framework outlined presents a comprehensive approach to fostering students' metacognitive skills, which are vital for academic and personal growth. By integrating tactics tailored to each competency, educators can effectively support students in becoming self-regulated learners capable of analyzing, strategizing, and reflecting on their learning processes

METHOD

His research employs the library study method, also known as literature study, which involves gathering references from existing literature such as books, journals, and other written sources. As described by Ir. Melfianora, M.Sc., literature study involves conducting research solely based on written works, encompassing both published and unpublished research. Typically, variables in literature study research are non-standard (Melfianora, 2021). According to Eka, the literature study method encompasses a series of activities involving the collection of library data, reading and taking notes, as well as processing research materials (Katiningrum, 2015).

RESULT AND DISCUSSION

Based on available references, learning using PjBL is proven to be able to explore students' creativity and creative thinking abilities. The success of PjBL in improving creative thinking skills has been studied by Zakiah (2020). Zakiah also pointed out that PjBL has the potential to develop students' thinking abilities more comprehensively. Through the process of project preparation and presentation, students are encouraged to apply their creativity in every stage, from product planning to evaluation. This allows for a more objective and comprehensive evaluation, not just focusing on the final results (Sari, 2017).Furthermore, the implementation of PjBL is also known to be able to improve students' creative thinking abilities, as well as improve students' cognitive, affective and psychomotor skills and abilities. This learning strategy is also known to be flexible, because it can be applied in various subjects according to the teacher's creativity in preparing learning objectives.

A research study focusing on student creativity within the context of PjBL was conducted in the VB SDIT LHI class, utilizing the online platform Zoom. The research aimed to explore student creativity during science learning, particularly on the topic of Ecosystem, through the implementation of the PjBL model. Data analysis was conducted over two cycles of the PjBL model, revealing notable outcomes. The findings indicated a discernible enhancement in student creativity throughout the learning process, evidenced by increased creativity in the works or products produced by students. Additionally, this improvement in creativity was accompanied by a rise in the completeness of student learning outcomes. Notably, the analysis conducted at the conclusion of each cycle revealed a progressive increase in student learning completeness from one cycle to the next .

Research utilizing the PjBL model has demonstrated its significant influence on student creativity, corroborating previous findings. Nurfathurrahmah's research highlighted the impact of the PjBL model on enhancing students' creative thinking abilities and cooperative attitudes.

Similarly, research conducted by Hayuhana Girl Siskawati concluded that the project-based learning model positively affects students' creative thinking abilities. In this study, researchers opted for the project-based learning model to investigate its impact on student creativity in the context of digital simulation material. The findings suggest that the utilization of the project-based learning model yields a noteworthy influence on student creativity compared to scenarios where the model is not employed. This underscores the importance of teachers implementing the project-based learning model in their instructional practices. Through structured activities such as group work, demonstrations, and discussions, teachers guide students in developing project outcomes, conducting experiments aligned with their projects, and elucidating experimental results based on provided worksheets.

In the thermochemistry class at SMA Negeri 5 Surakarta, grade XI students' creativity and learning achievement have been found to be greatly enhanced by the PjBL implementation. Research results showing the PjBL model's efficacy in raising learning achievement in chemistry classes support these conclusions. For example, applying the PjBL model improved learning achievement significantly in a prior study, where scores went from 56.62% to an astounding 82.60%.

According to Aini et al. (2018), the implementation of a project-based learning model significantly influences learning outcomes. PjBL can foster students' interest and confidence in showcasing or presenting the products derived from their assigned projects. This learning approach enhances students' engagement in learning, evident from their focused attention during the learning process, consequently leading to improved learning outcomes. Moreover, utilizing the project-based learning model imbues learning with greater meaning, shifting the focus from mere information memorization to a more enjoyable and profound learning experience. This notion is further supported by Sunita et al. (2019), who argue that project assignments stimulate enthusiasm for learning, ignite students' interest, and optimize learning outcomes. Fitri et al. (2018) discovered that implementing the PjBL model encourages active and independent learning, enabling students to refine their skills through the creation of project-related products. It is observed that students with a strong interest in learning tend to achieve higher academic success, while those with lower interest levels may experience diminished academic performance (Apriliani & Panggayuh, 2018). The correlation between students' interest in learning and their academic performance underscores the importance of cultivating intrinsic motivation in education. Understanding and nurturing students' interests can significantly impact their engagement and achievement levels in academic pursuits.

The research conducted by Rizkasari, Rahman, and Aji (2022) explored the effectiveness of implementing the Project Based Learning (PjBL) model to enhance learning outcomes and foster student creativity in theme 6 subthemes 2 and 3. The study revealed a notable increase in student participation through questioning and expressing opinions during classroom activities. Observations were made throughout the intervention to monitor the learning process. Initially, the pre-cycle phase indicated a 30% level of student creativity. However, after implementing interventions in Cycle I, which comprised two meetings, the average student creativity surged to 60%. Despite this improvement, challenges persisted, including students' reluctance to share their thoughts and concerns about potential ridicule for incorrect answers. As the outcomes of Cycle I fell short of expectations, the researchers proceeded to Cycle II. In Cycle II, conducted with students from Jumapolo I Public Elementary School in Karanganyar, there was a further enhancement, with student creativity rising from 65% in Cycle I to 80% in Cycle II. Notably, students exhibited enhanced creativity and problem-solving skills, offering innovative solutions to classroom challenges. For instance, when presented with a problem concerning polluted river water, students proposed neutralizing the water using natural and homemade alum. This underscores the effectiveness of the Project Based Learning model in fostering creativity and innovation among students throughout the learning process. (Suryana,2023). The acknowledgment of Project Based Learning's effectiveness in nurturing creativity and innovation among students reinforces its value as a pedagogical approach. By engaging students in real-world projects, PBL promotes active learning and problem-solving skills, fostering a conducive environment for creative exploration and innovation.

