Vol.2 No.1 April 2026 Hal.30-43
E-ISSN : 3109-5453 | P-ISSN : 3109-5534
DOI : xxxxxxxxxxxxxxxxxxxxxxxxxxxxx
https://journal.multidisciplinaryeducation.com/jme

THE EFFECTIVENESS OF THE PROJECT-BASED LEARNING MODEL THROUGH A SCIENTIFIC APPROACH TO STUDENT LEARNING OUTCOMES

Rohmah Shela Saputri1, Widia Nata Saputri2, Farida Juwita3, Shelly4

[1,2,3]Elementary School Teacher Education, University Lampung

rohmahshela37@gmail.com1, natasaputriwidia@gmail.com2, faridajwa@gmail.com3, aprilshelly13@gmail.com4

Abstract

This research seeks to evaluate the efficacy of the Project-Based Learning (PJBL) model implemented through a scientific approach that influences student learning outcomes. The methodology employed in this investigation involves a comprehensive literature review, wherein various prior research sources pertaining to the application of PJBL in elementary education are gathered and analyzed. This literature review emphasizes the capacity of PJBL to enhance students' cognitive, affective, psychomotor, and social-emotional competencies. The findings of this research indicate that PJBL, when executed through a scientific framework, significantly bolsters student interest, motivation, and academic performance. This educational model facilitates collaboration among students, fosters critical thinking, and actively engages them in practical projects that are pertinent to their everyday experiences. Nevertheless, the implementation of this model is accompanied by several challenges. The successful execution of this approach necessitates effective time management, adequate teacher support, and sufficient resources.

Article History
Sent: 29 June 2025
Accepted: 21 February 2026
Published: 30 April 2026

Keywords: Project Based Learning, Scientific Approach, Learning Outcomes, Effectiveness

A. INTRODUCTION

The provision of high-quality and contextually relevant education is of utmost importance when it comes to adequately preparing students to confront and navigate the myriad challenges they encounter in the real world, especially during their formative years at the elementary school (SD) level. Among the various pedagogical strategies gaining traction in contemporary education is the innovative approach known as Project-Based Learning (PJBL), which empowers learners by allowing them to engage in experiential learning through the completion of projects that are directly linked to their daily lives and experiences. By incorporating scientific methods into this instructional framework, PJBL not only enhances students' understanding of the subject matter but also significantly promotes the advancement of their critical thinking and creative problem-solving skills. Numerous studies conducted in recent years have demonstrated that the adoption of PJBL can markedly increase students' enthusiasm for learning while simultaneously improving their abilities to tackle and resolve intricate problems (Fitri et al., 2018; Sukmasari & Rosana, 2017).

Despite the multitude of benefits associated with the application of the PJBL (Project-Based Learning) model, it is important to acknowledge that this educational strategy also brings forth a range of challenges that can often serve as significant hurdles. Educators frequently find themselves grappling with obstacles such as a lack of necessary resources, constraints imposed by limited time, and the complexities involved in effectively assessing student learning outcomes. Research has shown that the shift in the role of teachers from traditional instructors to facilitators of learning requires substantial adjustments in their teaching methodologies and practices (Gunawan et al., 2017; Jumaheni et al., 2021).

In light of these circumstances, it becomes critically important to undertake a comprehensive investigation into the effectiveness of science-based PJBL (Project-Based Learning) on student learning outcomes, with a particular focus on understanding how it influences both material comprehension and the development of cognitive skills.

The primary objective of this research endeavor is to systematically identify the various challenges and barriers that educators encounter during the implementation of the PJBL (Project-Based Learning) model, as well as to explore potential solutions that could optimize its application in educational settings. Some of the recurrent issues that often surface include inadequate infrastructure, difficulties in designing projects that are in alignment with the curriculum, and a notable lack of training opportunities available for teachers (Ismail, 2018; Lutfi et al., 2017). By obtaining a deeper understanding of the challenges that currently prevail in this area, it is hoped that effective strategies will be devised to promote the successful integration of the PJBL (Project Based Learning) model within classroom environments.

