JPPIPA 11(8) (2025)

Jurnal Penelitian Pendidikan IPA

http://jppipa.unram.ac.id/index.php/jppipa/index

Student Worksheet on STEM-PJBL Simple Submarine Project: Enhancing Conceptual Understanding of Archimedes' Principle under Limited Laboratory Conditions

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Received: May 29, 2025
Revised: July 15, 2025
Accepted: August 25, 2025
Published: August 31, 2025

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DOI: 10.29303/jppipa.v11i8.11516

Abstract: This study aims to develop and evaluate the feasibility of a Student Worksheet (LKPD) based on the STEM (Science, Technology, Engineering, and Mathematics) approach and the Project-Based Learning (PJBL) model through a simple submarine project, designed to enhance students' conceptual understanding of Archimedes' Principle in junior high schools with limited laboratory facilities. The LKPD was developed using the ADDIE model, comprising the stages of analysis, design, development, implementation, and evaluation. The product was validated by subject matter and media experts and its practicality was tested by a science teacher and students. Implementation involved 27 eighth-grade students and was evaluated using pretest and posttest instruments based on seven indicators of conceptual understanding. Validation results indicated that the LKPD was highly valid (scores of 4.80 and 4.20), practical (score of 4.60), and well-received by students. Classroom implementation showed high student engagement, with an interest score of 4.89. The average N-Gain of 0.47 reflected moderate effectiveness, with greater improvements in higher-order indicators such as classification, interpretation, and application. The use of simple, readily available materials allowed experimental activities despite limited resourses. Overall, the LKPD is feasible as a project-based learning tool and highlights the need to strengthen foundational concepts early in instruction.

Keywords: Archimedes; Conceptual understanding; Simple submarine; STEM project-based learning; Student worksheet

Introduction

Conceptual understanding serves as a fundamental foundation in science education, particularly at the junior secondary school level. Scientific concepts and principles are the basis of scientific knowledge and are prerequisites for engaging in complex reasoning and conducting scientific inquiry effectively (Mi et al., 2020). Without a strong conceptual grasp, students may struggle to construct meaningful scientific knowledge and to participate deeply in scientific processes (Widiyatmoko & Shimizu, 2018). In addition to conceptual understanding, the curriculum also emphasizes the development of science process skills as part of students' broader scientific competence (Kemendikbudristek, 2024).

One essential topic in junior high school physics is the concept of buoyancy, which is explained through Archimedes' Principle. This topic is not only theoretically important within the curriculum but also highly applicable to everyday life, such as in the working principles of boats, submarines, and floating

How to Cite:
Fajar, D. M., Ibad, I., & Suroso, J. (2025). Student Worksheet on STEM-PJBL Simple Submarine Project: Enhancing Conceptual Understanding of Archimedes' Principle under Limited Laboratory Conditions. *Jurnal Penelitian Pendidikan IPA*, *11*(8), 515–525. https://doi.org/10.29303/jppipa.v11i8.11516

objects. The learning of Archimedes' Principle should go beyond the memorization of mathematical formulas and instead emphasize scientific processes involving inquiry, exploration, and reasoning based on data and real-world contexts (Taniguchi et al., 2019).

Nevertheless, students' understanding of Archimedes' Principle remains a significant challenge. Common difficulties include weak conceptual comprehension, trouble applying physical principles, and limited mathematical skills—especially in connecting buoyant force to the displaced water's weight (Khalijah & Bakar, 2007). Although the concepts of floating, suspending, and sinking are introduced as early as elementary school, many students still struggle due to reliance on intuitive reasoning rather than structured scientific thinking (Handayanto & Panre, 2024). Furthermore, previous studies also highlight issues in classroom practices, such as teachers' limited mastery of the content and a lack of varied teaching methods (Diyana et al., 2020; Maknun & Marwiah, 2022). These problems point to the need for contextual teaching materials and learning approaches that promote active engagement, not merely a single worksheet product. A promising approach is to integrate contextual, project-based methods and then realize them in forms such as a student worksheet (Lembar Kerja Peserta Didik or LKPD) that fosters independent exploration, critical thinking, and connections with real-life experiences.

