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Development Of Problem-Based Learning–Based Student Worksheets Integrated With *Catur Pramana* To Improve Elementary School Students' Science Process Skills

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Abstract

his study aims to develop Student Worksheets (LKPD) by integrating the Problem-Based Learning (PBL) model with Catur Pramana values. Utilizing the ADDIE framework, the research produced a science learning instrument tailored for elementary education. Expert validation confirmed the quality of the product with an Aiken's V index of 0.77, indicating high validity. Furthermore, the effectiveness test revealed a significant enhancement in student performance, with average scores rising from 15.6 (pre-test) to 25.4 (post-test). With an N-gain score of 0.7 and an effectiveness rate of 68%, the developed LKPD is categorized as moderately effective and serves as a strategic tool for fostering students' science process skills.

Keywords:: *lkpd, problem based learning, Catur Pramana.*

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INTRODUCTION

Education can be understood as a systematic effort that is planned through learning mechanisms to engage students in developing their spiritual potential, self-regulation, attitudes, intelligence, morality, and competencies required for life (Persi et al., 2024). The learning process today is required to adapt to the rapid development of the times. Professionally, educators are expected to implement student-centered learning models. This strategy is designed to facilitate active participation through the exploration of information from various sources and problem solving in order to optimize analytical thinking skills (Salsabilla, 2022). However, practices in the field often show that science learning tends to be conventional and teacher-centered, which results in low science process abilities and analytical skills among students (Faiz et al., 2022). Dependence on lecture methods and textbook literacy in teacher-centered learning, as well as the limited implementation of practical activities, contributes to the low contextualization of the material being taught (F.N. & Setiono, 2020). Research conducted by Octavia et al. (2024) indicates that students' process skills in problem solving remain low due to their lack of interest in science learning. This finding is consistent with the study conducted by Faidah et al. (2024), which shows that students' process skills are still in the developing stage and require improvement to enhance the quality of science learning.

Following the development of the 21st-century educational paradigm, educational activities in elementary schools are expected to optimize students' abilities in critical thinking, creativity, communication, and collaboration (Syafitri et al., 2024). The focus of learning is no longer limited to mastering content alone, but also on the process of knowledge construction through meaningful learning experiences. Based on this perspective, teaching materials are needed that can facilitate active student participation, provide opportunities for inquiry, and develop science process skills (Artini, 2023). The presence of systematically and creatively developed teaching materials is expected to assist educators in implementing quality, engaging, and relevant learning that meets the learning needs of students at the elementary education level (Rusmiati, 2022).

The use of Student Worksheets (LKPD) is one of the important efforts to advance science education in order to optimize science process skills (Kriswanti et al., 2022). The use of LKPD aims to develop competencies in thinking, working, and behaving scientifically. This condition aligns with the nature of science education, which focuses on learning experiences that improve students' process skills and scientific attitudes (Sasmitha et al., 2023). LKPD provides engaging experiences for students, allowing them to explore and better understand their surrounding environment through the media provided by teachers (Rahmawati et al., 2024). To make science learning more meaningful, LKPD can be integrated with the Problem-Based Learning (PBL) approach. PBL offers reasoning through structured approaches related to real-life situations (Nafisa et al., 2025). Through PBL, students can learn more deeply about natural phenomena and become involved in solving problems through simple experiments conducted individually or in groups by following the procedures contained in the LKPD as part of the science process (Ramadhani et al., 2025; Handayani, 2018).

Although PBL-based LKPD has the potential to improve science process skills, its implementation still faces several challenges, including teacher readiness, time constraints, limited facilities, and differences in students' abilities. The LKPD commonly used tends to focus mainly on answering questions, which does not yet encourage higher-order thinking skills. Therefore, careful instructional planning and the development of contextual LKPD are required. Research on the development of PBL-based LKPD shows that worksheets designed with real-life problems, discussions, investigations, experiments, and reflection can increase students' activeness and thinking skills. The results of expert validation and highly positive student responses indicate that the implementation of PBL-based LKPD is proven to be effective and feasible for developing students' critical thinking and scientific process skills in science learning (Ilham et al., 2024).