Through the execution of this research, it is anticipated that meaningful contributions will be made towards the evolution of improved learning methodologies, as well as the overall enhancement of student learning outcomes. By examining the efficacy of science-based PJBL and identifying the obstacles faced by educators in its implementation, this study aspires to formulate strategies that can significantly elevate the quality of education provided at the elementary level. The insights gleaned from this research are expected to offer valuable benefits not only for the progression of educational theories but also to furnish educators with practical guidance in the adoption of innovative and effective learning models that can enrich the educational landscape.

B. RESEARCH METHODS

This scholarly investigation utilizes a comprehensive literature review methodology to meticulously explore the effectiveness of the Project Based Learning (PJBL) pedagogical model when it is synergistically combined with a scientific approach, particularly in relation to its potential to significantly enhance the learning outcomes of students. The rationale behind the selection of literature reviews as a methodological tool is well-founded, as they enable the aggregation of extensive data from a myriad of previous studies, thus offering a more holistic and nuanced understanding of the intricate subject matter that is currently being scrutinized.

Within the realm of scientific inquiry, literature reviews serve as a pivotal element of the broader research methodology, playing a crucial role in establishing a solid foundation for subsequent analysis. Cooper, as referenced in the work of Permadin and Herdi (2021), delineated several critical objectives that literature reviews aim to fulfill: To begin with, literature reviews play an essential role in bridging the gap between contemporary research endeavors and the foundational studies that have preceded them, thereby fostering a continuum of knowledge. Furthermore, they provide readers with invaluable insights and relevant information regarding research findings that hold significance for the topic under investigation, ensuring that the reader is well-informed. Additionally, literature reviews are instrumental in identifying gaps or inadequacies present in prior research, thereby empowering scholars to make meaningful contributions and introduce innovative perspectives within the academic discipline at hand.

C. RESULTS AND DISCUSSION

Project Based Learning (PJBL) Learning Model

A learning model serves as an intricate framework that encompasses a multitude of applications related to a particular approach, procedure, strategy, method, and learning technique, which collectively span from the initial conception all the way through to the actual learning process. This learning model can be understood as a meticulously designed plan or systematic pattern that educators can utilize to formulate a structured learning plan, thereby enhancing the efficacy and quality of both learning and educational activities, ensuring that they unfold in a more productive manner. Within the realm of educational methodologies, there exists a diverse array of learning models, one prominent example being the project-based learning model, which is commonly referred to as PJBL.

Project-based learning represents a pedagogical approach that actively engages students in undertaking project work, which culminates in the creation of a tangible product or project aimed at achieving a comprehensive set of affective, cognitive, and psychomotor competencies. This learning

model effectively incorporates technology and real-world problems, thereby fostering an environment that encourages students to unleash their creativity and cultivates a heightened motivation towards active engagement in their learning journey.

The Project-Based Learning model boasts a plethora of significant advantages, making it exceptionally beneficial for students in a multitude of ways. However, it is worth noting that despite its numerous advantages, the Project-Based Learning model is seldom utilized by educators in practice, primarily due to the considerable preparations required and the time-intensive nature of its implementation. This particular model is designed with the intention of guiding students through collaborative projects that seamlessly integrate various subjects from the curriculum, while simultaneously providing them with valuable opportunities to explore content through diverse methods that hold meaningful relevance to their personal experiences, all while conducting experiments collectively.

The fundamental principle underpinning the PJBL (Project-Based Learning) model revolves around the notion that learning should be fundamentally centered around the students themselves. This student-centered approach is characterized by the utilization of real-life problems that have been framed within specific themes and topics, prompting students to engage in experiments or research activities that ultimately lead to the production of authentic products tailored to their individual capabilities. In doing so, students are empowered to tackle challenges by applying relevant concepts, principles, and scientific knowledge, thereby rendering their learning experiences significantly more meaningful and impactful.

Scientific Approach to Learning

The scientific approach comes from the word approach as well as scientific. Approach has the meaning of an idea or idea that is used to achieve a goal. While scientific means something that can be repeated openly by the perpetrator, on a scale of space and time, namely by anyone, anywhere, and anytime. Therefore, the scientific approach is an idea to achieve goals that can be carried out by anyone, anywhere, and anytime. There is also a definition of the scientific approach according to experts, namely:

1. **Ministry of Education and Culture**

   The scientific approach is a learning model that starts from collecting data through observation, conducting experiments, asking questions, processing information or data, to communicating it in the process of applying scientific principles.