The Science, Technology, Engineering, and Mathematics (STEM) approach provides a contextual learning framework by integrating these four disciplines to solve real-world problems (Dare et al., 2021). Through authentic, problem-based activities, STEM not only helps students understand theoretical concepts but also encourages application through simple design and engineering tasks. STEM-based learning has been shown to improve student motivation and engagement (Chittum et al., 2017), enhance learning outcomes (Wahono et al., 2020), and develop higher-order thinking skills (Zainil et al., 2023). Additionally, it supports the cultivation of 21st-century skills such as critical thinking, creativity, collaboration, and communication (Baran et al., 2021).

Project-Based Learning (PJBL), on the other hand, is a student-centered instructional model that emphasizes the creation of meaningful, real-world projects. In PJBL, students actively engage in planning, constructing, and evaluating projects that integrate prior knowledge with new concepts (Mitry, 2021). This model fosters collaboration, problem-solving, and responsibility for learning (Nisah & Syukri, 2024), while also allowing students to construct their understanding through authentic hands-on experiences (Prajoko et al., 2023). A growing body of research recommends the integration of STEM and PJBL to improve learning quality, particularly in developing 21st-century skills (Baran et al., 2021; Mulyaningrum et al., 2025; Nisah & Syukri, 2024; Rahmania, 2021).

Although STEM–PJBL integration has been widely applied in science education, there is still very limited work that develops a student worksheet using a simple submarine project to strengthen understanding of Archimedes' Principle. Previous implementations of STEM-PJBL in fluid mechanics have included hydraulic jacks (Hartono et al., 2024), pontoon bridges (Wati et al., 2024), simple hydraulic pumps (Amri et al., 2024), and Pascal mazes (Saefullah et al., 2021), yet none focus specifically on submarine-based learning.

Therefore, this study develops a STEM-PJBL-based LKPD using a simple submarine project to provide a richer, contextual, and meaningful learning experience in understanding Archimedes' Principle. The purpose of this research is to design, validate, and implement this LKPD and to evaluate its effectiveness in improving students' conceptual understanding under limited laboratory conditions.

Method

This study employed a Research and Development (R&D) approach to develop a student worksheet (LKPD) based on the Science, Technology, Engineering, and Mathematics (STEM) approach integrated with the Project-Based Learning (PJBL) model. In addition to producing the LKPD, this study evaluated the product's validity, practicality, and effectiveness in a real classroom context.

The development procedure followed the ADDIE model, consisting of five stages—Analysis, Design, Development, Implementation, and Evaluation—implemented in a cyclic process, where the Evaluation stage continuously informs and refines the other stages. (see Figure 1 for the procedural flow). In the analysis stage, a needs assessment was conducted to examine students' difficulties with the concept of buoyancy and its alignment with the characteristics of junior secondary students. This analysis involved curriculum review, content alignment, and common instructional challenges related to teaching Archimedes' Principle. The design stage focused on drafting the STEM–PJBL-based LKPD by integrating PJBL syntax with core STEM components. At this stage, the researcher previously tested the simple submarine design to ensure its technical feasibility before incorporating it into the PJBL stages of the LKPD. During the development stage, the LKPD draft was validated by two experts—one in subject content and the other in educational media. Afterward, the revised LKPD was evaluated on practicality through feedback from one science teacher prior to classroom use. In the implementation stage, the

LKPD was trialed with 27 eighth-grade students at a private junior high school in Kalisat District, Jember Regency, which was reported to have limited laboratory facilities. Evaluation was carried out comprehensively. It included: process evaluation to ensure each ADDIE stage was implemented as planned; product evaluation through expert validation scores, teacher practicality feedback, and student attractiveness response; and effectiveness evaluation by comparing students' pretest and posttest results on conceptual understanding.

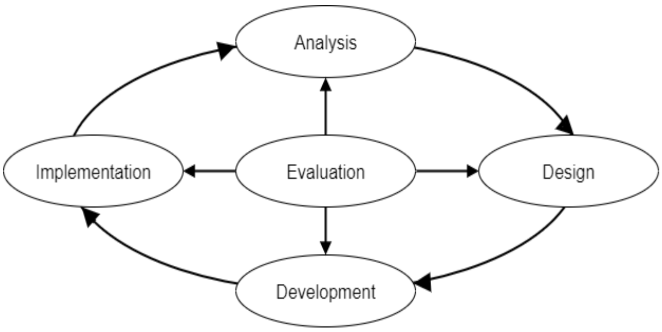


Figure 1. The cyclic process of the ADDIE model

The instruments used in this study included pretest and posttest questions, expert validation questionnaires, a teacher practicality questionnaire, and a student response questionnaire. Each questionnaire consisted of Likert-scale items and open-ended prompts to collect qualitative feedback. All instruments were adapted from Muliyati et al. (2023) and adjusted to the study context.