Based on this perspective, when linked to real-world learning, the PBL learning approach can also be integrated with the culture surrounding students' environments, allowing students to obtain direct learning experiences related to real concepts in their surroundings (Sudirman & Purnayasa, 2024). One way to achieve this is by integrating local wisdom as a distinctive characteristic of a region. The integration of local wisdom in learning represents an effort by educators to instill character values, enhance knowledge, and equip students with science process skills (Baro'ah, 2023). The science process in science learning is conducted through various methods, and there is a concept of Balinese local wisdom that can be applied as an interactive method in science learning, namely the concept of *Catur Pramana*. *Catur Pramana* refers to four primary methods of acquiring knowledge: pratyaksa, anumana, upamana, and sabda. The application of these principles, which include observation, reasoning, analogy, and testimony, can make learning more contextual while integrating science material with local wisdom (Wayan et al., 2025). With the introduction of innovation in Student Worksheets (LKPD) based on Problem-Based Learning and integrated with *Catur Pramana*, it is expected that students' activeness in learning will increase, their thinking abilities will develop, collaboration and discussion skills will grow significantly, and students' knowledge particularly in science learning will expand (Persi et al., 2024).

In line with this perspective, the development of LKPD based on the integration of Problem-Based Learning (PBL) and *Catur Pramana* represents an innovative breakthrough that can be implemented in science learning. Through the integration of the PBL model and *Catur Pramana*, students can develop their ability to acquire knowledge through observation, reasoning, comparison, and authoritative sources within a contextual framework. This approach not only strengthens science process skills but also integrates learning with the values of Balinese local wisdom, thereby creating meaningful learning experiences. Thus, the development of this LKPD is expected to optimize active participation, critical thinking abilities, and students' science process skills effectively (Sari et al., 2025).

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Science education at the elementary school level currently still faces challenges that affect the quality of both the learning process and outcomes, such as the dominance of teacher-centered learning, expository teaching methods, and assignments oriented toward memorization. These conditions limit students' opportunities to conduct scientific inquiry and independent science processes, resulting in science process skills, critical thinking, and analytical abilities that have not developed optimally. Furthermore, existing pedagogical materials tend to be conventional, lack contextual relevance, and have not effectively integrated local wisdom. In fact, Catur Pramana, as a foundational element of Balinese local wisdom, holds significant potential for integration into science education through the Problem-Based Learning (PBL) framework. To address this, the current study employs a Research and Development (R&D) approach following the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). The effectiveness of the developed product is measured using pre-test and post-test instruments, analyzed through N-Gain Score to determine the enhancement of students' abilities. These findings serve as a basis for product refinement and align with prior research demonstrating the efficacy of the ADDIE model in optimizing learning outcomes.

Various previous studies have developed LKPD to support learning activities, such as LKPD development (Trisnawati & Moh Salimi, 2024), Ethnoscience-Based LKPD (Agung et al., 2022), and Science Experiment-Based LKPD (Prabandari et al., 2022). However, these studies have not yet accommodated LKPD integrated with students' surrounding environments, particularly LKPD integrated with Balinese local wisdom through the concept of *Catur Pramana* using the PBL approach. This research provides a significant contribution through the design of Student Worksheets (LKPD) that combine the Problem-Based Learning (PBL) model with the epistemological principles of *Catur Pramana*. This innovation is designed to optimize students' conceptual understanding of science material. By implementing four methods of knowledge acquisition *pratyaksa* (observation), *anumana* (reasoning), *upamana* (modeling/analogy), and *sabda* (authoritative testimony) the learning process becomes more contextual and meaningful while bridging scientific concepts with local wisdom. Furthermore, the strengthening of character values is also directed toward developing scientific attitudes, including curiosity, accuracy, and responsibility. Through the integration of *Catur Pramana* within PBL-based LKPD, there is significant potential to enhance science process skills and connect education with local wisdom. This approach facilitates contextual learning by linking science concepts with cultural realities and students' experiences. However, its effectiveness requires systematic learning management and adequate teacher readiness so that local wisdom functions substantively in supporting science competencies rather than merely serving as a decorative element. This is consistent with previous research findings indicating that problem-based and contextual teaching materials within the PBL framework positively correlate with increased student motivation, engagement, and cognitive capacity (Nurbaeti, 2019).

