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Implementation of PjBL-Based Teaching Media to Improve Learning Outcomes of Fourth Grade Elementary School Students

Mahrini[1], Rita Novita[2], Rahmatullah[3], Siti Mayang Sari[4]
[1,2,3,4] Universitas Bina Bangsa Getsempena, Banda Aceh, Indonesia
Email: mahrini.nabil@gmail.com[1], rita@bbg.ac.id[2],
rahmatullah@bbg.ac.id[3], mayang@bbg.ac.id[4]

Abstract

This study aims to describe the implementation of Project Based Learning (PJBL)-based teaching media to improve fourth-grade elementary students' learning outcomes and examine their responses in thematic learning. The study was motivated by low student achievement and limited use of engaging, student-centered media. Using a qualitative case study approach, data were collected through observation, interviews, and documentation involving fourth-grade students at a public elementary school in Napai, Meulaboh, West Aceh. The developed teaching media included project-based student worksheets (LKPD), contextual learning videos, and group project guides, all validated by experts. The findings revealed that PJBL-based media created an active, enjoyable, and meaningful learning atmosphere. Students were fully engaged in stages such as identifying problems, designing, implementing, and presenting projects. Their responses were highly positive—they felt more interested, found the material easier to understand, and gained confidence in collaboration and problem-solving. Teachers noted improved classroom management and learning variety. Although requiring extra time and preparation, PJBL significantly enhanced student motivation and outcomes across cognitive, affective, and psychomotor domains. In conclusion, PJBL-based media effectively improved learning quality and outcomes, fostering active, independent, and meaningful learning experiences.

Keywords: ***Elementary School, Project-Based Learning, Teaching Media, Thematic Learning.***

INTRODUCTION

Education is a process of guiding people to become better, making it a crucial aspect of life. According to (Anggreaena, Ginanto, Felicia, Andiarti, Herutami, Alhapip, Iswoyo, hartini, 2022), providing proper education requires in-depth scientific research because education must be implemented. Elementary school is the first place expected to teach children basic concepts. The subjects taught daily can help achieve the general goals of basic education. Mathematics covers the foundations of all fields, making it crucial to teach mathematics (Handayani et al., n.d.). Mathematics is used in various areas of human life because it can be said that every aspect of human life depends on mathematics (Siregar & Dewi, 2022).

According to (Albina et al., 2022), the objectives of learning mathematics in schools are (1) understanding mathematical concepts, (2) using reasoning and the nature of mathematical models, (3) solving problems with the ability to understand problems, (4) using symbols to convey ideas, (5) understanding the importance of mathematics in life. Many main factors including teaching systems, learning methods, and teaching materials designed by teachers are adapted to students' abilities in order to have optimal learning activities and learning success (Faradila, 2024). It is hoped that in studying mathematics,

students are able to understand mathematics and utilize ideas flexibly, accurately, and effectively to solve problems (Siregar & Dewi, 2022).

According to (Priska Dinanti Putri, 2024) Basic education plays a crucial role in establishing the foundation of students' knowledge and skills. One of the challenges in elementary school learning is creating meaningful and contextual learning experiences so that students can better understand the material (Nabila et al., 2025). In reality, classroom learning is often dominated by lectures and memorization activities that lack active student participation (Ninggrat & Suriani, 2025)). This results in low motivation and learning outcomes, particularly in integrated thematic subjects that require the integration of concepts and skills (Asna, 2018).

Project-Based Learning (PJBL) is a learning approach that involves students in in-depth exploration of a real-life problem or topic through project work (Thomas, 2000). The PJBL process consists of several main stages, namely 1) Determining fundamental questions, 2) Project planning, implementation, monitoring, and reflection. PJBL provides a contextual, collaborative learning experience and fosters student learning responsibility (Syarifah et al., 2021).

The Project-Based Learning (PJBL) approach is one solution that can address these challenges (Yuline, 2018). PJBL emphasizes the learning process through real-life projects relevant to students' lives (Sari & Angreni, 2018). Through project activities, students are expected to develop a deep understanding of concepts and develop critical thinking, collaboration, and problem-solving skills (Fadiyah Andirasdini & Fuadiyah, 2024). Furthermore, PJBL aligns with the demands of the Independent Curriculum, which emphasizes competency-based learning and strengthens the Pancasila Student Profile (Mahulae et al., 2023). Problem Based Learning aims to help students be able to face real life situations and learn how adults play their roles (Yousuf et al., 2010).

