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Comparison of the effectiveness of problem based learning (PBL) and project based learning (PjBL) models in the learning process

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Abstract:
The old way of teaching, where teachers impart specific knowledge and students memorize information for standardized tests, is no longer adequate for the modern world. Teaching approaches need to prioritize personalized education that builds on students' strengths and helps them adapt to the demands of a changing world.. Old methods are no longer relevant to use in the current context. In addition, students can learn better because the selection of the right model in the learning process makes the learning experience more interesting and ultimately has an impact on the quality of learning. This study aims to compare the PBL (Problem-Based Learning) and PjBL (Project-Based Learning) models and determine the appropriate placement of these models in education. This study uses a qualitative-descriptive method with a semantic literature review. PBL is driven by the problems faced by students and focuses on research and investigation, while the PjBL approach is driven by the end product they want to produce, with the main focus on the entire production process. PBL begins with a problem, and the problem becomes the main focus in PBL, where every progress, plan, and effort made by students is directed towards solving the problem. On the other hand, PjBL begins with an assignment to carry out one or more tasks that lead to the production of the end product.

Keywords: Comparation, Problem Based Learning, Project Based Learning, Learning Model.

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Introduction

In the 21st century, there have been significant advancements in science, technology, the industrial revolution, globalization, and environmental awareness. Major changes are needed in the national education system to address the challenges of this era. Our education system still reflects valuable legacies from the past, but this

century brings new paradigms in education, challenging educators to continuously innovate to achieve better learning quality. The success of students greatly depends on the role of an educator, particularly in the process of teaching and learning. To achieve set goals, teachers must have a strong grasp of competencies and possess effective skills for planning and implementing high-quality teaching methods. The success of a learning process hinges on the communication between learners and educators (Simbolon & Koeswanti, 2020, p. 519). This interaction must occur to create a good teaching process, and of course, there are various methods that can be used to facilitate this interaction.

The old way of teaching, in which teachers impart set knowledge and students memorize information for standardized tests, is no longer sufficient for the modern world. Teaching approaches need to prioritize personalized education that builds on students' strengths and helps them adapt to the changing demands of the world. This involves nurturing critical thinking, problem-solving, and creativity. Old ways such as lecture methods and the like are no longer relevant, as discussed by Darmawan et al., (2024), considering the development of technology is increasingly widespread, while what always appears on the surface are endless problems. Therefore, it is important to utilize learning methods or models that are relevant to the current context.

The utilization of these methods often emphasizes the importance of developing deep learning abilities in areas such as character education, citizenship, communication, critical thinking, problem-solving, collaboration, and creativity. Consequently, it is crucial to comprehend the components of deeper learning, including expertise in content, critical thinking, problem-solving, collaboration, efficient communication, self-directed learning, and academic mindsets. Moreover, curiosity plays a significant role in enhancing student engagement and learning outcomes in various educational contexts. Research by Hunaepi et al., (2024) shows that curiosity significantly improves cognitive processes, leading to better encoding and memory consolidation, especially in science learning, where it can increase student engagement by 25% and learning outcomes by 30%. These elements can, of course, be achieved by applying appropriate learning models (Dole et al., 2017, p. 2).

A learning model is a collection of methods, strategies, and integration of methods used by teachers from start to finish. Choosing the right learning model can improve effectiveness and precision in the learning process. Additionally, learners can learn more effectively as a result of the appropriate method selection, making the learning process more engaging and influencing learning quality (Made et al., 2022, p. 5163). By definition, a learning model relates to a plan used as a guide in designing learning both inside and outside the classroom (Trianto, 2012, p. 22). In line with this Həsənli (2024) states that a learning model is a structured framework that guides the design and delivery of educational experiences, aiming to achieve specific learning objectives. It includes various theoretical principles and practical applications, making it adaptable to different educational contexts and learning characteristics. The effectiveness of the learning model is influenced by the role of the teacher and the context in which learning occurs, emphasizing the importance of interaction between students and educators (Almulla, 2020).