The objective of this study is to develop Problem-Based Learning (PBL)-based Student Worksheets (LKPD) integrated with Catur Pramana principles. This development aims to produce a valid and effective instrument to optimize elementary students' science process skills. The urgency of this research stems from the scarcity of learning materials that systematically combine innovative instructional models with indigenous local wisdom. The primary novelty of this work lies in the integration of Balinese local wisdom into the PBL design, which not only fosters science process skills but also facilitates knowledge construction through the stages of Catur Pramana. Expected outcomes include a feasible LKPD product, enhanced student engagement and critical thinking, as well as theoretical and practical contributions to contextual science education.

METHODS

This study adopts a Research and Development (R&D) approach, which is focused on creating and validating a specific educational tool. The product developed is a Student Worksheet (LKPD) that combines Problem-Based Learning (PBL) with Catur Pramana values (Persi et al., 2024). The main goal of this development is to provide a medium that can effectively improve science process skills for elementary students.

The study took place at SDN 1 Pengotan, situated in Pengotan Village, Bangli District, between October and December 2025. The participants included the fourth-grade teacher, while the primary focus of the research was the creation of Problem-Based Learning (PBL)-based worksheets (LKPD) integrated with Catur Pramana values.

The development of the LKPD followed the ADDIE framework, which involves five systematic stages: analysis, design, development, implementation, and evaluation (Gangga Gupita Ganeswara, 2021). The following section presents an illustration of the development stages used in this research.

1. Analysis

The analysis stage was conducted to identify the needs related to science learning in elementary schools through observation, curriculum analysis, and teacher interviews. At this stage, several aspects were examined, including observations of science learning activities in the fourth grade at SDN 1 Pengotan, observations of students' science process skills, analysis of the frequency of learning meetings, and analysis of the science material to be taught using the *Catur Pramana* stages. Through this analysis stage, it is expected that problems and the need for interactive learning materials can be identified, allowing a systematic needs analysis to be formulated.

2. Design

The design stage is the step taken to prepare the initial draft of the Problem-Based Learning (PBL)-based LKPD design, in which the learning activities are integrated with Balinese local wisdom, namely *Catur Pramana*, in order to produce a prototype or initial design of the LKPD. At this stage, a storyboard and LKPD design framework are developed.

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3. Development

At this stage, the PBL-based LKPD integrated with *Catur Pramana* is developed as part of the learning process. This stage is followed by product testing through a validity assessment and the preparation of product validation questionnaire instruments addressed to experts. The quality of the developed product is evaluated by three subject matter experts through a rigorous validation process. Each expert assesses the product based on specific quality indicators using a 5-point Likert scale (ranging from 1 to 5) and provides qualitative feedback for further refinement. The content validity and expert agreement are then quantified using Aiken's V formula (Equation 1). The resulting V-index is interpreted according to established criteria to determine the level of product validity:

$$V=\frac{\Sigma s}{n(c-1)}$$

In the formula above, it can be explained that V = validation score, s = r − lo, r = the score given by the expert, lo = the minimum score, n = the number of experts, and c = the maximum score. Furthermore, the validation criteria are presented in Table 1 below.

Table 1. Validation Criteria by Experts

V_{score}	Kriteria
V> 0,8	**Very High**
0,60≤ V < 0,80	**High**
0,40≤ V < 0,60	**Moderate**
0 ≤ V < 0,40	**Low**

4. Implementation

At this stage, the effectiveness of the product is tested. The effectiveness of the developed PBL-based LKPD integrated with *Catur Pramana* is analyzed using the gain formula (Equation 3). Students' science process skills are measured through an observation sheet. The improvement in students' abilities is analyzed using the standard gain technique (Siti Rofikoh et al., 2024) with the following formula:

$$gain=\frac{S_{post}-S_{pre}}{S_{maks}-S_{pre}}$$

Description:

g (gain) = gain score,

Spre = initial score,

Spost = final score,

Smaks = maximum score.

The analysis of science process skill achievement obtained before and after the treatment is conducted through the calculation of standard gain, based on the criteria presented in Table 2 below.