Teaching media are any aids used in the learning process to convey information or subject matter (Junaidi, 2019). Effective teaching media must be able to capture students' attention, facilitate conceptual understanding, and encourage active student engagement (Arsyad A, 2011). Types of teaching media can include print (worksheets, books), visual (pictures, graphics), audiovisual (video), and interactive digital media (Saleh et al., 2023).

Learning is a process that inevitably occurs in everyone. The goal of learning is to achieve behavioral changes, increase knowledge, and develop skills across the cognitive, affective, and psychomotor domains, and the process is ongoing (Durrotunnisa & Nur, 2020).

Learning outcomes are students' achievements after participating in a learning process that encompasses cognitive (knowledge), affective (attitude), and psychomotor (skills) aspects.

Learning outcomes can be measured through tests, observations, and assessments of the products or learning processes undertaken by students (Sulastri et al., 2014).

Learning outcomes are a form of change in behavior that is relatively permanent in a person as a result of experience or training both in physical and psychological aspects, such as from not knowing to knowing, from having no skills/less skills to having more skills, and so on (Mulia et al., 2021).

The learning process is generally always packaged within a learning activity. Therefore, it can be said that learning is the assistance provided by educators (teachers, parents, the community, etc.) to facilitate the acquisition of knowledge, mastery of material,

skills, expertise, and character, as well as the formation of attitudes and beliefs in students (Pane & Darwis Dasopang, 2017).

Based on this background, this study aims to implement Project-Based Learning (PJBL)-based teaching media in thematic learning in fourth grade elementary schools and examine its impact on learning outcomes and student engagement during the learning process. This study was conducted on fourth grade students of Napai State Elementary School, Meulaboh City, West Aceh, with a focus on the implementation of PJBL-based teaching media in thematic learning. Learning focused on specific themes relevant to the curriculum and students' daily lives. The approach used was qualitative with a case study method.

METHOD

Research Design

This research uses a qualitative approach with a case study type. This approach was chosen because it is suitable for describing in depth the process of implementing Project-Based Learning (PJBL)-based teaching media and understanding student responses and their impact on learning outcomes in the context of real-life learning in fourth-grade elementary schools. This research was conducted at a public elementary school in Meulaboh City. The research subjects were fourth-grade teachers and fourth-grade students of Napai Elementary School, Meulaboh City, West Aceh, who were involved in thematic learning using PJBL-based teaching media. Subject selection was carried out purposively, considering that the school had implemented the Independent Curriculum and was open to learning innovation.

Participants/Sample

The research subjects were 30 fourth-grade teachers and fourth-grade students of Napai State Elementary School, Meulaboh City, West Aceh, who were involved in thematic learning using PJBL-based teaching media.

Data Collection

Data collection was carried out in several stages including through direct observation stages aimed at observing the implementation, learning and student involvement in preparing the project, interviews were conducted with teachers and several students aimed at obtaining in-depth data regarding their experiences during the learning process as well as by conducting documentation showing the results of student projects, teacher notes, photos of activities and video recordings of learning.

Data Analysis

The instruments used include observation guidelines, interview guidelines, and documentation formats. The instruments were designed to reveal key aspects in the implementation of PJBL, such as clarity of project objectives, student involvement, collaboration, and learning reflection.

RESULTS AND DISCUSSION

Results

The results of the study showed that the implementation of Project-Based Learning (PJBL)-based teaching media significantly improved the learning outcomes of fourth-grade elementary school students. Learning was implemented in two cycles using a project approach involving interactive teaching media such as project-based student worksheets (LKPD), thematic videos, and simple teaching aids.

Learning Outcomes Of The Experimental And Control Classes And Interviews With Class Teachers

The results of the data analysis showed that there was a significant difference between the learning outcomes of students in the experimental class and the control class. The average post-test score of the experimental class was 82.7 with learning completeness reaching 90%, while the control class had an average score of 70.2 with completeness of only 66.7%. The t-test results showed a significance value <0.05, which means there is a significant influence of the use of PJBL-based teaching media on student learning outcomes. The table below shows the detailed comparison results of the experimental and control groups as well as the results of the T-test for student learning outcomes.(Widhiarso, 2011).