Many learning models have been developed for education practitioners, which are naturally aimed at achieving good educational outcomes. However, among the many models, the author has chosen the PBL and PjBL models for discussion in this context. In this case, the author is not trying to implement these two models in the learning process but rather conducting a comparative study to assess their effectiveness through

literature research, to understand the function of each model and determine the appropriate use of each in the learning process

Basically, there have been several studies that discuss the effectiveness of PBL and PjBL models, such as research Nurhidayah et al., (2021) in discussing the implementation of PjBL in science learning, or as has been researched by Dole et al., (2017) in discussing the implications of the PBL and PjBL models on learning. However, the author realizes that this study does have some similarities with related studies, but that does not mean that the author is acting impolitely. The author with a different description tries to present a comparison between the PBL and PjBL models in the context of learning in general. Therefore, with this study, the author hopes that there will be a meeting point to answer the question of which model is suitable for use in what conditions? Because as the author understands, both learning models each have their advantages and disadvantages, so it would be very good to first examine the learning model before implementing it.

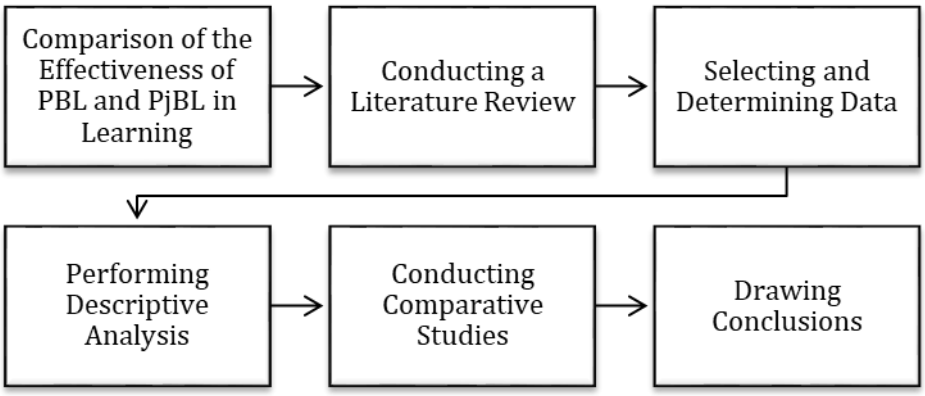
Research Methods

This study uses a descriptive-analytical approach, where descriptive analysis focuses on data exploration and visualization, using statistical methods to summarize and interpret data effectively. This approach is essential for making decisions based on data insights (Bayyurt & Baday, 2022). In this case, the type of research is library research. Literature studies often use systematic reviews and content analysis to synthesize findings from multiple sources, allowing for a comprehensive understanding of themes and patterns (Maundeni, 2023). This discipline according toJohnson & VanLaningham (2022) emphasizes concentrated interpretation of texts, which can help students navigate their own experiences and social contexts.More specifically, the literature used in this study is a semantic literature review, where the SLR (Systematic Literature Review) research method. Definitively, a systematic literature review (SLR) is a research method used to collect, analyze, and synthesize the results of various relevant studies in a particular field. SLR aims to provide a comprehensive overview of the topic being studied, identify trends, and evaluate the effectiveness of the methodology used in previous research (Gough & Richardson, 2024).

Systematic literature reviews (SLRs) are essential for synthesizing research findings across multiple fields, and this is the approach the author uses to provide a structured approach to evaluating the existing literature. This approach involves explicit eligibility criteria, comprehensive searches, and reproducible methods to minimize bias, ultimately summarizing the results effectively (Brignardello-Petersen et al., 2024). Comparative studies involve analyzing differences and similarities across species to identify common properties and processes associated with a particular phenomenon, such as aging in this context (Riddle et al., 2023).