The content expert validation questionnaire assessed: content appropriateness, integration of STEM-PJBL approach and content, and language use. The media expert validation questionnaire assessed: visual design and aesthetics, typography and layout, as well as functionality and alignment with PJBL. The teacher practicality questionnaire evaluated: content quality and concept relevance; integration with PJBL and skills development; and language and readability. The student response questionnaire evaluated: comprehension and independent learning, engagement and motivation, and media quality and usability.

The pretest and posttest instruments were designed to measure seven indicators of conceptual understanding (Laelasari & Wakhidah, 2023) across 14 multiple-choice questions, as shown in Table 1 along with sample questions.

The collected data were analyzed both quantitatively and qualitatively. Quantitative data from expert validation, teacher practicality, and student responses were analyzed using percentage calculations and categorized based on feasibility criteria. Qualitative data were analyzed by identifying the most prominent comments from respondents. To assess improvement in conceptual understanding, pretest and posttest scores were analyzed using the N-Gain formula and interpreted using Hake's gain classification criteria (Hake, 1998).

Table 1. Indicators of conceptual understanding

Indicators	Number of Items
1. Restating the concept	2
2. Providing examples and non-examples	3
3. Classifying	1
4. Interpretation	1
5. Drawing conclusions	2
6. Explaining processes	2
7. Applying the concept	3

Sample Questions

Explaining processes:

11. A submarine expels part of the water from its ballast tank and begins to rise to the surface. Which explanation is the most accurate?
    a. The volume of the submarine decreases, causing its density to increase
    b. The weight of the submarine increases because the buoyant force becomes smaller
    c. The mass of the submarine decreases, causing its density to decrease
    d. The water pressure inside the submarine decreases

Applying the concept:

13. The submarine does not sink even though a weight has been added. What is the best solution?
    a. Reduce the weight
    b. Increase the volume of the bottle
    c. Reduce the air inside the submarine
    d. Replace the water with oil

Result and Discussion

Analysis

The analysis phase began with interviews with the science teacher and a review of students' previous test results. The findings revealed that students still struggled to understand the concept of Archimedes' Principle. One suspected reason was the delivery of the material in the textbook, which tended to be abstract and heavily mathematical, without being linked to real-life applications. The teacher expressed support for the implementation of project-based learning, as it is believed to enhance student engagement and promote more contextual understanding.

Observations and interviews also indicated limited laboratory facilities, especially in terms of fluid mechanics equipment. This limitation prompted the researcher to develop a student worksheet (LKPD) that utilized simple or recycled materials commonly found at home, ensuring that experiments could still be conducted effectively despite limited resources.

Curriculum analysis showed that Archimedes' Principle is part of the topic "Pressure in Fluids and Its Applications in Daily Life" within the junior high school curriculum. This curriculum encourages the use of real-world project-based learning to strengthen students' understanding of science concepts and process skills (Kemendikbudristek, 2024). These findings reinforce the urgency of developing a STEM-PJBL-based LKPD using a simple submarine project to bridge scientific concepts with real-life experiences.

Design

The design of the simple submarine project in this study refers to the work of Thiam (2017), who developed an engineering-based learning project for eighth-grade students aimed at teaching the principles of Archimedes. In this project, students were assigned to design, construct, and test a submarine model capable of ascending, descending, and moving forward by utilizing a fluid transfer system—such as balloons, hydraulic, or pneumatic mechanisms.

Through this project, students are expected to understand that changes in the submarine's mass—caused by water intake while keeping volume constant—affect the density of the vessel. This change in density determines whether the submarine will sink, float, or remain suspended. Therefore, the project not only enhances students' understanding of buoyant force, density, and stability but also fosters teamwork, problem-solving, and scientific literacy through the preparation of technical reports that detail design processes, challenges, and scientific concept applications.

The STEM integration framework for the simple submarine project is illustrated in Figure 2.