2. **Rusman (2015)**

A scientific approach is a learning model that provides a space for learners to explore and elaborate on the material learned. In addition, this educational model also provides opportunities for students to hone their skills through learning activities that have been designed by educators.

3. **Hosnan (2014)**
   The scientific approach is a learning process that is designed so that students actively build concepts, laws, or principles by observing, formulating problems, proposing hypotheses, collecting data with various techniques, analyzing data, drawing conclusions, and voicing it.
4. **Karar and Yenice (2012)**
   The scientific approach is a learning process that is designed in such a way, that students can actively construct concepts through observing steps, formulating problems, making hypotheses, collecting data with several techniques, analyzing data, drawing conclusions, and presenting the concepts that have been discovered.
   A scientific approach can be implemented by every teacher in all subjects to achieve learning objectives. The implementation of the scientific approach does not only focus on how to develop students' competencies in conducting observations or experiments, but also how to develop students' knowledge or thinking skills so that they can support creative activities in innovating or creating. Therefore, the implementation of scientific approaches in learning is centered on students to actively construct their knowledge through a series of scientific activities.

The implementation of scientific approaches in learning starts from the preliminary stage, core activities, to the conclusion. In the preliminary activity, it is directed to strengthen students' understanding of the purpose and importance of the material to be delivered, so as to give rise to high curiosity. This curiosity is a great capital in the next stage of learning, namely the core activities.

The core activity which is the learning experience for students is the most used time to do learning with a scientific approach. In the learning implementation plan, an educator designs systematic learning activities in accordance with scientific steps. Student activities are directed to construct concepts, knowledge, understanding, and skills with the help of educators through observing, questioning, collecting information, reasoning/associating, and communicating to help develop thinking skills and help develop students' curiosity.

1. **Observing** is an activity of identifying an object through sensing, through the senses of sight (reading, listening), smell, listening, tasting and touch when observing an object using or not using aids so that students can identify a problem.

2. **Asking** is the activity of expressing something that he wants to know, whether it is related to an object, an event, a certain process. Questions can be asked orally or in writing and can be in the form of question sentences or hypothesis sentences so that students can formulate problems and hypotheses. The question should be related to why and how that demands answers through experimental activities.
3. **Collecting data** is an activity of seeking information as material to be analyzed and concluded. This activity can be done by reading books, field observations, trials, interviews, distributing questionnaires, and others so that students can test hypotheses that have been made before.
4. **Associating** is processing data in a series of physical and mental activities with the help of certain equipment. Data processing can be in the form of tables, graphs, charts, concept maps, calculations, and modeling. Furthermore, students analyze the data to compare or determine the relationship between the data they have processed and the existing ones so that a conclusion can be drawn.
5. **Communicating** is the activity of students in describing and conveying the results of their findings from observing, questioning, collecting and processing data, as well as associating addressed to others both orally and in writing in the form of diagrams, charts, pictures, and the like with the help of simple technological devices and/or information and communication technology.

The five steps in the scientific approach can be done sequentially or nonsequentially, especially in the first and second steps. While in the third step and so on, it should be done sequentially. This scientific step is applied to provide more space for students to build learning independence and optimize their intelligence potential. Students are asked to build their own knowledge, understanding, and skills from the learning process carried out, while educators direct and provide reinforcement and enrichment of what students learn. Through a learning model that is relevant to the scientific approach, outputs (students) with good intellectual abilities and character will be produced.

The Application of PJBL Through a Scientific Approach

A scientific approach is an approach that invites students to be active in the learning process. As mentioned earlier, in this approach, students are invited to go through five main steps, namely; observe, query, collect information/data, associate/analyze, and communicate. These five scientific steps allow students to be able to build their skills, skills, and creativity in the learning process.

To form the activeness of students in the learning process, a learning model that is in accordance with the character of students with a scientific

approach is needed. One of the models that can be applied to shape this is the project-based learning (PJBL) model.