Comparative studies encompass a variety of methodologies aimed at analyzing similarities and differences across a range of subjects, including religion, literature, law, and biological phenomena. This approach facilitates a deeper understanding of the underlying principles and frameworks that govern different fields (Abdullah, 2023). Comparative studies are characterized by their multidisciplinary nature, fostering scientific discovery and informing policy decisions through systematic comparison (Blair-Walcott, 2023). Kaur and Sasikumar (2017) explain that comparative analysis used to evaluate descriptive responses includes activities such as comparing different

methodologies such as Text-to-Text and Graph-to-Graph approaches. Their work reveals the potential for automation in assessing descriptive responses, although it also identifies challenges in standardization and accuracy. The authors use comparative analysis to provide valuable insights, although this analysis also faces limitations related to methodological rigor and the complexity of the variables involved (Burdick, 2023, p. 74).



Picture 1. Research Flow Chart

Results and Discussions

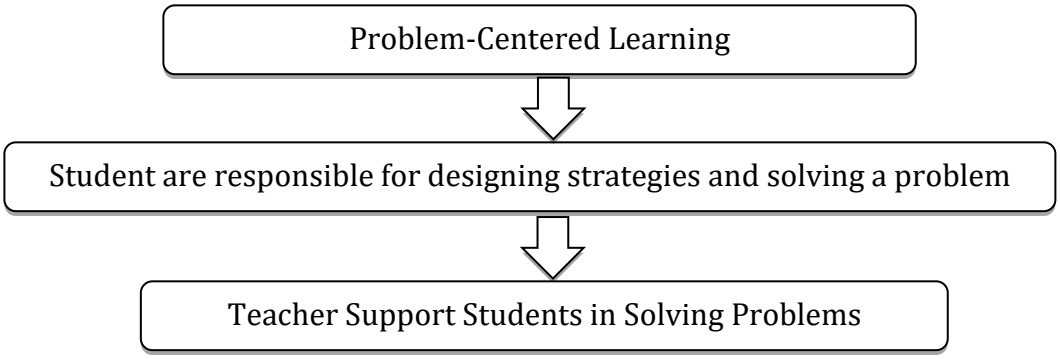
PBL (Problem Based Learning)

PBL, also known as problem-based learning, is widely favored by students, educators, and researchers as a learning model. It was developed by Howard Barrows and is centered on improving students' comprehension and addressing particular problems. Tan (2003) defines PBL as a progressive, active, and student-centered learning method where unstructured problems serve as the primary focus and play a central role in driving the learning process (Noordin et al., 2011, p. 3). This approach helps students develop critical thinking and problem-solving skills (Inayah et al., 2021, p. 130), by engaging them with problems designed to be solved. Initially introduced in medical education in 1969 and implemented at McMaster University in Canada, this approach has since been widely adopted by educators worldwide (Purnama, 2023, p. 43).

PBL is an innovative teaching model that shifts instruction from being teacher-driven to student-driven (refers to an approach to learning where students play an active role in organizing and directing their own learning process. In this pproach, students are not merely passive recipients of information; they act as agents who control and lead their own learning) emphasizing problem-solving, creativity, and critical thinking (Noordin et al., 2011, p. 3). Through this approach, students engage with real-world problems, building knowledge individually or in groups (Simbolon & Koeswanti, 2020). Teachers present problems, ask questions, and facilitate inquiry and dialogue among students, allowing them ample freedom to explore and develop their abilities (Wajdi, 2017, p. 84).

As mentioned earlier, although PBL was initially introduced in medical schools, the best results, according to Walker and Leary (2009) has been observed in teacher education. However, fewer studies have focused on implementing PBL with younger

children (primary school) compared to middle and high school students (Dole et al., 2017, p. 3). This may be due to PBL's emphasis on higher-order cognitive skills such as analysis, evaluation, and creation, or levels C4, C5, and C6 in Bloom's taxonomy (Mohammed & Omar, 2020), or HOTS (Higher Order Thinking Skills) [Engaging students in higher levels of thinking, Higher Order Thinking Skills (HOTS) is a cognitive process. Cognitive concepts and approaches enhance this process, by utilizing learning taxonomies such as problem-solving methods, Bloom's taxonomy, and the taxonomy of teaching, learning, and evaluation. See, (Saputra, 2016, p. 91)]. which is challenging for younger students who need more guidance in their learning process. Elwan Setiadi supports the view that PBL is an approach designed to actively improve problem-solving strategies, cognitive principles, and psychomotor. This approach places students in an active role, allowing them to address real-life problems (Stiadi, 2024). Eggen and Kauchak (as cited inGallagher & Savage, 2023) identified three main characteristics of Problem Based Learning.



