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Development Of Student Worksheets (LKPD) Swimming Material for Elementary School Students

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Abstract

Study purpose. To develop a valid, practical, and effective Student Worksheet (LKPD) on swimming for Grade VI students at SD Negeri 45 Lubuklinggau to improve learning outcomes.

Materials and Methods. The study employed a Research and Development (R&D) approach using the ADDIE model, comprising the stages of analysis, design, development, implementation, and evaluation. Research instruments included expert validation sheets, teacher and student response questionnaires, and learning outcome tests. Data were analyzed using descriptive quantitative and qualitative methods to assess the feasibility and effectiveness of the developed worksheet.

Results. Validation showed that the worksheet was rated as "highly valid" by both subject matter and media experts. Field trials revealed positive responses from teachers and students, as well as a significant improvement in students' conceptual understanding and basic swimming skills. Consequently, the developed worksheet was deemed suitable for use in instruction. Teacher responses showed a 78% approval rate, while student responses showed 94%, placing it in the "highly practical" category. Furthermore, the worksheet's effectiveness was rated at 0.75, falling into the "high" category. The swimming worksheet proved to be valid, practical, and effective in enhancing the quality of student learning. This study contributes by providing innovative teaching materials that can serve as an alternative for developing physical education instruction in elementary schools.

Conclusion. the swimming worksheet developed for Grade VI students at SD Negeri 45 Lubuklinggau demonstrated high effectiveness and is suitable for use in classroom learning activities.

Keyword: Student Worksheet Development, Swimming, Elementary School, Physical Education Instruction.

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Introduction

Physical education is one of the core subjects taught in elementary schools, starting from Grade 1 through Grade 6 (Quinaud et al., 2022). The physical education curriculum covers six main areas of study, namely athletics, gymnastics, sports games, swimming, health education, and outdoor education (Kayla Marie Norton et al., 2023). Among these six areas, swimming is considered a crucial component because it offers comprehensive benefits for students' physical, cognitive, and affective development (Rezha Arzhan Hidayat et al., 2024). Swimming provides numerous health advantages as it engages nearly all major muscle groups during movement (Brahim Harbach et al., 2022). Swimming activities are commonly undertaken for family recreation, health and fitness, physical education, and the development of competitive athletic performance. Along with the advancement of sports and increasing public awareness of healthy lifestyles, swimming has become increasingly popular worldwide, as reflected in the establishment of numerous swimming clubs (Dóra Ari et al., 2025; Dharma et al., 2022). Consequently, swimming has been formally incorporated into the Learning Objectives Sequence (Alur Tujuan Pembelajaran/ATP) of the Merdeka Curriculum, requiring physical education teachers to teach or at least introduce swimming concepts and skills to their students (Ermawan Susanto, 2016).

The successful implementation of swimming instruction heavily depends on the availability and quality of instructional resources. Under the Merdeka Curriculum, teachers are expected to be creative in selecting and utilizing various teaching materials to accommodate students' needs, abilities, and interests (Difana Leli Anggraini et al., 2022; alfauzi Makruf et al., 2026). Well-designed instructional resources are expected to encourage students to become more active, motivated, and engaged in the learning process (Eric MCMULLEN et al., 2026). However, achieving these objectives requires adequate support, including the provision of appropriate teaching materials, learning media, and effective instructional systems (Deyana Nuru Intan et al., 2022).

Preliminary observations and interviews conducted with the Physical Education teacher at SD Negeri 45 Lubuklinggau revealed critical issues in swimming instruction for sixth-grade students. First, the only teaching material used was a standard printed textbook provided by the Ministry of Education, Culture, Research, and Technology. No supplementary resources, such as student worksheets, instructional videos, or audio-based materials, were utilized to support learning. Second, students' learning resources were severely limited, resulting in low motivation to seek information independently. Students relied entirely on teacher explanations during classroom and field-based activities, making it difficult for them to understand the learning content. Third, this condition negatively impacted students' academic achievement in swimming, as they lacked opportunities for guided practice and self-directed learning.

These findings are consistent with previous studies. Hadiyanti (cited in Nyoman dharma Yogi, 2025) reported that badminton instruction was ineffective due to inadequate instructional materials. Similarly, Prayogi Dwina Angga et al. (2020) found that elementary schools generally lack diverse and varied teaching materials. Furthermore, Fenton (2025) argued that commonly used student worksheets in elementary schools are often unattractive, lack visual representations of learning content, are printed on low-quality paper, and fail to provide authentic examples of concept applications that support students' learning processes.