Table 2. Normalized Gain Index Criteria

Nilai gain standar	Keterangan
≥ 0,7	High
0,7 ≥ *g* ≥ 0,3	Medium
≤ 0,3	Low

5. **Evaluasi (Evaluation)**

The evaluation stage is conducted to analyze the shortcomings of the developed product and to formulate recommendations for improvement. Based on the results of this evaluation, the final product is considered feasible for dissemination and broader implementation.

RESULTS AND DISCUSSION

This section presents the research findings along with their discussion, which are related to previous relevant studies. The analysis of students' needs indicates that the science learning process in Grade IV of SD Negeri 1 Pengotan is still dominated by lecture methods and textbook use, resulting in less than optimal student engagement. Classroom observations revealed that most students experience difficulties in comprehensively understanding concepts and demonstrate limited proficiency in science process skills, such as observing, questioning, and drawing conclusions. Students also tend to be passive and are not yet accustomed to solving contextual problems. In addition, the material analysis showed that there are no teaching materials that integrate the *Catur Pramana* approach, resulting in learning that is not yet fully contextual.

Meanwhile, the analysis of teachers' needs, obtained through interviews and curriculum review, indicates the necessity for innovative and interactive teaching materials. Teachers stated that the conventional LKPD currently used does not adequately support the implementation of Problem-Based Learning (PBL) due to limitations in time and reference materials. Considering the limited number of learning sessions, effective and well-structured teaching materials are required. Therefore, the development of PBL-based LKPD integrated with *Catur Pramana* is proposed as a solution to support student-centered learning and systematically improve students' science process skills.

The results of the LKPD development were evaluated based on two main aspects: validity and effectiveness. Validity was determined through expert judgment, which included the aspects of content, language, presentation, and graphics. Effectiveness was measured using the N-gain score derived from the comparison between pretest and posttest results. These two indicators serve as the main parameters in assessing the quality of the LKPD in optimizing students' science process skills.

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1. Expert Validation Results of PBL-Based LKPD Integrated with *Catur Pramana*

The results of the expert validity test on the Problem-Based Learning (PBL)-based LKPD integrated with *Catur Pramana* were conducted to determine the feasibility of the product before its implementation in learning activities. The validation process involved three experts who evaluated the aspects of content, language, presentation, and graphics based on teaching material development standards. The goal of this evaluation was to verify that the LKPD is suitable for elementary students, follows the core principles of Problem-Based Learning, and correctly integrates Catur Pramana into science education. Feedback and scores from the three validators were used as a guide to improve and finalize the product, with the results summarized in the table below.

Table 3. Expert Validation Results

No	Assessed Aspect	Score		
		Expert Validation 1	**Expert Validation 2**	**Expert Validation 3**
1.	**Cover LKPD**			
1	The LKPD title represents the overall content of the LKPD	3	4	3
2	The LKPD title attracts students' interest in participating in science learning	3	4	3
3	The cover illustration reflects the content of the LKPD so that students can predict its contents	3	4	3
2.	**LKPD Content**			
4	The LKPD content is easy for Grade V students to understand	3	3	3
5	The LKPD content uses simple language that is easy for Grade V students to read and understand	3	3	3
6	The LKPD content contains images and text that are interrelated	3	3	3
7	The style and accuracy of language in the LKPD are appropriate for Grade V students	4	3	3
8	The LKPD content successfully attracts students' interest in participating in science learning	3	3	4

9	The LKPD text is well written, with punctuation appropriate to students' age level and good sentence coherence	4	3	3
3.	**LKPD Anatomy**			
10	The LKPD design is well presented	3	3	3
11	The selected font type attracts students' attention	4	4	4
12	The font type in the LKPD is easy for students to read	4	3	3
13	The layout/systematic organization is not too dense and makes it easier for students to read	4	3	4
	Total Score	**44**	**43**	**42**
	Average (V_{score})		**0,77 (High)**	

Based on the validity analysis using the Aiken's V index, a score of 0.77 was obtained, which falls into the high category according to the expert validation criteria (0.60 < 0.77 < 0.80). These results indicate that the Problem-Based Learning (PBL)-based LKPD integrated with *Catur Pramana* that was developed meets the feasibility standards comprehensively and demonstrates strong validity for use as a learning material in elementary school science education.