Picture 2. Characteristics of Problem Based Learning

The illustration shows that learning begins with the identification of a problem, and its resolution becomes the focal point of the learning process (Blumenfeld et al., 1991, p. 370); Students are tasked with creating plans and addressing an issue. The teacher then supports the learners by introducing a problem as a question and offering assistance while the learners work towards solving it (Purnama, 2023, p. 44). Students are tasked with creating plans and addressing an issue. The teacher then supports the learners by introducing a problem as a question and offering assistance while the learners work towards solving it. Thus, learning can only begin once a problem is identified; without a problem, learning cannot proceed. Third, problem-based learning operates within the structure of the scientific method, applying logical thinking from beginning to end.

The steps in implementing the PBL model include: First, determining (Orienting students to the problem). Here, the teacher selects or designs problems that are appropriate to the learning topic and relevant to students' lives. These problems must be challenging, engaging, and offer multiple potential solutions for exploration;

Second, organizing students for learning, which involves forming learning groups. The teacher divides students into small groups, with each group consisting of members with diverse abilities and backgrounds to maximize collaboration and idea exchange. Each group member is given specific roles to help manage tasks and responsibilities, such as group leader, note-taker, researcher, and presenter. Assigning roles ensures that each student actively participates in the learning process.

Third, guiding individual and group experiences, where the teacher actively monitors the progress of each student and group in understanding and solving the problem. This includes direct observation, open-ended questions, and discussions with students about their progress. The teacher also provides constructive feedback to individuals and groups, identifying areas of strength and areas for improvement.

In the next step, developing and presenting work, students collaborate in groups to develop solutions or products that address the problems they have investigated. This involves applying the knowledge they've gained and ideas discussed during the learning process. Then, groups prepare a final report documenting the entire learning process, including problem identification, research methodology, collected data, analysis, proposed solutions, and reflections. Students present their work to the class or a larger audience, aiming to communicate the solution they developed, demonstrate their understanding of the problem, and explain their process. After the presentation, a question-and-answer session allows the audience to ask questions and offer feedback, helping students further test their understanding and gain new perspectives.

Finally, students analyze and evaluate the problem-solving process (Simbolon & Koeswanti, 2020), (Purnama, 2023). Here, they identify obstacles faced during problem-solving and discuss how they overcame these obstacles while searching for better solutions in the future. They also compare their final results with predetermined success criteria and evaluate how well their solutions met the objectives and requirements. Teachers provide feedback based on these criteria. Based on the evaluation and feedback, students develop improvement plans for future projects or problems, formulating more effective strategies, identifying additional resources, and setting clearer goals.

As with any model, PBL has its strengths and weaknesses. Some of the key advantages of PBL include: First, Problem-Based Learning (PBL) offers students the logical consequence of achieving satisfaction in discovering new knowledge. PBL encourages students to solve problems, think critically, and collaborate, thereby strengthening their understanding of the material and enhancing their intrinsic motivation to learn;

Second, PBL develops students' motivation and learning activity by engaging them in solving relevant and interesting problems. This active involvement makes students more motivated and enthusiastic about learning. Additionally, PBL supports students in applying their knowledge to gain a more profound grasp of real-world issues, allowing them to not only comprehend concepts theoretically but also utilize cognitive skills in real-life scenarios. Furthermore, PBL motivates students to take charge of their own learning journey by necessitating them to self-evaluate both their results and methods.;

PBL offers chances for students to utilize their knowledge in real-world scenarios, allowing them to understand how classroom concepts can be put into practice in actual situations. Sixth, PBL inspires students' interest in continuing to learn even after formal education ends, fostering a lifelong learning attitude. Seventh, PBL facilitates students in understanding learning concepts to tackle real-world challenges (Sanjaya, 2007, p. 45).

