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DEVELOPMENT OF PROJECT-BASED LEARNING DIGITAL WORKSHEETS TO ENHANCE INDONESIAN LANGUAGE LEARNING OUTCOMES IN FIFTH-GRADE ELEMENTARY STUDENTS

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ABSTRAC
This study aimed to develop and evaluate a Project-Based Learning (PjBL)-based digital Student Worksheet (LKPD) to improve Indonesian language learning outcomes for fifth-grade elementary students. The research addresses the limited integration of digital learning media and project-based pedagogy in Indonesian language instruction at the elementary level. A Research and Development approach using the ADDIE model was applied, combined with a quasi-experimental pretest–posttest control group design involving 56 fifth-grade students divided into experimental and control classes. Data were collected through expert validation sheets, teacher and student practicality questionnaires, and learning achievement tests. The results indicated that the developed digital LKPD was highly feasible, with strong practicality responses from teachers and students. Learning effectiveness analysis showed a significant improvement in student achievement in the experimental class compared with the control class, with a medium–high normalized gain. These findings demonstrate that integrating project-based learning with digital worksheets can enhance student engagement and improve Indonesian language learning outcomes. The study contributes to the development of technology-supported project-based learning media for literacy instruction in elementary education.

INTRODUCTION

Indonesian language instruction in elementary schools plays a strategic role in developing students' foundational literacy skills, including listening, speaking, reading, and writing (Sari dkk., 2025; Simbolon, 2023). However, classroom practices often remain teacher-centered and rely on conventional methods such as lectures and

Sosioedukasi
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written assignments. Preliminary observations at elementary schools within Cluster 4 of Tabanan District revealed that 68% of fifth-grade students exhibited passive participation during Indonesian language lessons. Teachers predominantly used printed Student Worksheets (LKPD) without interactive media variation, while students demonstrated low interest in literacy activities and difficulties comprehending reading texts. This reality reflects a significant gap between current instructional practices and the demands of 21st-century learning, which requires collaboration, critical thinking, and creativity (Thornhill-Miller dkk., 2023; Tohani & Aulia, 2022).

The Merdeka Curriculum envisions student-centered learning grounded in contextual experiences. Indonesian language instruction at the elementary level should not only enhance students' cognitive abilities but also foster character development and communication skills through meaningful activities (Kemendikbudristek, 2022). Within this framework, Project-Based Learning (PjBL) offers a relevant pedagogical approach by engaging students in solving real-world problems connected to their daily lives (Omelianenko & Artyukhova, 2024; Retno dkk., 2025). Through PjBL, students collaborate, explore authentic contexts, and produce tangible outputs that demonstrate their understanding of linguistic concepts, thereby transforming language learning into an active, purposeful experience.

Interviews with fifth-grade teachers in Cluster 4 revealed that most educators have not implemented PjBL due to limited digital infrastructure and insufficient knowledge in designing interactive media such as digital LKPD. Yet research by Suarsana and Mahayukti (2018) demonstrates that digital-based worksheets enhance student motivation and learning outcomes by providing dynamic and flexible learning experiences. Similarly, (Srikawati & Suarjana, 2022) found that electronic LKPD enables independent learning and active student engagement, proving more effective than conventional printed worksheets. These findings highlight a persistent gap between 21st-century learning demands and actual Indonesian language instruction practices, particularly within elementary schools in Tabanan District.

This gap is further underscored by national literacy assessment data. Programme for International Student Assessment (PISA) results indicate that Indonesian students' reading literacy scores remain below the OECD average at 371 points compared to 476 points (Malondeng dkk., 2025; Sarmurzin dkk., 2025). This underperformance suggests that students' text comprehension and critical thinking abilities require substantial improvement. A key contributing factor is the lack of innovative learning media and methods that foster genuine student engagement in literacy processes (Amelia dkk., 2024; Syukriady dkk., 2023). Consequently, developing a PjBL-based digital LKPD emerges as a promising solution to address these challenges.

Previous studies have demonstrated the effectiveness of PjBL and digital media in improving Indonesian language learning outcomes. (Puspitaningrum dkk., 2024) reported that PjBL implementation increased elementary students' Indonesian language scores from an average of 66.55 to 85.17. Hidayat (2022) found that PjBL enhanced students' creativity in composing descriptive texts at the elementary level. (Fadiyatul Muqtashidah & Ekohariadi, 2025) documented significant improvements in students' cognitive competence through web-based project worksheets. However, most existing research examines either the instructional model or digital media in isolation. Few studies have systematically integrated PjBL with digital LKPD development using the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model, particularly within Indonesian language instruction contexts in Tabanan's elementary schools.