2. Effectiveness of PBL-Based LKPD Integrated with *Catur Pramana*

To evaluate the effectiveness of the Catur Pramana-integrated PBL LKPD (**table 4**), this study measured the improvement of students' science process skills using the N-gain score. This analysis compares pre-test and post-test results to determine the extent of skill enhancement after using the developed material. The N-gain score was selected to provide an objective assessment of how effectively the product improves student performance. Finally, the N-gain values were classified into specific categories to confirm the overall effectiveness of the LKPD in elementary science education.

The effectiveness analysis shows that students' average scores improved from 15.6 in the pre-test to 25.4 in the post-test**.** The average N-gain score of 0.7 falls into the high category, while the effectiveness percentage of 68% indicates that the product is moderately effective. The N-gain scores ranged from a minimum of 0.6 (56%) to a maximum of 0.8 (79%), showing slight variations in how students responded to the material. Overall, these results demonstrate that the Problem-Based Learning (PBL)-based LKPD, integrated with Catur Pramana, is effective in improving science process skills among elementary school students.

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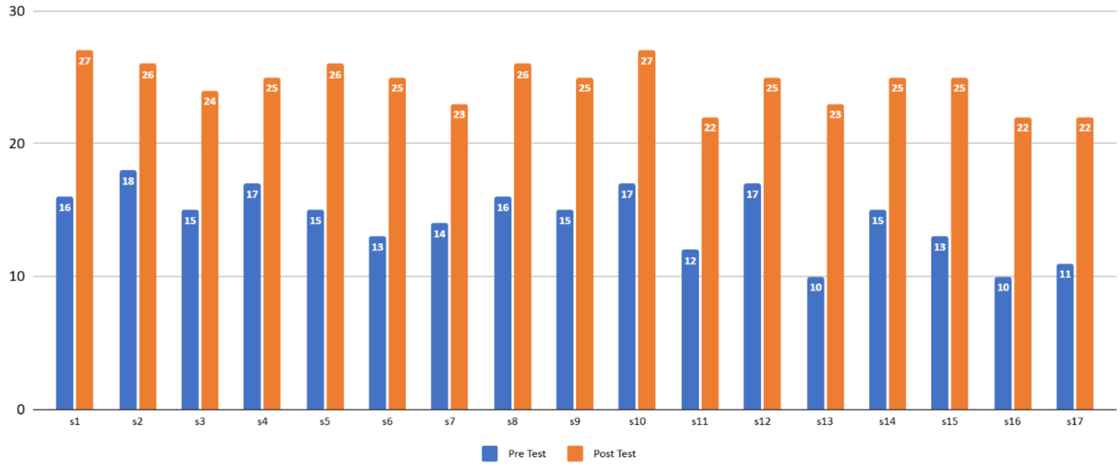
Table 4. Test Results

No	Indicator	Pre Test	Post Test	N-Gain	Interpretation Percentage	Interpretation
1	s1	16	27	0.79	79%	Effective
2	s2	18	26	0.67	67%	Moderately Effective
3	s3	15	24	0.60	60%	Moderately Effective
4	s4	17	25	0.62	62%	Moderately Effective
5	s5	15	26	0.73	73%	Moderately Effective
6	s6	13	25	0.71	71%	Moderately Effective
7	s7	14	23	0.56	56%	Moderately Effective
8	s8	16	26	0.71	71%	Moderately Effective
9	s9	15	25	0.67	67%	Moderately Effective
10	s10	17	27	0.77	77%	Effective
11	s11	12	22	0.56	56%	Moderately Effective
12	s12	17	25	0.62	62%	Moderately Effective
13	s13	10	23	0.65	65%	Moderately Effective
14	s14	15	25	0.67	67%	Moderately Effective
15	s15	13	25	0.71	71%	Moderately Effective
16	s16	10	22	0.60	60%	Moderately Effective
17	**s17**	11	22	0.58	58%	Moderately Effective
Average		**15.6**	**25.4**	**0.7**	**68%**	**Moderately Effective**
Minimum Score		**13**	**23**	**0.6**	**56%**	
Maximum Score		**18**	**27**	**0.8**	**79%**	