However, PBL also has some drawbacks, which can be summarized in two main points: First, if students lose interest or are uncertain that the problem presented is solvable, they may be unwilling to attempt solving it. Second, some students may feel that if they do not fully understand the materials needed to address a problem, they may question the purpose of trying to solve it. Consequently, they may only learn what they deem important, rather than engaging deeply with the material (Sanjaya, 2007).

PjBL (Project Based Learning)

Project-Based Learning (PjBL) involves placing learners at the core of education, ensuring their active participation in the learning process. Through PjBL, students are trained to face problems, work collaboratively, and reflect on their learning. This approach also encourages students to actively engage in inquiry, decision-making, and enhances their practical thinking skills (Nurhidayah et al., 2021, p. 1). At first glance, this point may seem similar to PBL, as there are opinions that suggest similarities between PBL and PjBL. However, it is important to understand that the two models differ in several aspects. Some experts view PjBL as a learning method where students must develop their own understanding of the subject matter and express that understanding in various ways. According to Larmer in his book "Setting the Standard for Project-Based Learning," the dynamic approach to learning describes a process where students actively explore real-world issues, face challenges, and gain a deeper understanding. PjBL, at its core, is a learning model that focuses on the student's role in enhancing and implementing a concept through the completion of a final task that involves independent exploration and solving real-world problems (Made et al., 2022, p. 5163).

This model involves learners in completing tasks that focus on complex problems related to the subject matter and their surroundings. Learners have the opportunity to carry out observation, surveys, or problem analysis together. In the teaching and learning activities, learners are encouraged to be active and play a significant role in the learning process by asking questions, researching, presenting, and communicating about the problem presented. The results of the investigation carried out by the learners are eventually turned into a scientific work that can be presented (Yanti & Novaliyosi, 2023, p. 2192).

In producing a product from the analyzed problem, further research activities are necessary, although the research can take an experimental form. In this case, students are given projects in groups by the teacher (Nurhidayah et al., 2021, p. 2). In this approach, students must produce creations or undertakings connected to the lesson/skills that arise during the learning journey. The basis of PjBL originates from the concept that individuals absorb 10% through reading, 20% through listening, 30% through observing, 50% through both listening and observing, 70% through engaging in discussions with others, 80% through firsthand experience, and 95% through teaching others (Fauzia & Kelana, 2020, p. 597). Therefore, it is not surprising that through the PjBL approach, students can channel their creativity by creating and designing projects that help solve learning challenges.

To understand further, PjBL has characteristics that can serve as a guide for identifying its processes in detail. The start of a project involves choosing a topic that will lead students to a problem. This problem can be tackled through experiments or observation. Each individual or group then begins searching for data on the chosen topic. Learners suggest solutions to the problem, which is known as the "Project Plan" in schools. Subsequently, each individual or group looks for and compiles information and documents as evidence and secondary data for the issue. Learners carry out experiments, make observations, gather and interpret data, and document the results. At the end of the session, each group prepares a report and shares their findings with the class. The presented projects are then discussed and evaluated by all students and teachers.

In essence, it can be concluded that Project-Based Learning is a learning model that aims to strengthen desirable characteristics in students, such as research skills,

confidence, responsibility, and teamwork. This is achieved through activities where students work either individually or in groups to design plans and complete projects within a set time frame (Nurhidayah et al., 2021, p. 2). Table 1 below presents the Project-Based Learning Syntax (PjBL).