The existing instructional materials for swimming in SD Negeri 45 Lubuklinggau present several specific limitations. The standard textbook provides general information about swimming but does not include structured activities, practice exercises, or step-by-step guidance for developing basic swimming skills. The material is presented in a one-way format without opportunities for students to actively engage with the content through exercises, self-assessment, or hands-on activities. The textbook contains minimal illustrations

or diagrams that could help students understand swimming techniques, body positions, and safety procedures. The material does not accommodate students' varying ability levels, learning styles, or prior knowledge in swimming. Additionally, the content does not provide explicit connections between theoretical concepts and practical swimming activities, making it difficult for students to transfer knowledge to actual water-based practice.

Previous studies have investigated the development of instructional materials for physical education, providing a foundation for this research. Destriani et al. (2022) developed website-based learning media for volleyball, demonstrating that technology-integrated materials significantly improve student engagement and learning outcomes. Elok Pawestri (2020) developed Student Worksheets to accommodate student diversity in thematic learning for Grade II elementary students, concluding that worksheets effectively facilitate differentiated instruction and enhance student participation. Anisah Fitri Melenia (2024) emphasized that worksheets serve as structured learning resources containing assignments that support students' learning activities, promoting active engagement and self-directed learning. Yeyen Nurtanto (2024) developed Liveworksheet-based worksheets and found significant improvements in student learning outcomes, suggesting that interactive worksheets are more effective than conventional ones. Slamet (2022) and Marinu Waruwu (2024) provided comprehensive frameworks for research and development in education, establishing the validity and reliability of the ADDIE model for developing instructional products.

However, previous studies have several limitations. Destriani et al. (2022) focused on website-based volleyball media and was not specific to elementary swimming education. Pawestri (2020) focused on thematic worksheets for Grade II students and was not applicable to physical education or swimming. Nurtanto (2024) focused on Liveworksheet-based worksheets for general subjects, not swimming-specific content. Nyoman dharma Yogi (2025) developed a worksheet for badminton, which is a different sport with different characteristics compared to swimming, which has unique water-based requirements.

Based on the review of existing literature and preliminary observations, several research gaps can be identified. No previous study has specifically developed a Student Worksheet for swimming material at the elementary school level, particularly in the Indonesian context. While the ADDIE model has been widely used for developing instructional materials, its application to swimming education in elementary schools remains unexplored. Existing validation instruments for physical education materials do not adequately address the unique characteristics of swimming instruction, such as water safety, aquatic skills progression, and psychomotor assessment. There is a lack of empirical data on the practicality and effectiveness of swimming worksheets in improving elementary students' swimming learning outcomes. Furthermore, the specific challenges faced by schools without adequate swimming facilities, such as SD Negeri 45 Lubuklinggau, have not been addressed in previous research.

This study addresses the identified research gaps by developing a Student Worksheet for swimming material with several novel characteristics. This is the first known development of a structured Student Worksheet specifically designed for swimming instruction in Indonesian elementary schools, filling a critical gap in physical education teaching materials. The product is developed using the systematic ADDIE model (Slamet, 2022; Marinu Waruwu, 2024), ensuring that every aspect of the instructional material is rigorously planned, validated, and refined. The worksheet integrates basic swimming concepts and techniques including freestyle and breaststroke, water safety and self-rescue procedures, step-by-step practical activities with clear illustrations, structured exercises and self-assessment tools, and character education values such as discipline, cooperation, and safety awareness (Yeyen Nurtanto, 2024). The product is validated by three experts covering media, subject matter, and language aspects, ensuring validity from multiple perspectives. The worksheet is designed to be used in schools with limited swimming facilities, providing theoretical understanding and dry-land

exercises that complement practical swimming sessions. Finally, the product's effectiveness is empirically measured through pre-test and post-test assessments, providing evidence-based validation of its impact on student learning outcomes.