Picture 1. Comparison of Pretest and Posttest Scores

Based on the empirical data, there was an improvement in students' learning achievement from the pretest to the posttest stage, with the average score increasing from 15.6 to 25.4. The N-gain calculation of 0.7 places this result in the high category, indicating the effectiveness of the Problem-Based Learning (PBL)-based LKPD integrated with *Catur Pramana*. The consistency of these results is supported by the study of Prayunisa and Marzuki (2024) regarding science learning tools. Specifically, 85% of students showed improvement, where the majority (15 out of 17 students) were categorized as moderately effective. This finding strengthens the argument that innovation in science learning has a positive impact on the quality of education. These findings are also consistent with Darmayanti and Sunarianingsih (2024), who emphasize the role of learning media in improving science process skills, including observation, prediction, classification, communication, and drawing conclusions. These skills serve as indicators not only of students' conceptual understanding but also of their critical and analytical thinking literacy at the elementary school level.

The research findings indicate that the Problem-Based Learning-based LKPD integrated with the principles of *Catur Pramana* is both feasible and effective as a science learning medium at the elementary level for improving science process skills. Expert validation using the Aiken's V index of 0.77 (high category) confirms that the product is valid and applicable in learning activities. The effectiveness analysis using the N-gain score shows an increase in the average science process skill score from 15.6 (pretest) to 25.4 (posttest) with an N-gain value of 0.7 (high category). The effectiveness percentage reached 68% (moderately effective category) with a score range from 0.6 to 0.8. This improvement confirms the contribution of the LKPD to learning achievement. These findings are consistent with the study conducted by Putri et al. (2025), which explains that more than 85% of teachers experienced increased effectiveness in the use of science learning tools, although a small portion remained in the less effective category due to differences in academic backgrounds. This is also supported by F. A. Putri et al. (2024), who emphasize that Problem-Based Learning (PBL) can optimize analytical abilities and conceptual understanding through independent and collaborative inquiry processes.

The integration of *Catur Pramana* as Balinese local wisdom strengthens the pedagogical approach by providing a systematic epistemological framework for knowledge acquisition through direct observation (pratyaksa), logical reasoning (anumana), comparison (upamana),

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and authoritative testimony (sabda). This integration enhances contextual and meaningful learning by aligning the curriculum with the students' cultural environment. Consequently, the Problem-Based Learning (PBL)-based student worksheets (LKPD) integrated with *Catur Pramana* demonstrate high validity and significant effectiveness in improving learning outcomes. Thus, this development represents an innovative instructional tool capable of optimizing the quality of science education in elementary schools.

Expert validation findings indicate that the LKPD developed in this study demonstrates a high level of validity, evidenced by an Aiken's V coefficient of 0.77. This value confirms that the product meets rigorous feasibility standards across content, linguistic, presentation, and graphical dimensions. Such high validity underscores the alignment of the LKPD with the cognitive characteristics of elementary school students and the core principles of Problem-Based Learning (PBL). These results resonate with previous research by Nuai and Nurkamiden (2022), which asserts that LKPDs designed with authentic problems, investigative activities, and reflective practices significantly enhance the quality of science education. Furthermore, this high validity score demonstrates that the integration of local wisdom can be executed systematically without compromising scientific accuracy.

From the perspective of effectiveness, the empirical findings indicate that the integration of *Catur Pramana* in the Problem-Based Learning-based LKPD has a positive impact on students' science process skills. This is evidenced by the N-gain score of 0.7, which falls into the moderately effective category. The transformation of scores from the pretest to the posttest stage confirms that this learning medium facilitates a more comprehensive conceptual understanding through a series of experimental activities. These findings are also consistent with the research conducted by Nikmah et al. (2023), which emphasizes that the Problem-Based Learning approach supported by innovative learning instruments can significantly improve science process skills. In addition, the disparity in N-gain scores indicates variations in students' adaptation to the learning model, which correlates with their basic abilities and prior academic experiences.

The implementation of LKPD using the Problem-Based Learning model integrated with *Catur Pramana* is not limited to improving cognitive learning outcomes but also contributes to the development of science process skills. The scope of these competencies includes observation, classification, prediction, and conclusion skills. Learning activities structured according to scientific stages enable students to actively engage in the process of scientific inquiry. This finding is supported by the literature presented by Nurjanah et al. (2024), which states that Problem-Based Learning encourages student involvement in inquiry processes and enhances scientific thinking skills through authentic learning experiences. Therefore, the LKPD developed in this study serves a dual role: as a learning resource and as a medium for developing fundamental scientific skills in the context of science learning at the elementary education level.