The ADDIE model was selected for its systematic approach to learning media development, spanning needs analysis through implementation evaluation (Robert Maribe Branch & Stefaniak, 2019). The analysis phase enables precise identification of student and teacher needs; design and development phases ensure product alignment with learner characteristics; while implementation and evaluation phases allow measurement of the product's impact on learning outcomes. This approach guarantees the validity, practicality, and effectiveness of the developed digital LKPD.

Therefore, this research addresses the urgent need for innovative Indonesian language learning media that genuinely enhances student engagement and learning outcomes. The study focuses on developing a PjBL-based digital LKPD using the ADDIE model to improve fifth-grade students' Indonesian language achievement in Cluster 4 of Tabanan District. The research questions are: (1) How valid is the developed PjBL-based digital LKPD in terms of

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content and media aspects? (2) How practical is the digital LKPD for classroom implementation? (3) How effective is the PjBL-based digital LKPD in improving fifth-grade students' Indonesian language learning outcomes? The objectives are to: (1) produce a valid PjBL-based digital LKPD, (2) assess its practicality during instructional implementation, and (3) evaluate its effectiveness in enhancing students' Indonesian language achievement.

METHOD

This study employed a Research and Development (R&D) approach using the ADDIE model, which consists of five systematic phases: Analysis, Design, Development, Implementation, and Evaluation. The ADDIE model was selected because it provides a structured yet flexible framework for developing instructional media, beginning with needs analysis and ending with evaluation of learning effectiveness (Molenda, 2003; Robert Maribe Branch & Stefaniak, 2019). Recent studies also confirm that ADDIE remains widely applied in educational technology development because of its iterative design process and its ability to integrate digital learning tools effectively (Abuhassna dkk., 2024). Therefore, the model was considered appropriate for developing a Project-Based Learning (PjBL)-based digital worksheet (LKPD) to support Indonesian language instruction in elementary schools.

The analysis phase began with a preliminary study conducted in four elementary schools within Cluster 4 of Tabanan District, involving 126 fifth-grade students. Classroom observations indicated that Indonesian language instruction mainly relied on conventional reading and writing activities with limited student engagement. Teachers predominantly used printed Student Worksheets (LKPD) without technological integration. Survey results showed that 72% of students preferred interactive digital media for learning activities. Interviews with teachers revealed that limited competence in designing digital learning media was the main obstacle to integrating technology into classroom instruction.

In addition, curriculum analysis was conducted to align the developed product with the Merdeka Curriculum learning outcomes, particularly competencies related to text comprehension, writing, and presentation. The integration of digital worksheets in learning is considered important to support interactive learning and improve student engagement in the digital era (Rahmayani & Atmazaki, 2025; Zakiyyah dkk., 2025). Based on these findings, the development of a PjBL-based digital LKPD was considered necessary to enhance student engagement and learning outcomes, as previous studies have shown that project-based digital worksheets can foster active learning, collaboration, and higher-order thinking skills (Huda dkk., 2025; Sujinah & Rohmah Barokah Toriqul Yanah, 2024).

During the design and development phases, the initial prototype was structured according to the principles of Project-Based Learning, including essential questions, project planning, project implementation, report preparation, and presentation of results (Sopa Marwa dkk., 2025). The worksheet focused on the topic “Composing Observation Report Texts” and incorporated interactive features such as instructional videos, digital quizzes, and reflection forms, as digital learning media that combine multimedia elements have been found to increase students’ motivation and learning effectiveness (Putri dkk., 2025). Research instruments were also prepared, including expert validation sheets, teacher and student practicality questionnaires using a four-point Likert scale, and learning achievement tests in the form of pretest and posttest. The implementation phase was conducted in two schools within Cluster 4 of Tabanan District, namely SD Negeri 2 Bongan and SD Negeri 4 Bongan, involving 56 fifth-grade students. The study employed a quasi-experimental design with a pretest–posttest control group design (Sugiyono, 2022). The experimental class used the PjBL-based digital LKPD, whereas the control class used conventional printed worksheets. Teachers in the experimental class received brief training before the implementation to ensure consistent use of the learning media.

The learning process was carried out in three meetings of 90 minutes each, during which students collaboratively produced observation report texts based on investigations of their school environment. The evaluation phase included both formative and summative evaluation. Feasibility was determined from expert validation scores, while practicality was measured using teacher and student response questionnaires with a criterion of ≥80% categorized as practical (Khan dkk., 2021). Effectiveness was analyzed using paired sample t-tests and normalized gain (N-gain) interpreted according to Hake’s criteria Quantitative data were analyzed using SPSS version 26, while qualitative data from observations and interviews were analyzed using thematic analysis procedures, including coding,

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categorization, and interpretation of themes (Naeem dkk., 2023). This combination of quantitative and qualitative analysis enabled methodological triangulation to ensure the validity and reliability of the research findings.