The following are the steps and strategies for the implementation of PJBL with a scientific approach in:

1. **Fundamental Questions**
   Educators can bring up topics and ask questions about how to solve problems. Social studies topics or materials that can be used such as how to overcome environmental problems. At this stage, the scientific approach is that students can listen and observe the information provided by the educator, then they are welcome to ask basic questions about what to do about the topic/problem-solving.
2. **Design product planning**
   At this stage, educators ensure that each student in the group chooses and knows the procedure for making projects/products to be produced. The scientific approach is that students collect information from various sources, develop hypotheses or estimate the results of the project to be carried out.
3. **Compiling a Manufacturing Schedule**
   At this stage, educators and students make an agreement on the schedule for making the project (stages and collection). The application of the scientific approach that can be done is for students to collect data/information in a more scheduled and systematic manner.
4. **Monitor project activity and progress**
   The role of educators is to monitor the activeness of students during the implementation of projects, monitor the realization of developments and guide if students experience difficulties. At this stage, students can apply process learning by associating or processing data, then analyzing whether the data is appropriate so that conclusions can be drawn.
5. **Testing results**
   Educators assess students, how the project is, their activeness, their involvement in the making, and measure the achievement of standards. At this stage, students need to communicate by discussing the feasibility of the project that has been made and making a product/work report to be presented to others.

Application Models PJBL through the Scientific Approach affects student learning outcomes in elementary school

The learning model is the application structure of various approaches, procedures, strategies, methods, and learning techniques designed from the planning stage to the implementation of learning activities (Asyafah, 2019:22). In addition, a learning model can also be understood as a pattern or design used to prepare a learning plan so that the teaching and learning

process can take place optimally (Khoerunnisa & Aqwal, 2020:27). One type of learning model is known as Project Based Learning (PJBL).

According to Isriani Hardini and Dewi Puspitasari (2012:122), Project Based Learning (PJBL) is a learning model that provides educators with the opportunity to manage the learning process in the classroom by involving students in project activities. Meanwhile, Warsono and Hariyanto (2012:152) explained that PJBL is a teaching method that connects the use of technology with daily problems that are close to students or projects carried out at school. According to Umi Faizah (2015:29), PJBL is a learning strategy that encourages students to gain new knowledge and understanding through project activities.

From this opinion, it can be concluded that Project Based Learning (PJBL) is a learning method that involves students in project activities to produce a product or work. This model aims to develop students' affective, cognitive, and psychomotor competencies by connecting technology and real problems in daily life. This approach encourages learners to be more creative and motivated to learn more actively.

The Project Based Learning (PJBL) learning model has many advantages that are very beneficial for students. However, this model is rarely applied by teachers because it requires careful preparation and a long time to implement. According to Mulyasa (2014:145) PJBL is a learning model that focuses on solving complex problems through an investigative process. This model was also created to assist students in carrying out collaborative projects that combine various subjects in the curriculum. In addition, PJBL provides opportunities for students to explore learning materials meaningfully and conduct experiments together.

The principle of the PJBL (Project Based Learning) learning model is Learning that emphasizes that learning must be student-centered because this learning model uses problems that may be experienced in real life that the theme and topic have been determined, then experiments or research are carried out to produce real products that suit the students' abilities. This aims to enable students to solve problems using the right concept, so that it becomes more meaningful.

The main principle in the Project Based Learning (PJBL) learning model is student-focused learning. The model utilizes real-life relevant issues as a basis for learning, with predetermined themes and topics. Students then conduct experiments or research to produce real products according to their abilities. The goal is for students to be able to solve problems by applying the appropriate concepts, principles, and knowledge to make the learning process more meaningful.

Challenges and Obstacles for Educators in the Implementation of the PJBL Learning Model with a Scientific Approach

Project-Based Learning, which serves as a dynamic pedagogical model aimed at fostering active engagement among students, undoubtedly encounters a multitude of challenges and barriers during its execution. These impediments are not solely the responsibility of the students; in fact, the educators who assume the role of facilitators also face significant hurdles when it comes to the effective implementation of this innovative learning strategy. A particularly prevalent challenge that educators often confront is the insufficient allocation of time during the educational process. This concern arises primarily due to the inherent nature of the project-based model, which necessitates that students develop tangible products, a process that typically demands an extended period for successful completion. Within this intricate framework, the teacher's role is crucial, as they are responsible for not only facilitating the learning experience but also for managing and supervising the classroom environment to ensure that the learning objectives are met in an effective manner.