Integrating Catur Pramana into the LKPD helps students improve their cultural literacy and character. This approach makes science easier to understand because it connects concepts with local wisdom in real-life contexts. These findings are consistent with research by Yuliantika (2022), which confirms that using local culture in learning has a positive effect on student engagement and cultural identity. Therefore, Catur Pramana is not only important for scientific thinking but also plays a key role in teaching local values to students.

In terms of layout and usability, the developed LKPD demonstrates a high level of practicality for both teachers and students. Design elements such as systematic structure, simple language, and attractive visuals facilitate the implementation of problem-based learning in classroom settings. These findings align with the theoretical study proposed by Arini and Darmayanti (2022), which emphasizes that quality learning instruments must meet the standards of validity, practicality, and effectiveness to ensure optimal implementation in educational settings. This aspect is important because it determines the sustainability of product use in real classroom contexts in elementary schools.

Furthermore, the implementation of the Problem-Based Learning-based LKPD integrated with *Catur Pramana* contributes positively to students' learning motivation. Contextual and challenging learning activities stimulate students' curiosity and encourage them to participate actively. These findings are consistent with the research conducted by Widiani and Darmayanti (2024), which indicates that Problem-Based Learning can enhance students' intrinsic motivation by providing opportunities for independent and collaborative learning in solving real-world problems. With increased learning motivation, students tend to demonstrate more positive attitudes toward science learning and greater confidence in expressing their opinions.

Developing an LKPD that blends Catur Pramana with Problem-Based Learning is highly relevant for today's educational needs. This tool offers a holistic impact, enhancing not only academic scores but also critical thinking, cultural awareness, and science process skills. These results align with research by Prayunisa and Marzuki (2024), which highlights the necessity of integrating 21st-century skills (4C) critical thinking, collaboration, creativity, and communication into the classroom. Consequently, this LKPD serves as an innovative model for improving science education, especially in schools that value local cultural heritage.

The results of this research demonstrate that the Problem-Based Learning worksheets, integrated with Catur Pramana values, significantly enhance the quality of elementary science education. This synergy between modern instructional models and indigenous wisdom fosters a contextual and student-centered learning environment. These findings support Aminullah's (2019) view that incorporating cultural heritage into education effectively strengthens student identity and deepens scientific literacy. Consequently, this developed LKPD serves as a strategic innovation that meets 21st-century educational standards while actively preserving local cultural values.

CONCLUSION

Field results indicate that the developed Student Worksheets (LKPD), which combine Problem-Based Learning with Catur Pramana values, are both feasible and effective for elementary science education. Implementation at SD Negeri 1 Pengotan showed a positive impact on students' science process skills. The product achieved a high validity rating with an Aiken's V index of 0.77. Furthermore, its effectiveness was demonstrated by an increase in average scores from 15.6 (pre-test) to 25.4 (post-test). With an N-gain of 0.7 and an effectiveness rate of 68% (moderately effective), these findings confirm that the LKPD contributes significantly to improving student learning outcomes.

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The practical implication of this study is the availability of an alternative innovative learning tool that emphasizes active learning and the integration of local wisdom. From a theoretical perspective, these results strengthen the foundation for the development of Problem-Based Learning-based instructional materials within the literature of science education. Furthermore, this study opens opportunities for the academic community to generalize learning tools across different contexts and educational levels in order to optimize their effectiveness.

Recommendations. For educational practitioners, it is recommended to adopt this LKPD as an innovative alternative in science learning to enhance students' participation and learning outcomes, while still adapting it to students' characteristics and school environmental conditions. Schools are expected to support its implementation by providing adequate facilities and professional training for teachers. For future researchers, it is recommended to further develop and generalize the LKPD across different science topics as well as other subject areas, so that its implementation can be expanded and tested in more diverse learning contexts. Future studies should also examine its effectiveness with a more representative population in order to provide more comprehensive empirical evidence regarding the integration of Problem-Based Learning and local wisdom.

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