Table 1. Pretest and Posttest Results of the Experimental and Control Groups

Class	Number of Students	Pre-test Average	Post-test Average	Completeness (%)	N-Gain Score	Category N-Gain
Experiment (PJBL)	30	61,2	82,7	90%	0,56	Currently
Control (Konvensional)	30	60,8	70,2	66,7%	0,24	Low

Table 2. Results of the t-test for Learning Outcomes (Post-test)

Group	N	Average	SD	Sig. (2-tailed)
Experiment	30	82,7	7,25	
Control	30	70,2	6,87	
Uji-t				0,000

Description: A significance value of 0.000 < 0.05 indicates that there is a statistically significant difference between the experimental class and the control class after treatment.

The improvement in learning outcomes in the experimental class was due to active student involvement in the project, the use of engaging teaching media, and effective group collaboration. This supports constructivist learning theory, which states that learning will be more meaningful if students are actively involved in the process of constructing their knowledge.

In addition to student outcomes, research was also conducted on fourth-grade teachers at Napai Elementary School, Meulaboh City, to determine their perceptions and experiences during the implementation of PJBL.

The following data is from observations and interviews:

Table 3. Results of Interviews and Observations of Grade IV Teachers at Napai State Elementary School, Meulaboh City

Observed Aspects	Findings Before PJBL	Findings After PJBL
Teachers' Understanding of PJBL	Still limited, only know in general.	Improved, able to design PJBL learning.
Teaching Media Design Skills	Relying on regular textbooks and LKPD.	Able to compile project-based LKPD.
Use of Teaching Media in Learning	Use of Teaching Media in Learning	Using videos, project LKPD, teaching aids.
Student Activation Strategies	Dominant lecture, question and answer.	More varied: discussions, project presentations.
Perception of Student Enthusiasm	Students are less active and get bored quickly.	Students are more enthusiastic and active in collaborating.
Obstacles Faced	Limited time, not yet familiar with PJBL.	It took some time to adapt, but I felt it helped.

From these data, it can be concluded that PJBL training and implementation not only impact student learning outcomes, but also improve teacher competence in designing more meaningful and enjoyable learning.

The implementation of Project-Based Learning (PJBL) has shown significant changes compared to the situation before its implementation. These changes can be seen in the following aspects:

1. Teachers' Understanding of PJBL

   Before implementation, teachers' understanding of PJBL was limited, with only general knowledge and no ability to apply it. After PJBL was implemented, teachers' understanding improved, and they were able to design project-based learning more systematically.
2. Skills in Designing Learning Media

   Initially, teachers relied on textbooks and standard student worksheets (LKPD). After implementing PJBL, teachers were able to develop project-based LKPDs tailored to students' needs, making the learning media more varied and contextual.
3. Use of Media in Learning

   Before PJBL, the learning media used was limited and conventional. After PJBL, teachers began utilizing a wider variety of media, such as videos, project-based LKPDs, and visual aids that support active student engagement.
4. Strategies for Activating Students

   Before PJBL, learning strategies were dominated by simple lectures and question-and-answer methods. After PJBL, strategies became more diverse, including group discussions, project work, and presentations of student work, thus encouraging more active engagement.
5. Perceptions of Student Enthusiasm

   Before PJBL, students appeared less active and easily bored during learning. After implementing PJBL, students demonstrated greater enthusiasm, actively collaborated, and were more motivated to complete project assignments.

6. Obstacles Faced

   Initially, time constraints and teachers' unfamiliarity with PJBL were major obstacles. However, after implementation, although it still took time to adapt, teachers felt that PJBL provided many benefits in improving the quality of learning.

Overall, the implementation of PJBL, supported by appropriate learning media, successfully improved teachers' competency in designing lessons while encouraging improved learning outcomes and active student engagement in the classroom.

Analysis Of Student And Teacher Activities In Pjbl Learning

The implementation of project-based learning (PJBL) has shown a significant impact on increasing student activity in the classroom. Throughout the learning process, students demonstrated higher engagement than before. At the beginning of the lesson, most students were still passive, especially when expressing opinions or asking questions. However, as the lesson progressed, their engagement increased significantly. This was evident in students' courage to ask questions, argue, discuss with friends, and confidently present project results in front of the class. Their activity in group work also increased, marked by positive collaboration in developing plans, dividing tasks, and completing projects together.

Students also appear more motivated because the projects they are given are contextual and relevant to their lives. Teaching materials such as project-based worksheets, visual aids, and instructional videos help students grasp concepts more concretely. The projects also provide space for students to explore, think critically, and express their ideas creatively.