RESULTS

This study produced a Project-Based Learning (PjBL)-based digital Student Worksheet (LKPD) designed to improve Indonesian language learning outcomes for fifth-grade elementary school students. The development process followed the ADDIE model stages, including analysis, design, development, implementation, and evaluation. After the product was developed, it was evaluated through three major assessments: validity, practicality, and effectiveness.

The validity evaluation involved three experts: a media expert, a language expert, and a subject matter expert. Each expert assessed the product using a four-point Likert scale ranging from 1 (not feasible) to 4 (very feasible). The results of the expert validation are presented in Table 1.

Table 1, *Summary of Digital LKPD Validity Test Results*

Aspect Assessed	NP	
Media feasibility (display, navigation, interactivity)	3.55	Very Feasible
Language feasibility (spelling accuracy, readability, instruction clarity)	3.40	Very Feasible
Content feasibility (relevance to learning outcomes, accuracy, PjBL alignment)	3.48	Very Feasible
Overall Mean	3.48	Very Feasible

Source: Research data (2025).

The overall mean validation score of 3.48 indicates that the digital LKPD meets the pedagogical and technological standards for elementary learning media. This result suggests that the integration of multimedia elements and project-based learning tasks successfully aligns with instructional design principles, which emphasize usability, clarity, and learner engagement

The practicality test was conducted to determine the ease of use and user acceptance of the digital LKPD. The evaluation involved 4 teachers and 56 students who responded to a questionnaire consisting of 20 items. The analysis showed an average practicality score of 87.47%, categorized as very practical.

These findings suggest that both teachers and students perceived the digital LKPD as easy to operate, visually appealing, and supportive of project-based learning activities. Teachers reported that the integrated multimedia components simplified the delivery of instructional material, while students expressed higher engagement due to the interactive features embedded within the worksheet.

Table 2, *Summary of Digital LKPD Practicality Test Results*

Respondents	Number of Items	Mean Score (%)	Category
Teachers (n = 4)	20	86.25	Very Practical
Students (n = 56)	20	88.70	Very Practical
Overall Mean	-	87.40	Very Practical

Source: Research data (2025).

The high practicality score (87.47%) demonstrated that both teachers and students found the digital LKPD easy to operate, engaging, and supportive in understanding project-based learning procedures. Teachers reported that the integrated interactive features such as instructional videos and digital quizzes simplified lesson delivery, while students expressed greater motivation due to the media's visual appeal and responsive design.

Effectiveness was measured using a pretest–posttest control group design with 56 fifth-grade students divided equally into experimental and control groups. The experimental group used the PjBL-based digital LKPD, while the control group used conventional printed worksheets. Data were analyzed using paired sample *t*-test (SPSS v.26) and normalized gain (*N*-gain) calculations. Table 3 presents the learning achievement results.

Sosioedukasi
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Table 3, *Summary of Pretest and Posttest Scores*

Class	N	Mean Pretest	Mean Posttest	N-Gain	Category
Experimental	28	65. 21	83.32	0.52	Medium–High
Control	28	64.89	72.36	0.23	Low

Source: Research data (2025).

The effectiveness of the developed digital LKPD was tested using a quasi-experimental pretest–posttest control group design. The experimental group consisted of 28 students, while another 28 students formed the control group. The experimental class used the PjBL-based digital LKPD, whereas the control class used conventional printed worksheets.

The results showed that the experimental group experienced a significant improvement in learning outcomes. The average score increased from 65.21 in the pretest to 83.32 in the posttest, with an N-gain of 0.52, categorized as medium–high improvement. In contrast, the control group showed only a slight improvement with an N-gain of 0.23, categorized as low.

A paired sample t-test revealed a statistically significant difference in the experimental group ($t = 7.842$, $p < 0.05$), while the control group showed no significant difference ($p > 0.05$). Furthermore, the effect size (Cohen's d) reached 0.84, indicating a large effect of the digital LKPD intervention on students' Indonesian language learning outcomes.

The paired *t*-test for the experimental group yielded $t = 7.842$, $p = 0.000$ (< 0.05), indicating a statistically significant improvement in learning outcomes after using the digital LKPD. In contrast, the control group showed $t = 1.602$, $p = 0.112$ (> 0.05), reflecting non-significant improvement. Cohen's *d* effect size calculation produced a value of 0.84, classified as a "large" effect, confirming that the PjBL-based digital LKPD substantially influenced students' Indonesian language achievement.