In addition to the aforementioned time constraints, another significant obstacle that can hinder the successful implementation of the project-based learning model is the insufficient level of student engagement when it comes to contributing to the project work. Given the diverse backgrounds and varying learning preferences of students, it is essential to recognize that individuals possess a wide range of learning styles, each accompanied by different levels of comprehension and understanding. Consequently, it is not feasible for every student to participate actively in the learning process, which ultimately affects the overall effectiveness of the learning models being employed. This observation aligns with the findings presented by Mislinawati and Nurmasyitah (2018), who articulated the challenges associated with encouraging student participation in the learning process. It has been noted that students who may struggle academically tend to adopt a more passive role during discussions, often opting to remain silent while listening instead of engaging actively. Moreover, the teachers' limited capability in navigating time constraints can lead to less than optimal classroom management and oversight, further exacerbating the challenges faced in the educational setting.

Furthermore, a similar perspective was articulated by Cintang (2018), who emphasized that the difficulties and barriers encountered by educators in the execution of the Project-Based Learning (PjBL) model can primarily be attributed to issues surrounding time management. Additionally, technical challenges arise during the project implementation phase, particularly when students lack discipline in adhering to the established work procedures, which can result in suboptimal project outcomes—especially when the

project is intended to yield tangible, real-world products. Furthermore, the disparity in student capabilities can lead to unequal levels of engagement and achievement among learners, thereby complicating the learning experience for all involved.

In light of the various challenges outlined above, several potential solutions can be implemented to effectively address these issues and enhance the overall learning experience. First and foremost, it is crucial to establish a structured timeline that aligns with the project duration, or alternatively, to encourage students to undertake project work outside of classroom hours. Secondly, to foster greater student involvement and ensure active participation, teachers must take on the responsibility of supervising, reminding, and motivating students throughout the project process.

Both Mislinawati and Nurmasyitah (2018) and Nyai Cintang (2018) underscore the critical importance of adept time management and proactive teacher supervision in surmounting the challenges associated with project implementation within the classroom context. To effectively mitigate time-related constraints, educators can make necessary adjustments to the project duration in accordance with the time available, strategically segment the time allotted for each phase of the project, or even integrate multiple lessons where appropriate. In addition, providing effective oversight of student activities during the project work phase is vital to ensure that all students are fully engaged and participating in the learning process. To tackle issues related to student discipline, it is imperative for teachers to fulfill their supervisory role by organizing students into heterogeneous groups, thereby fostering an environment where students can support and complement one another's learning experiences.

Additionally, drawing from the comprehensive findings of various researchers who have conducted extensive studies in this domain, it becomes evident that educators encounter a multitude of significant challenges when attempting to effectively implement scientific approaches within their teaching methodologies. These challenges can be encapsulated in the following points: 1) At the initial observation phase of the learning process, it has been observed that a considerable number of students frequently fail to fully engage with the instructions provided by their teacher, as some students may choose to remain silent, exhibit a lack of concentration, or, in some instances, engage in conversations with their peers instead of focusing their attention on the objects or materials presented for observation by the educator. 2) During the questioning phase, teachers often find themselves grappling with the difficulty that arises from students not taking an active role in posing inquiries, which can be attributed to a notable lack of curiosity among students regarding the subject matter

being taught. Furthermore, when educators do extend the opportunity for students to ask questions, it is not uncommon for students to feel perplexed about what they should inquire about, thus underscoring the critical need for guidance from teachers during this phase. 3) At the information collection stage, teachers encounter the challenge posed by the fact that elementary school students tend to depend heavily on the teacher as their primary source of information, thereby limiting the breadth of their learning experience. 4) In the reasoning or associating phase, educators face the significant hurdle of students exhibiting a lack of critical thinking skills, which hinders their ability to analyze and make connections regarding the material, thereby indicating a pressing need for teacher assistance in fostering these essential cognitive skills. 5) Finally, at the communication stage, the issues that teachers confront are predominantly centered around students' insufficient abilities to articulate their thoughts and ideas in front of their classmates. Many students display feelings of embarrassment and apprehension regarding the potential for making mistakes while speaking, a situation that often arises due to inadequate practice and development of their speaking skills.