From the teacher perspective, involvement in project-based learning (PJBL) also showed positive developments. Initially, teachers admitted they were unfamiliar with designing student-centered learning. Conventional methods such as lectures and question-and-answer sessions still dominated. However, after being provided with guidance and hands-on practice in implementing PJBL, teachers began to develop systematic project-based learning steps. Teachers became more active as learning facilitators, directing, motivating, and evaluating the process and results of students' work on projects.

Reflection activities conducted after each cycle showed that teachers found learning using the PJBL approach more meaningful. Teachers recognized that students' active participation in the learning process can be achieved by providing opportunities to explore and solve problems through project activities. Although teachers faced challenges initially, such as limited time and classroom management, overall, PJBL helped create a more lively and effective learning environment.

Thus, the analysis of these activities shows that the implementation of PJBL not only impacts student learning outcomes but also improves the quality of teaching and learning interactions between students and teachers. The PJBL approach fosters a collaborative, creative, and meaningful learning environment, in line with the principles of the Independent Curriculum.

Challenges In Pjbl Implementation

PJBL (Project-Based Learning) or Project-Based Learning is a learning approach rooted in constructivism theory, especially developed and popularized by:

- John Dewey: An American philosopher and educator, known as a key figure in progressive education theory. He emphasized that learning should be active, based on

  direct experience, and relevant to students' real lives. Dewey's idea of "learning by doing" became the philosophical foundation of project-based learning.
- Jean Piaget: A developmental psychologist who supported constructivism, the idea that students construct their own knowledge through interaction with their environment. Project-Based Learning (PBL) emphasizes that knowledge is not directly imparted but rather constructed by students themselves.
- Lev Vygotsky: Using sociocultural theory and the zone of proximal development (ZPD), Vygotsky emphasized the importance of social and collaborative learning. In PBL, students work in groups and receive guidance from teachers or peers, in line with Vygotsky's views.

Although research results show that project-based learning (PjBL) provides many benefits in improving student activity and learning outcomes, its implementation in elementary schools is not free from various challenges, including:

- Teacher Readiness: Not all teachers are accustomed to designing open, flexible, and student-centered learning. Many teachers still tend to use conventional, more structured, and one-way approaches, requiring time and training to fully understand the essence of PJBL.
- Learning Time: PJBL requires more time than traditional learning methods, especially for project planning, implementation, and presentation of results. This often conflicts with limited face-to-face time in the curriculum and the dense material that must be completed.
- Availability of Learning Media: Not all schools have access to technology or teaching aids that optimally support project implementation. In this regard, teacher creativity in utilizing simple media and the surrounding environment is crucial.
- From a student perspective, the ability to work in groups and learn independently remains a challenge. Some students are less accustomed to taking initiative or completing assignments collaboratively. Teachers need to provide intensive guidance so students can adapt to this more active and participatory learning model.

However, these challenges can be gradually overcome through teacher training, thorough lesson planning, and support from schools and parents. With the right strategy, PJBL remains a highly promising approach for developing character and 21st-century competencies in elementary school students.

Implications of Research Results

The results of this study provide several important implications for the development of learning at the elementary school level.

- From a learning practice perspective: These findings indicate that a project-based learning approach combined with contextual learning media can significantly increase student engagement, motivation, and learning outcomes. Therefore, teachers need to be more active in designing project-based learning experiences that are challenging, relevant, and enjoyable for students. Project-based learning can also be a

strategic alternative to support the implementation of the Independent Curriculum, which encourages differentiated learning and is oriented towards the Pancasila learner profile.

- From a teacher professional development perspective: This research demonstrates the importance of teacher training and mentoring in implementing Project-Based Learning (PJBL). Teachers need to be equipped with skills in designing projects, developing project-based worksheets (LKPD), and using a variety of teaching media for effective learning.
- From an educational policy perspective: These results support the need for schools to provide space and support for the implementation of Project-Based Learning (PJBL), including in terms of time allocation, learning resources, and collaboration between teachers, students, and parents. Thus, the Project-Based Learning (PJBL) approach is not only an alternative method but can be used as a primary strategy for improving the quality of learning in elementary schools.