Using the Project Based Learning (PjBL) paradigm has been shown to be successful in enabling students to develop their creative and innovative skills, especially in Theme 6, Subthemes 2 and 3. This was seen by the kids' engaged engagement in the classroom, as several of them voiced their thoughts and asked questions. Researchers observed ongoing learning activities. The level of student innovation is 30% in the pre-cycle phase. After carrying out a series of actions during two meetings. In cycle I, the average student creativity increased to 60%. However, cycle I faced several difficulties, such as students' reluctance to voice their thoughts in class and their fear of being made fun of by teachers and friends for making mistakes. Researchers continued to Cycle II because the results in Cycle I had not achieved the expected results. Jumapolo I Karanganyar State Elementary School students took part in Cycle II after Cycle I resulting in improvements and increased creativity from 65% in Cycle I to 80% in Cycle II (Elinda, et al. 2022). The utilization of Project Based Learning (PjBL) has

demonstrated success in fostering students' creative and innovative skills, particularly in Theme 6, Subthemes 2 and 3. The observed increase in student engagement and creativity levels throughout the cycles underscores the effectiveness of this approach. Despite initial challenges, such as students' reluctance to participate and fear of judgment, the iterative process of PjBL implementation led to significant improvements in student creativity, highlighting its potential for meaningful educational outcomes.

Based on previous research findings, it is evident that project-based learning (PjBL) contributes significantly to the enhancement of 21st-century skills, particularly creative thinking or creativity. PjBL facilitates the integration of theoretical knowledge with practical application, thereby fostering the development of students' problem-solving, communication, and collaboration skills. (Muhammad,dkk.2022). Implementing project-based learning in the classroom has shown significant benefits for students' thinking skills and creative abilities throughout the process. However, it's essential to assess the outcomes of this approach. Students were asked to complete a questionnaire to identify any difficulties they encountered during project-based learning. Results showed that 33.3% of students strongly agreed they faced obstacles and difficulties in developing their creative thinking, while 50% agreed to some extent. Additionally, 16.7% felt neutral and didn't encounter significant difficulties. The main challenges students faced included developing ideas into coherent text, structuring or organizing a well-structured text, and selecting appropriate vocabulary to avoid repetition.

These difficulties may stem from students' unfamiliarity with these components in writing and completing assignments in class. With more practice and exposure to these skills, students' creative thinking can gradually improve. (Eka,at all.2023). The recognition of students' difficulties in unfamiliar components of assignments is crucial for addressing gaps in their creative thinking skills. Through consistent practice and exposure, students can gradually enhance their proficiency in these areas, facilitating their overall development of creative thinking abilities.

Extensive research has demonstrated the beneficial effects of project-based learning on critical thinking and creativity, including studies by Amorati and Hajek (2021), Chang and Chen (2022), Sukamta et al. (2018), Wurdinger et al. (2020), and Wang (2022). All of these findings provide credence to the idea that project-based learning improves soft skills. Nonetheless, the majority of previous research has concentrated on either creativity or critical thinking separately. Research examining both variables at the same time has focused on other research contexts rather than higher vocational colleges, and no study has explicitly looked at how project-based learning is used in business English instruction.

Based on the results of the literature review titled "Creating Manipulatives: Improving Students' Creativity through Project-Based Learning," it is possible to draw the conclusion that the use of project-based learning enhanced students' creativity, especially when it came to producing learning materials for mathematics. Flexibility significantly improved, as seen by the wide variety of learning materials created covering a wide range of junior high school mathematics themes. Additionally, there was notable progress in originality, although some students still developed media similar to previous iterations. Overall, the novelty aspect demonstrated considerable improvement, with several manipulative media being original creations, while others were adaptations from prior studies. (Siti,K,dkk.2019). The findings from the literature review suggest that project-based learning effectively enhances students' creativity, particularly evident in the creation of learning materials for mathematics. The observed improvements in flexibility and originality indicate the positive impact of this approach on students' creative thinking abilities. While some similarities to previous work were noted, the overall trend towards novelty and originality highlights the efficacy of project-based learning in fostering innovative thinking among students.

CONCLUSION

By analyzing various studies, it is concluded that PjBL is an effective learning approach in stimulating and increasing student creativity at various levels of education. Through collaborative projects that require problem solving and the application of knowledge in real contexts, PjBL enables students to develop the creative skills essential for success in the dynamic modern world.Several factors contribute to the success of PjBL in increasing student creativity including interesting and relevant project designs, the supportive role of teachers, and the use of technology as a learning aid. The application of constructivist principles also plays an important role in strengthening the positive effects of PjBL on student creativity.Thus, PjBL not only improves students' understanding of subject matter, but also helps them develop essential creative skills to face future challenges. Therefore, PjBL can be considered a valuable learning approach in preparing students for success in this ever-changing era.

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