Table 1. PjBL Syntax

No.	Syntax	Activity
1	Reflection	Students are urged to ponder the information provided and link their existing knowledge to the new concepts they need to grasp. Subsequently, they are presented with a pertinent problem.
2	Research	Students gather pertinent sources of information to address the issue as part of their research. Each group is directed to engage in cooperative discussions.
3	Discovery	Each experimental group creates a design for an experiment.
4	Application	The experiment they have designed is applied and tested by each group.
5	Communication	The research findings are reported by each group and conclusions are drawn collectively.

The steps for implementing the Project-Based Learning (PjBL) model have been detailed by numerous experts. However, I have selected only a few that I find easy to comprehend. One example is a framework that encompasses: (1) Observation and questioning phase; (2) Experimentation phase; (3) Connection phase; (4) Streamlining phase; and (5) Reconstruction phase. Meanwhile, according to Nafiati (2019), the steps include: (1) Determining the project; (2) Dividing into groups; (3) Procedures for completing the project; (4) Completing the project under the teacher's guidance; (5) Compiling findings for reporting and presenting; ans (6) Evaluating the project results (Mustika Sa et al., 2024).

According to Ndaryanti et al., (2024), there are several steps in implementing the PjBL model, namely.

a. Starting with an essential statement: This is a question or statement that stimulates deep thinking and reflection in the context of the project. It helps direct students' focus toward the ultimate learning objective and provides a framework for the project. For example, in an environmental problem-solving project, the essential statement might be, "How can we design innovative solutions to reduce plastic waste in our environment?" This statement guides students in exploring the topic, designing strategies, and creating useful solutions or products.
b. Designing the project plan: This involves developing a structured plan for the project's execution, including defining objectives, necessary resources, time limits, and the steps to achieve the desired final outcome. The project plan helps guide students in organizing their tasks and assigning responsibilities to ensure the project is completed according to plan and meets the learning objectives.
c. Creating a title: The title is a brief summary or description of the project, giving an overview of the project's focus and goals. A good title should be clear and reflect the essence of what will be learned or accomplished. For example, in a water conservation project, the title might be "Tackling the Water Crisis: Innovative

Solutions for Water Conservation at Our School." This title helps students focus on the topic they will explore and resolve during the project.

d. Monitoring students and project progress: This involves continuously supervising and tracking students' progress in carrying out their projects through regular meetings, discussions, or periodic evaluations. Monitoring ensures students stay on track toward the project goals and achieve the expected progress. Teachers can provide additional guidance or support when needed and ensure that the project proceeds as planned.
e. Assessing results: This involves evaluating the products or solutions students generate during their project. The assessment covers not only the quality of the final product but also the process students underwent to achieve it. The assessment approach in PjBL often includes diverse criteria such as critical thinking, teamwork, creativity, and the application of learning concepts. Through this assessment, teachers provide useful feedback to students and identify areas for improvement.
f. Evaluation in PjBL is designed to offer a comprehensive assessment of student advancement, the efficiency of the learning approach, and the attainment of learning goals. Throughout the learning process, educators and students participate in discussions.

The advantages of PjBL can be summarized in several points 1) It transforms students' thinking from limited to broader and more comprehensive in understanding and solving everyday problems; 2) It builds students' ability to apply cognitive, affective, and psychomotor skills in an integrated manner, which is expected to benefit their life processes; 3)) It stimulates creativity, original thinking, high-level cognitive abilities, analytical skills, interpersonal communication, sharing, tolerance, and social interaction (Ndaryanti et al., 2024); 4) It enhances scientific problem-solving by enabling students to ask questions, challenge thought processes, engage in observation and hypothesis interpretation, conduct experiments, collect and analyze data; 5) It develops students' ability to work in teams and fosters a sense of responsibility (Indrasari & Wulandari, 2024).

Owever, the disadvantages of using the PjBL model include; 1) The classroom environment may become less conducive and harder to control during project activities due to the freedom given to students, leading to potential disruptions. Therefore, teachers need strong classroom management skills: 2) Students who are less skilled in conducting experiments and gathering information may face difficulties; 3) There may be instances where some students are less active in group work ; 4) It is not suitable for students with lower-order thinking skills (LOTS).