In light of the aforementioned challenges, there exist several proactive strategies or solutions that can be employed to effectively mitigate these obstacles, as posited by Malikah (2017:46), which can be summarized as follows: 1) To enhance student engagement during the observation phase, it is imperative for educators to cultivate a learning environment that is not only enjoyable but also stimulates curiosity among students. Teachers should actively encourage students to analyze their observations critically and share their insights with their peers, fostering a collaborative learning atmosphere. 2) In order to motivate students to engage in questioning, educators must implement effective and appropriate teaching strategies that are tailored to enhance students' enthusiasm for learning, thereby empowering them to ask questions, express their opinions, and gain a deeper comprehension of the subject matter. 3) A significant factor contributing to the challenges encountered during the information collection phase is the inadequacy of learning resources and facilities. To address this issue, it is essential to foster collaborative partnerships between educational institutions and government entities to ensure that the necessary infrastructure and resources are available. Additionally, teachers must take the time to understand the unique characteristics of each student in order to provide targeted support that meets their individual needs. 4) To facilitate students in connecting the information they acquire, educators can employ group discussion techniques as a means of promoting collaborative learning. Moreover, the integration of diverse teaching methodologies is crucial in sustaining students' interest and engagement in the learning process. 5)

Educators should also encourage students to regularly present their work, whether individually or in group formats, to build their confidence in communication. Offering incentives or rewards can serve as an effective motivational tool, further encouraging students to participate actively in their learning journey.

The Influence of the PJBL Model through a Scientific Approach on Student Learning Outcomes in Elementary Schools

The Project Based Learning (PjBL) model represents a significant and innovative approach to education, particularly within the context of elementary school settings, where it has been demonstrated to substantially enhance the learning outcomes of students, especially when it is effectively integrated with a scientific methodology. The learning outcomes of students encompass a wide range of dimensions, including cognitive, affective, and psychomotor aspects, and these outcomes are profoundly influenced by a learning process that actively engages students in practical, real-world projects that require their participation. According to the research conducted by Apriliani & Panggayuh (2018), the implementation of the PjBL model facilitates collaborative efforts among students within group settings, thereby simplifying the process of addressing and resolving complex problems that they may encounter.

This collaborative learning experience not only fosters essential skills in teamwork and cooperation but also promotes a deeper and more comprehensive understanding of the material being studied. The findings presented by Pratiwi et al. (2018) indicate that when an integrated scientific approach is employed, students become actively involved in various stages of the learning process such as observing phenomena, formulating questions, gathering relevant data, and establishing connections between concepts, which collectively enhance their cognitive learning outcomes as well as their critical thinking abilities. Therefore, it is evident that the PjBL model, when utilized in conjunction with a scientific approach, empowers elementary school students to engage in a more profound and applicable learning experience, which ultimately reinforces their comprehension and practical skills that are pertinent to real-world situations.

The effectiveness of the Project Based Learning (PjBL) model, particularly when viewed through the lens of a scientific approach, can be assessed not only by evaluating the enhancement of students' collaborative or problem-solving capabilities but also by examining the direct and tangible influence it exerts on the attainment of more comprehensive, holistic, and contextually relevant learning outcomes. Muamar et al. (2017) have articulated that the PjBL model enables students to actively participate in projects that necessitate the application of concepts and theories they have

previously learned in realistic contexts, thereby solidifying their understanding and facilitating the practical application of theoretical knowledge.

This assertion aligns with the conclusions drawn by Rahayu & Saputra (2020), which indicate that the incorporation of a scientific approach within PjBL significantly enhances students' analytical and critical thinking abilities, ultimately leading to improved cognitive learning outcomes. Furthermore, the scientific approaches that encourage students to engage in activities such as observation, inquiry, experimentation, and the synthesis of information, as elucidated by Firdaus et al. (2018), contribute to the establishment of a more dynamic and meaningful learning environment. This educational model is also closely linked to an increase in students' motivation to learn, as they find themselves more emotionally and intellectually invested in the completion of projects that are relevant to real-world challenges (Fathurrohman et al., 2019). Such a combination of learning experiences not only leads to enhanced academic performance but also significantly contributes to the development of students' social and emotional competencies, which are critically important for the holistic growth and development of elementary school students..