Figure 1. Interview with Teacher F

The image shows an interview with Teacher F conducted in a classroom. Several teachers and the interviewer are seen sitting together at a table prepared with documents and interview notes. Teacher F provides information regarding the classroom learning process, specifically regarding experiences, challenges, and strategies used in teaching. The purpose of this interview was to obtain more in-depth information as part of the research process, so that the collected data can be used to analyze and improve the quality of learning in elementary schools.

Interviews were conducted by researchers with fourth-grade elementary school teachers to obtain initial information regarding the implementation of Project-Based Learning (PJBL) in teaching. The interviews took place in the teachers' lounge in a formal and conducive atmosphere, with several teachers present to provide information about classroom learning practices.

In interviews, teachers stated that the learning media used so far has tended to be conventional, thus not fully enhancing student active participation. They also explained the need for a variety of project-based media that can connect learning materials to students' everyday lives, thus facilitating conceptual understanding and fostering collaborative skills.

Through these interviews, researchers obtained important data regarding the actual learning conditions, the obstacles teachers face in using media, and their expectations regarding the implementation of the PJBL model. This information served as the basis for designing and developing relevant PJBL-based learning media, in accordance with the characteristics of fourth-grade elementary school students.

Figure 2. Students practice projects with media.

The image shows the activities of fourth-grade elementary school students in a Project-Based Learning (PJBL) learning process. Students are seen grouped around a table, observing and using media in the form of a manual scale and various fruit samples (such as melon, snake fruit, dragon fruit, and pear) as learning objects.

In this activity, the teacher guides students in direct observation and practice, namely weighing fruit using a scale and recording the results. The project students undertake not only emphasizes mastery of mathematical concepts, such as measuring weight, but also fosters collaboration, communication, and problem-solving skills.

The use of real-world media, such as fruit and scales, provides a contextual learning experience and helps students connect lesson concepts to everyday life. Through the PJBL approach, students are actively involved in finding answers, discussing, and concluding the results of the activity. This aligns with 21st-century learning objectives, which emphasize critical thinking, collaboration, communication, and creativity.

The research results show that the implementation of Project-Based Learning (PJBL)-based teaching media can improve the learning outcomes of fourth-grade elementary school students. This improvement is evident in the significantly higher posttest scores compared to pretest scores. This finding aligns with Thomas's (2000) opinion that project-based learning encourages students to actively construct knowledge through direct experience, rather than simply passively receiving information (Sari & Angreni, 2018).

The teaching media used in PJBL help students understand concepts contextually. The projects provided allow students to relate the material to everyday life, making the learning process more meaningful(Wahyu, 2013). This aligns with Piaget's constructivism theory, which emphasizes that students construct their own knowledge through concrete learning experiences. Thus, learning focuses not only on cognitive achievement but also on critical thinking, problem-solving, and group collaboration skills.

Furthermore, the results of this study support previous studies showing that PJBL can increase student motivation and engagement (Thomas, 2000). Students are more enthusiastic about working on projects because they feel responsible for their work. In this context, learning media serves as a tool that facilitates students' exploration of ideas, discussions, and presentation of project results in a more focused manner.

However, several challenges remain in its implementation. Teachers are required to be more creative in designing projects that suit student characteristics and limited time allocation. Furthermore, not all students have the same learning abilities, so teachers need to implement differentiation strategies to ensure all students actively participate and achieve the Minimum Completion Criteria (KKM).

Thus, it can be concluded that PJBL-based teaching media is effective in improving the learning outcomes of fourth-grade elementary school students. This improvement is not only evident in the cognitive domain, but also in the affective and psychomotor aspects. This success depends on teachers' readiness to systematically design, implement, and evaluate project activities, as well as the support of adequate learning resources.

CONCLUSION

Based on the research results, it can be concluded that the implementation of Project-Based Learning (PJBL)-based teaching media is effective in improving the learning outcomes of fourth-grade elementary school students. Learning designed through the PJBL approach not only improves students' academic grades but also increases their active involvement, independence, and collaborative skills. This is demonstrated by the increase in the average post-test score in the experimental class compared to the control class, as well as the increase in student learning activities from lesson I to lesson II.

Furthermore, teachers also experienced improvements in their understanding and skills in designing and implementing PJBL learning effectively. Despite several challenges such as limited time, resources, and student readiness, the PJBL approach can still be implemented with positive results if supported by careful planning and the use of contextual and engaging teaching media. Therefore, PJBL deserves to be recommended as a learning model that can be widely applied to improve the quality of basic education, particularly in developing 21st-century competencies in students.

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