Comparison between PBL and PjBL through the Semantic Literature Review Approach & Literature Research

Project-Based Learning (PjBL) involves initiating with problems to collect and incorporate new knowledge through practical activities in the real world. This approach aims to address intricate problems that demand exploration and comprehension from students. In contrast, Problem-Based Learning (PBL) focuses on a specific theme to establish problems, requiring students to have a strong grasp of fundamental theory and work towards offering different solutions to the problems presented by the instructor.

Before delving into this study, it is important to understand that in comparing, there will always be one that is categorized as better than the other, and vice versa. This

is based on two things: the facts that occur and the analytical perspective. Some studies that the author found include research conducted by Nugroho et al., (2019), where they examined the differences that occurred after applying two learning models, PBL and PjBL, but they did not compare them directly, instead comparing them with conventional learning. The results of this study show an increase in learning outcomes when experimenting with PBL and PjBL compared to conventional models. However, if examined further, the PBL model (with an average score of 85.66) has a higher average score compared to PjBL (with an average score of 82.22). This shows a gap or difference in value of 3.44.

Research conducted by Murniyati (2018) which the author cites in the article by Simbolon & Koeswanti, (2020, p. 524) shows the opposite result of Nugroho et al.'s study, indicating that the PjBL model is superior to the PBL model, with a post-test increase in the PjBL difference at 2.90, while PBL was at 2.81. Let's begin by delving into the theoretical examination. To start, Hong, in his research comparing PBL and PjBL models, stated that the similarities encompass: 1) Both being instructional approaches aimed at effectively engaging students; 2) Both serving as dependable constructive learning techniques; 3) Utilization of real-world tasks in both models to enhance learning results. Simulated real-world workplace scenarios provide students with multiple solutions or answers to projects and problems; 4) Both are student-centered problem-solving approaches; 5) Teachers function as guides or instructors; 6) Students engage in cooperative teamwork over an extended period and explore various sources of information; 7) In practice, both are employed in group settings or competitions, and they complement each other.

The distinctions exist in the following areas: (1) Focus: PjBL is geared towards K-12 education (vocational education), while PBL is commonly used in K-12 education, although its origins are in medical training or preparation for other professions; (2) Central Task: In Project-Based Learning, the final task is meticulously planned and executed. For instance, a computer-related project necessitates thorough planning and execution. The final project is utilized for implementing plans, creation, and process. In Problem-Based Learning, the final task is straightforward with additional components. For instance, a group research findings presentation. The overall discussion and research process (in comparison to the final task itself) is the primary focus of the entire learning process; and (3) Core of the Curriculum: Problem setting is at the heart of the course: Project-Based Learning involves students working on proposed projects, discussing various issues, and attempting to solve them. Problem-Based Learning begins with specifically defined problems that necessitate comprehensive conclusions and full solutions. The central focus of the course is providing immediate feedback on solving these problems (Hong, 2007, p. 5). Another comparison according to Noordin et al., (2011, p. 8);

The comparison between PBL and PjBL as explained above provides an understanding that the PBL and PjBL models both have the same goal, namely emphasizing the learning process in problem-based activities. However, of course the problems that are explained still need to be discussed further. Because it seems that the problems described in the PBL model are slightly different from the problems described in the PjBL model. This concerns the purpose of the models being formulated.