D. CONCLUSION

The incorporation of scientific methodologies alongside project-based learning models, commonly referred to as PJBL, has the potential to significantly enhance the educational outcomes experienced by students across various disciplines. This innovative approach aims to provide substantial support for both learners and educators, facilitating an increase in interest, motivation, and overall academic performance in the classroom setting. Nevertheless, the effective execution of PJBL encounters a multitude of challenges, among which time management issues frequently arise for educators, particularly because the nature of projects often necessitates an extended duration for completion. Furthermore, it has been observed that certain students tend to adopt a passive role in the learning process, particularly those who may possess lower academic abilities, while others exhibit a lack of discipline and may struggle with essential skills such as critical thinking and effective communication.

In order to address and mitigate these various challenges, it is imperative that there is a concerted effort to improve time management techniques, provide more intensive guidance, implement a diverse array of learning methods, and secure adequate support from educational institutions and governmental bodies alike. Additionally, incorporating awards and opportunities for public speaking practice can serve to elevate students' self-confidence, thereby enhancing their overall engagement in the learning

process. In summation, the amalgamation of PJBL with a scientific approach has been demonstrably effective in fostering advancements in students' cognitive, affective, psychomotor, and social-emotional competencies. This educational model encourages learners to take a more active role in authentic projects, cultivate collaboration skills, engage in critical thinking, and achieve a deeper understanding of the underlying concepts being taught.

E. BIBLIOGRAPHY

Cintang, N., Setyowati, D. L., & Handayani, S. S. D. (2018). The Obstacles And Strategy Of Project Based Learning Implementation In Elementary School. Journal Of Education And Learning (Edulearn), 12(1), 7-15.

Epifania, M., Hero, H., & Bunga, M. H. D. (2020). Analisis Pemahaman Guru Dalam Menerapkan Model Project Based Learning (Pjbl) Di Sd Katolik 143 Bhaktyarsa. Journal Nagalalang Primary Education, 2(1).

Ginanjar, H., Septiana, T., Ginanjar, D., & Agustin, S. (2021). Keberhasilan Implementasi Pembelajaran Berbasis Proyek: Faktor-Faktor Kunci Dalam Proses Pembelajaran. Jurnal Pendidikan Tambusai, 5(2).

Madul, F. J., Targan, G. L., & Jediut, M. (2022). Hambatan Dalam Penerapan Pendekatan saintifik Di Sekolah Dasar Dan Upaya Mengatasinya. Jipd: Jurnal Inovasi

Marza, N. S., & Ahmad, S. (2019). Pengaruh Pembelajaran Berbasis Proyek Terhadap Hasil Belajar Siswa. Jurnal Pendidikan Dan Pembelajaran Sains, 6(2), 88-99.

Mislinawati, M., & Nurmasyitah, N. (2018). Kendala Guru Dalam Menerapkan Modelmodel Pembelajaran Berdasarkan Kurikulum 2013 Pada Sd Negeri 62 Banda Aceh. Jurnal Pesona Dasar, 6(2).

Mufidah, A. M., Yusuf, M., & Karsidi, R. (2020). Analisis Permasalahan Dan Kesiapan Guru Dalam Penerapan Project Based Learningdi

Nurhadiyati, A., Rusdinal, & Fitria, Y. (2020). Pengaruh Model Project Based Learning (Pjbl) Terhadap Hasil Belajar Siswa Di Sekolah Dasar. Jurnal Basicedu, 3(2), 524– 532.

Pendidikan Dasar, 6(1), 44-52. Umi, U. (2015). Penerapan Pendekatan Saintifik Melalui Model Project Based Learning Untuk Meningkatkan Ketrampilan Proses Dan Hasil Belajar Siswa Kelas Iv Sd Negeri Seworan, Wonosegoro. Scholaria: Jurnal Pendidikan Dan Kebudayaan, 5(1), 24-38.

Raini, G. K. (2022). Pendekatan Saintifik Dengan Model Pembelajaran Berbasis Proyek (Pjbl) Untuk Meningkatkan Hasil Belajar Matematika Siswa Kelas V Sd. Sekolah Luar Biasa Provinsi Jawa Tengah. Jurnal Ortho pedagogik, 1(3), 64-75.