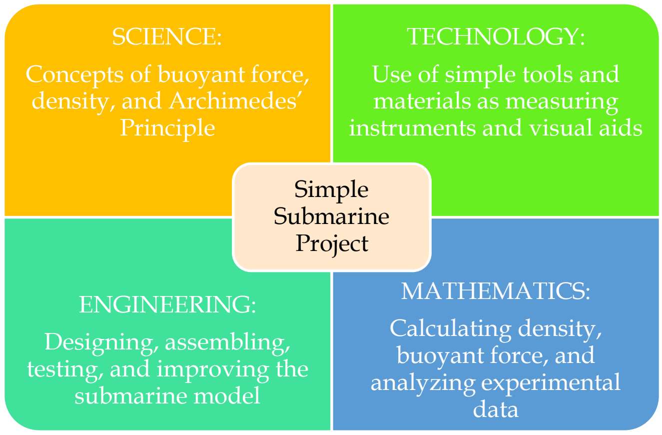
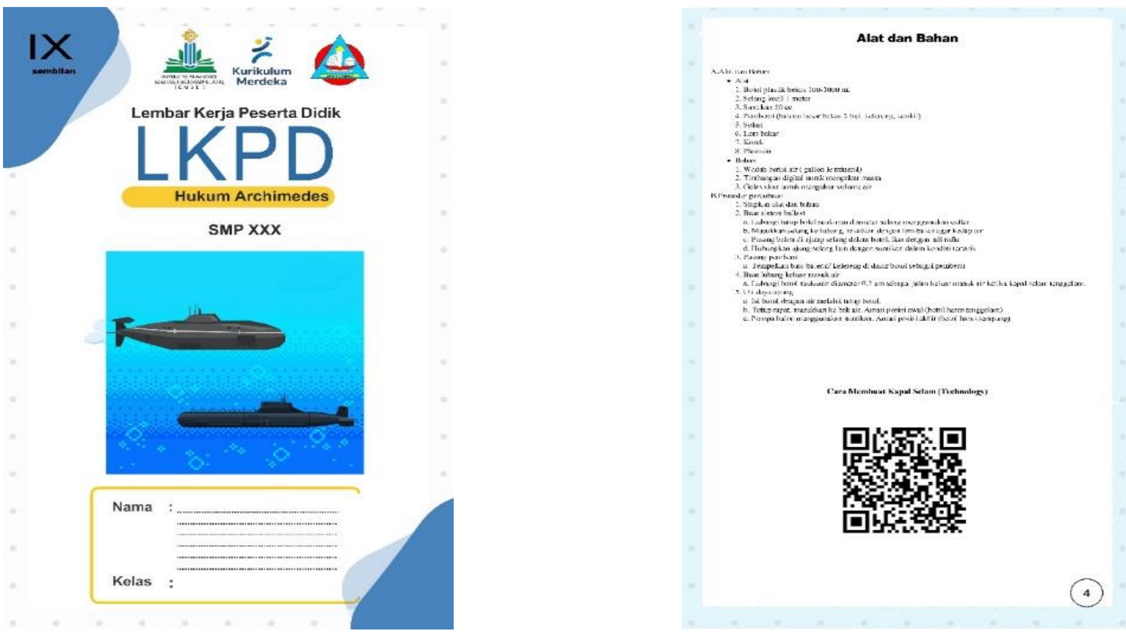


Figure 2. STEM integration framework in the simple submarine project

Referring to the framework, a Student Worksheet (LKPD) was developed by integrating the STEM approach with the Project-Based Learning (PJBL) model. The LKPD structure was designed based on the PJBL syntax, which includes: formulating essential questions, planning the project, developing a timeline, carrying out the project, monitoring progress, testing the product, and reflecting on the learning experience (Suradika et al., 2023). Each stage was intended to promote active student engagement in exploring concepts, formulating solutions, and reflecting on their learning through the simple submarine project activities.



(a) (b)

(c)

(d)

Figure 3. Design of the STEM‑PjBL student worksheet for the simple submarine project: (a) cover; (b) materials, technology activities, and video guide; (c) science and engineering activities; (d) mathematics activities

The LKPD consists of several key components, including title and student identity sections, instructions for use, learning objectives, a summary of theoretical content, student activity sheets, and an evaluation section consisting of conceptual understanding questions, as guided by national curriculum standards (Suwadi et al., 2024). The visual design was also considered by using attractive colors, images, and illustrations while maintaining readability and appropriateness for junior high school students. The materials and activities were developed to be contextual and to connect science concepts with real-life situations. The design of LKPD is presented in Figure 3.

Develop

At the development stage, the designed student worksheet (LKPD) was evaluated by a subject-matter expert and a media expert for content and design validation, and by a teacher for practicality assessment. The results of the evaluations from all three reviewers are presented in Table 2, Table 3, and Table 4.