Table 2. Comparasion PBL and PjBL according to Noordin

Domain	PjBL	PBL
Objective	The aim is to enhance both technical and non-technical skills and offer practical engineering experience to students.	To improve students' non-technical skills
Final Product	The final product encourages the formation and depiction of the entire production, planning, and evaluation process. Example: using CAD in an Engineering Project that requires extensive effort and comprehensive planning	The final product is much simpler. Example: A group report on research findings
Knowledge	More comprehensive and inclined towards applying knowledge	More inclined towards knowledge acquisition
Learning Process	Focuses on producing a model	The learning process primarily emphasizes research and inquiry.
Problem	Several problems will emerge as students implicitly assume in the project that problem-solving skills are needed to complete it	Students begin with clearly outlined problems and require a series of solutions or conclusions as well as immediate responses.
Evaluation	PjBL success is evaluated through skills acquired during the model production process.	PBL success is evaluated through the effectiveness of the solution.
Implementation	Often related to engineering education and science teaching. Involves a lot of equipment, software, and laboratories to produce a product.	Commonly used in medical education and professional preparation practices. Little to no equipment is used in the problem-solving process.
Time and Resources	Completing a project requires a significant amount of time and effort to locate scarce resources. It is essential for students to effectively allocate their time and resources in order to meet project deadlines.	Not too time-consuming, and resources are not limited and are easily accessible.

PjBL aims to improve students' technical and non-technical skills through concrete practical experiences. In PjBL, students are involved in complex projects, where they have to plan, implement, and evaluate the entire production process. For example, in an engineering project, students may use CAD software to design a product, which not only hones technical skills but also fosters managerial and teamwork skills. On the other

hand, PBL focuses more on developing students' non-technical skills. This method encourages students to think critically and analytically through investigating predetermined problems. The main purpose of PBL is to facilitate the learning process in which students learn to find solutions to the problems faced. In this case, students usually produce group reports based on research findings, which are simpler compared to the final product in PjBL.

In PjBL, the final product reflects the entire learning process and requires students to demonstrate their ability to design, implement, and evaluate the project. This product can be a physical prototype, a detailed report, or a presentation that shows the results of their work. Thus, PjBL emphasizes the formation and depiction of the entire production process, which requires comprehensive planning. In contrast, in PBL, the end product is simpler and usually takes the form of a report or presentation explaining the results of the research. The main focus here is on the process of investigation and problem solving, rather than on a complex end product. Students are expected to develop effective solutions based on their understanding of the problem at hand.

PjBL focuses on the production of real models or products, where students are directly involved in all stages of creation. This process requires high levels of collaboration, communication, and technical skills. Students not only learn theory, but also apply it in practice, which makes their learning experience richer and more contextual. On the other hand, PBL emphasizes research and inquiry. Students are encouraged to explore problems with a more open and flexible approach. They start with a clearly defined problem and must come up with a variety of possible solutions. This process encourages students to think critically and creatively in finding answers.

In PjBL, evaluation is based on the skills acquired during the model production process. Students are assessed not only on the final product, but also on their collaboration and work process. PjBL is often associated with engineering and science education, where the use of equipment and software is important. In contrast, PBL is evaluated based on the effectiveness of the solutions students find. Success in PBL does not depend on a physical product, but on the student's ability to analyze a problem and propose an appropriate solution. PBL is often used in medical education and professional practice, where problem solving is key

Conclusions and Suggestions

PBL and PjBL are often mistaken for being the same, despite their many similarities. The PBL approach revolves around student-driven problems and emphasizes research and inquiry, while the PjBL approach is centered on the final product that students aim to create, focusing primarily on the production process. In PBL, the starting point is a problem, which remains the central focus throughout the process. As students make progress, plan, and put in effort, their goal is to solve the problem. The commencement of PjBL involves the assignment of one or more tasks to be completed, resulting in the creation of a final product. When comparing PBL and PjBL, it becomes evident that PjBL is better suited for technical education. Unlike PBL, which has fewer characteristics, PjBL focuses on improving technical skills through real-world engineering practice. In addition, the PBL approach is more suited to medical practice when compared to PjBL. Choosing the right model in education can have a great impact on students. Although we cannot always have the character of the students we want, it is still important to prioritize understanding their needs. It is important to choose the right

model depending on the specific situation and environment. In practice, the integration of these two methods in the educational curriculum can provide a more holistic and effective learning experience for students, preparing them to face the challenges of the complex professional world. From this study, the author hopes that educators will understand the learning model that is appropriate to the needs and themes of education being taught. This is intended so that the learning process can run well according to the formulated achievement objectives.

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