DISCUSSION

The findings demonstrate that the PjBL-based digital LKPD developed through the ADDIE model is valid, practical, and effective in improving Indonesian language learning outcomes among elementary school students. However, beyond these quantitative results, several theoretical and pedagogical interpretations can be drawn.

First, the high validity score (3.48) indicates that the integration of digital technology with project-based learning principles successfully produced a learning medium aligned with instructional design standards. The iterative validation process within the ADDIE framework contributed to the refinement of the product. Previous studies have shown that development models such as ADDIE enhance instructional product quality because they allow continuous evaluation and revision throughout the design process (Abuhassna dkk., 2024). Therefore, the high feasibility rating in this study confirms the effectiveness of systematic instructional design in producing high-quality digital learning media.

Second, the high practicality score (87.47%) indicates strong acceptance from both teachers and students. This result suggests that the digital format of the worksheet successfully addressed limitations associated with traditional printed worksheets. Interactive features such as videos, quizzes, and digital forms enabled more dynamic learning interactions. These findings support previous research demonstrating that digital worksheets can increase students' motivation and engagement because they provide interactive and flexible learning environments (Srikawati & Suarjana, 2022). Furthermore, the integration of project-based learning tasks within the digital worksheet encouraged collaborative learning and active participation, which are key elements of student-centered learning.

Third, the significant improvement in learning outcomes and the large effect size (0.84) indicate that the digital LKPD had a substantial impact on students' mastery of Indonesian language concepts. This improvement can be explained by the instructional characteristics of Project-Based Learning. PjBL emphasizes authentic tasks, inquiry-based activities, and collaborative problem solving. Through the project activities embedded in the digital worksheet,

Sosioedukasi
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Volume 15 No. 1. Maret 2026 https://ejournal.unibabwi.ac.id/index.php/sosioedukasi/index

students actively constructed knowledge rather than passively receiving information. Such learning processes align with constructivist learning theory, which posits that meaningful learning occurs when students actively engage in constructing knowledge through real-world experiences.

The effectiveness of the digital LKPD in this study also confirms previous empirical findings on the benefits of project-based learning in language instruction. Several studies report that PjBL improves students' writing skills, critical thinking abilities, and learning engagement because it requires learners to apply knowledge in meaningful contexts (Omelianenko & Artyukhova, 2024; Retno dkk., 2025). By integrating PjBL within a digital learning environment, the developed worksheet simultaneously supports literacy development and digital competence, which are essential competencies in 21st-century education.

From a theoretical perspective, the findings contribute to the growing body of research on technology-enhanced project-based learning in elementary education. The study demonstrates that combining digital learning media with inquiry-based pedagogical models can create a more effective learning ecosystem. The digital LKPD functioned not only as a learning resource but also as a platform facilitating collaborative inquiry, reflection, and presentation. This integration strengthens the constructivist paradigm in educational technology, emphasizing active learning supported by digital tools.

From a practical perspective, the results highlight the potential of digital worksheets as an alternative instructional medium for Indonesian language learning in elementary schools. Teachers often face challenges in maintaining students' interest during literacy lessons that rely heavily on text-based activities. The integration of multimedia elements and project tasks within the digital worksheet provided a more engaging learning experience and supported students in organizing their ideas when composing observation report texts.

Nevertheless, several limitations should be acknowledged. The implementation of the digital LKPD was conducted within a relatively short period of time and limited to two schools. In addition, variations in digital infrastructure across schools may influence the scalability of the developed product. Future research should therefore examine long-term implementation and explore the integration of digital project-based worksheets in broader educational contexts.

CONCLUSION

This study developed a Project-Based Learning (PjBL)-based digital Student Worksheet (LKPD) for fifth-grade Indonesian language learning using the ADDIE development model. The results indicate that the developed digital LKPD meets the criteria of validity, practicality, and effectiveness, demonstrating its suitability as a learning medium to support Indonesian language instruction in elementary schools.

The integration of project-based learning activities within a digital worksheet format promotes active student participation, collaboration, and contextual learning experiences. Through project tasks related to observation report texts, students were able to engage more deeply in the learning process and demonstrate improved language understanding.

These findings suggest that digital learning media integrated with student-centered learning models can serve as an effective strategy to enhance literacy learning in elementary education. Therefore, the developed PjBL-based digital LKPD has the potential to support more interactive and meaningful Indonesian language learning aligned with the goals of contemporary curriculum implementation.

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Sosioedukasi
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