The validation results from the subject-matter expert indicated a score of 4.8 out of 5.0 (categorized as very valid), covering the appropriateness of content, integration of the STEM-PJBL approach, and language quality. The media expert validation yielded a score of 4.2 out of 5.0 (also categorized as very valid), focusing on visual design, layout, and alignment with PJBL activities.

Table 2. Expert validation results – content expert

Category	Assessment Indicators	Average Score
Content Appropriateness	Material aligns with Learning Outcomes and Objectives; Refers to correct scientific concepts; Matches student characteristics at the junior high level.	4.60
Integration of STEM-PJBL approach	Complete PJBL syntax; Encourages critical thinking; Activities involve observing, concluding, evaluating; Contextual to real life (submarine project).	5.00
Language Use	Communicative and systematic language; Clear sentences; Correct grammar and spelling.	4.60
Average (criteria)		4.80 (Very valid)

During the initial draft, the subject expert questioned how students could measure density through mass and volume measurements, considering the limited availability of measuring instruments in schools. As a solution, the developer provided a digital scale from outside the school for mass measurements, while students used a simple overflow cup method for measuring volume. This approach not only enabled students to complete the measurements effectively but also taught them to find practical solutions under equipment constraints.

Table 3. Expert validation results – media expert

Category	Assessment Indicators	Average Score
Visual Design and Aesthetics	Attractive layout; Illustrations support understanding; Color use does not interfere with readability.	4.00
Typography and Layout	Readable and consistent fonts; Neat and clear layout.	4.50
Functionality and PJBL Alignment	Supports group-based learning; Media aligns with project activities.	4.50
Average (criteria)		4.20 (very valid)

Table 4. Practicality assessment – teacher response

Category	Assessment Indicators	Average Score
Content Quality and Concept Relevance	Supports individual and group understanding; Usable without requiring complex facilities.	4.50
Integration with PJBL and Skill Development	Promotes project engagement; Suitable within allocated time; Can be used without repeated explanation.	4.60
Language and Readability	Language suits student literacy; Instructions are easy to follow; Layout supports clarity.	4.60
Average (criteria)		4.60 (very valid)

Revisions were made based on expert feedback, including editorial improvements, font size adjustments, layout refinements, and enhancements to the usage instructions. After revision, the LKPD was assessed for practicality by a science teacher, resulting in a score of 4.6 out of 5.0, categorized as very practical. The teacher noted that the LKPD was easy to use, relevant, and effective in promoting student engagement in the project activities. One notable teacher comment suggested that the LKPD could serve as an alternative final practical exam for ninth-grade students, especially in schools with limited laboratory facilities.

Implementation

The implementation stage was conducted after the LKPD was declared valid and practical during the development phase. The product was then piloted in a limited setting to evaluate its feasibility in real classroom instruction. The trial involved 27 eighth-grade students from a private junior high school in Kalisat District, Jember Regency. The implementation took place in one session lasting three hours, based on a schedule agreed upon with the school and participating teachers.

In the classroom, the teacher used the LKPD as the main instructional guide. The lesson began with the introduction of a problem and planning of the project, followed by the core activities of designing and testing a simple submarine model. Students were divided into six small groups and worked collaboratively to construct and evaluate their submarine designs. The teacher acted as a facilitator, guiding the activity and assisting students in understanding the concepts that emerged during the project.

The implementation results showed high levels of enthusiasm and active participation among students throughout all phases of the project. Group discussions were productive, and students demonstrated strong interest in tackling the challenges posed by the project. The LKPD was considered effective in guiding the learning process systematically and in promoting student engagement both cognitively and affectively. The teacher also gave positive feedback, noting that the LKPD sequence was easy to follow and well-aligned with the learning objectives. Figure 4 presents several snapshots of student activities during implementation.

Table 5. Students' quantitative assessment of LKPD based on categories

Assessment Aspect	Average	Standard Deviation
Comprehension and Independent Learning		
The LKPD is easy to understand.	3.19	0.40
Activity instructions in the LKPD are clear and not confusing.	4.96	0.20
The LKPD helps me understand the concept of Archimedes' Principle.	3.15	0.40
I completed the LKPD without heavily relying on the teacher.	3.20	0.50
Engagement and Motivation		
I enjoyed learning using this LKPD.	3.90	0.40
I was more interested in the lesson because of the submarine project.	4.89	0.40
I feel motivated to learn science through this kind of activity.	4.00	0.50
Media Quality and Usability		
The illustrations in the LKPD helped me understand the material.	4.10	0.70
This LKPD can be used both individually and in groups.	4.80	0.40
The time allocated for completing the LKPD was appropriate.	4.85	0.50
Average (criteria)	4.10 (very practical)	

(a) (b) (c) (d)

Figure 4. Students' activities with the STEM‑PJBL worksheet in the simple submarine project: (a) Students working in groups to design a simple submarine using recycled materials such as plastic bottles, hoses, balloons, weights (rocks), and syringes; (b) several models of student-designed simple submarines; (c) students testing the performance of their submarines in a water-filled container by observing position changes due to variations in balloon air volume via syringe, showing excitement upon successful trials; (d) students measuring mass and volume at each position (sinking, floating, and hovering) as a basis for calculating density and evaluating the design (volume measurement tool not visible in the photo)

Quantitative evaluation by students toward the worksheet was conducted based on three main categories: clarity and independent learning, engagement and learning motivation, as well as media quality and usability. The results of the evaluation are presented in Table 5.

Based on Table 5, the evaluation results indicate that the highest-rated aspects were the clarity of activity instructions (4.96), followed by students' interest in the submarine project (4.89), and the appropriateness of the allotted time (4.85). These findings suggest that the LKPD effectively facilitates engaging and well-structured learning activities. On the other hand, the lowest scores were found in the aspects of conceptual understanding of Archimedes' Principle (3.15) and ease of comprehension of the worksheet (3.19), indicating a need for strengthening students' conceptual understanding. Overall, the LKPD was positively received and considered suitable for use in project-based learning.

Qualitative comments from students highlighted that the learning activities were enjoyable, particularly during the submarine testing and the measurement of mass and volume. However, several students also noted that the extended duration of the activity was somewhat tiring.

Evaluation

The evaluation stage is the final step in the ADDIE development model and aims to assess the effectiveness of the LKPD in improving students' conceptual understanding. The evaluation was conducted by comparing the results of pretests and posttests using a multiple-choice test consisting of 14 items, developed based on seven conceptual understanding indicators as outlined by Laelasari & Wakhidah (2023).

Each indicator was analyzed using the N-Gain formula to quantitatively measure the improvement in students' conceptual understanding. The results of the analysis are presented in Table 6.

Table 6. Results of students' conceptual understanding improvement based on N-Gain

Indicator	Pretest	Posttest	N-Gain	Criteria
Restating the concept	0.13	0.15	0.02	Low
Providing examples and non-examples	0.31	0.41	0.14	Low
Classifying	0.33	0.85	0.78	High
Interpretation	0.22	0.93	0.90	High
Drawing conclusions	0.11	0.46	0.40	Moderate
Explaining processes	0.30	0.51	0.30	Moderate
Applying the concept	0.07	0.79	0.77	High
Average	0.21	0.59	0.47	Moderate

The analysis results revealed that the average N-Gain score for students' conceptual understanding was 0.47, categorized as moderate. This indicates that the STEM-PJBL worksheet developed through a simple submarine project had a moderately effective impact on enhancing students' conceptual understanding.

More specifically, three indicators fell into the high category: classifying (0.78), interpretation (0.90), and applying concepts (0.77). These results suggest that the project-based approach was effective in fostering higher-order thinking skills, particularly in terms of application and analysis. Two other indicators—drawing conclusions (0.40) and explaining processes (0.30)—were categorized as moderate, indicating a need to further strengthen students' logical reasoning and understanding of cause-and-effect relationships. Meanwhile, the indicators of restating concepts (0.02) and providing examples and non-examples (0.14) were categorized as low, highlighting that students' foundational conceptual understanding requires greater attention at the beginning of instruction.

Discussion now starts directly with interpretation of findings. The product's validity was reflected in the average scores of 4.80 from content experts and 4.20 from media experts (both categorized as highly valid), indicating alignment of content and design with scientific principles and the characteristics of junior high school learners. The integration of PJBL syntax with STEM elements further strengthened specific instructional aspects, such as contextualization of concepts, clarity of task sequences, and alignment with hands-on activities, in line with Kemendikbudristek (2024) policy encouraging project-based learning to enhance science literacy and process skills. Moreover, the worksheet's adaptability to limited school laboratory resources—such as the use of digital scales and simple volume measurement tools—demonstrated its flexibility in addressing field challenges.

The worksheet also received very positive feedback regarding its practicality, with an average score of 4.60 from the science teacher (categorized as highly practical). The teacher noted in detail that the worksheet's clear step-by-step instructions and contextual materials made it easy to implement and engaging for students. They further suggested its use as an alternative practical exam in schools with limited laboratory facilities. These findings support previous research indicating that STEM-PJBL can be a contextual and effective solution for enhancing students' conceptual understanding in resource-constrained settings (Susanti & Fatmawati, 2023; Zuhaida et al., 2023).

The classroom implementation of the worksheet revealed high levels of student enthusiasm and active participation throughout all learning stages, from planning to testing the submarine project. Students collaborated in groups, discussed ideas, built prototypes, and evaluated their designs. The questionnaire results showed a high score in student interest toward the project activities (4.89), reinforcing findings that STEM approaches significantly promote student motivation and engagement (Ilafi et al., 2024; Nurhayati et al., 2023; Subari & Mercuriani, 2024). Furthermore, the STEM-PJBL approach proved to foster meaningful and independent learning (Egenrieder, 2010; Hanif et al., 2019; Tang et al., 2024) by providing direct experiences that helped students construct a more complete and applicable understanding of concepts. Nevertheless, time management emerged as a challenge for some students. Project-based learning typically requires a longer duration, which can lead to fatigue if not well managed (Imaduddin et al., 2021). Therefore, effective time management is essential to ensure that project activities run optimally without compromising students' learning comfort.

The evaluation of the worksheet's effectiveness showed that improvements in students' conceptual understanding were uneven. The overall N-Gain of 0.47 indicates moderate effectiveness. Gains were notably higher on indicators related to higher-order thinking—such as classifying, interpreting, and applying concepts—while indicators targeting very basic understanding, such as restating concepts or giving examples and non-examples, showed minimal progress.

This gap between stronger improvement in higher-order indicators and weaker basic understanding invites further interpretation. One possibility is that the LKPD activities emphasized project execution and problem solving, which naturally stimulate higher-order processes, but did not include enough scaffolding to strengthen foundational concepts early on. Another possibility is that some students who already possessed basic understanding were able to benefit fully from the higher-order tasks, while others struggled because their foundational knowledge was insufficient. It is also worth considering whether the assessment items for basic indicators were less sensitive or less integrated with the project-based context, resulting in lower measured gains.

These findings align with previous studies (Handayanto & Panre, 2024; Khalijah & Bakar, 2007) that highlight students' difficulties in developing a basic conceptual understanding of Archimedes' Principle, often due to reliance on intuitive thinking or abstract teaching methods. Although STEM-PJBL-based worksheets have proven effective in enhancing higher-order thinking skills, the challenge of strengthening this foundational conceptual understanding indicates the need for more targeted instructional strategies early in the learning process to ensure comprehensive understanding (Hailikari et al., 2008; Ziori & Dienes, 2008). To address this, teachers could first reinforce key concepts through brief reviews or scaffolding tasks—such as restating principles or giving examples—before students move on to the project-based activities.

A limitation of this study is the use of a limited sample and assessment items that may not fully capture basic concept progress; further studies with broader samples and refined instruments is recommended.

Conclusion

The development of a STEM-PJBL-based student worksheet (LKPD) through a simple submarine project has proven to be valid, practical, and of moderate effectiveness in enhancing junior high school students' conceptual understanding of Archimedes' Principle. The validity of the LKPD was demonstrated through positive evaluations from content and media experts, while its practicality was reinforced by feedback from the teacher, who noted that the LKPD was easy to use and aligned with learning needs. Classroom implementation showed active student engagement and enthusiasm, along with high N-Gain improvements in higher-order thinking indicators such as classification (0.78), interpretation (0.90), and application of concepts (0.77). Overall, the LKPD is considered suitable as an alternative project-based learning tool, particularly in schools with limited facilities, and is recommended for further development on a broader scale.

Acknowledgments
The authors would like to express their gratitude to the junior high school that supported the implementation of this research. Appreciation is also extended to the science teacher and students who participated in the trial activities.

Author Contributions
Conceptualization and methodology, writing—original draft preparation, D.M.F.; validation, J.S.; investigation, resources, data curation, I.I. All authors have read and agreed to the published version of the manuscript.

Funding
This research received no external funding.

Conflicts of Interest
The authors declare no conflict of interest.

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