A Student Worksheet, or Lembar Kerja Peserta Didik, is a printed instructional material designed to facilitate students' interaction with learning content. It consists of worksheets containing structured tasks that students are required to complete, intentionally designed as a learning resource that includes assignments to support students' learning activities (Anisah Fitri Melenia, 2024). Furthermore, a worksheet can be defined as a printed teaching material containing learning materials, summaries, and instructions for carrying out learning activities aligned with the Learning Outcomes (Elok Pawestri, 2020). The primary difference between a worksheet and a textbook lies in their instructional focus. A worksheet emphasizes the application and specific understanding of content through exercises, questions, and activities designed to help students master the material, while textbooks generally present content comprehensively to help students understand concepts and theories (Fistiana Diah Palupi, 2026). A high-quality worksheet should contain concise learning materials, activity guidelines, practice exercises, and character education values (Yeyen Nurtanto, 2024). In addition to supporting classroom instruction, worksheets serve as an important medium for teachers to instill positive values and character education in students, promoting effective interaction between teachers and students and enhancing learning activities and academic achievement (Riswanto et al., 2026 ; Destriani et al., 2022).

Based on the identified problems, limitations, and research gaps, this study aims to develop a valid, practical, and effective Student Worksheet for swimming material for Grade VI students at SD Negeri 45 Lubuklinggau, to evaluate the validity of the developed worksheet based on expert validation, to assess the practicality of the worksheet based on teacher and student responses, and to measure the effectiveness of the worksheet in improving students' swimming learning outcomes. This research contributes to providing innovative swimming teaching materials as an alternative for physical education instruction in elementary schools, offering a validated and tested worksheet that can be adopted by other schools facing similar challenges, contributing to the body of knowledge on instructional material development for physical education particularly in aquatic sports, and supporting the implementation of the Merdeka Curriculum by providing teachers with flexible, student-centered learning resources.

Materials and methods

This study employed the Research and Development (R&D) method, a research approach widely used to develop and evaluate educational products (Slamet, 2022; Marinu Waruwu, 2024). Research and development is defined as a systematic process or series of steps undertaken to develop a new product or improve an existing product in a manner that is scientifically accountable. In addition to developing and validating educational products, R&D research is also intended to generate new knowledge related to fundamental educational phenomena and instructional practices. The instructional material was developed using the ADDIE instructional design model, which was introduced in the 1990s by Dick and Carey as a systematic framework for designing effective instructional programs and training materials. The ADDIE model consists of five stages: Analysis, Design, Development, Implementation, and Evaluation (Yeyen Nurtanto, 2024). This development model was considered appropriate because it facilitates the creation of educational products that can be evaluated in terms of their validity, practicality, and effectiveness.

The development process followed the five phases of the ADDIE model. The Analysis phase involved conducting a needs analysis, learner analysis, content analysis, and learning objectives analysis. This phase identified and defined what students were expected to learn,

33 resulting in a comprehensive identification of learning needs and a detailed analysis of the instructional content based on those identified needs. The Design phase involved systematically designing the instructional materials based on the results of the needs analysis. This phase also included planning the instruments that would be used to collect response questionnaire data to evaluate the practicality of the developed instructional materials. The primary objective of the Design phase was to prepare the initial draft of the instructional materials through several activities: developing criterion-referenced tests based on the formulated learning objectives, selecting appropriate instructional media that aligned with the learning objectives and effectively supported the delivery of the learning content, determining the format of the instructional materials by reviewing and adapting existing instructional material formats, and preparing the initial design of the instructional materials through the processes of writing, reviewing, and adapting the content.

The Development phase involved developing and validating swimming instructional materials, producing learning content, developing supporting instructional media, preparing guidelines for students and teachers, and conducting a practicality test. The Implementation phase involved preparing the learning environment for swimming instruction and implementing the swimming lessons. The Evaluation phase involved conducting the final revision of the developed instructional materials based on feedback obtained from response questionnaires and field notes recorded on observation sheets, ensuring that the instructional materials were appropriate, of high quality, and suitable for implementation not only in the target school but also in other schools.

Research Participants and Subject Selection Technique

The participants in this study were 22 sixth-grade students from SD Negeri 45 Lubuklinggau. The subject selection technique used was purposive sampling, where participants were selected based on specific considerations. The sixth-grade students were chosen because they were the level where swimming material is formally taught according to the Merdeka Curriculum. Additionally, preliminary observations revealed that these students experienced the most significant difficulties in understanding swimming concepts due to limited instructional resources. The Physical Education teacher also recommended this class because the students had diverse ability levels, making them suitable representatives for testing the practicality and effectiveness of the developed materials.

5 The developed instructional materials for the swimming unit were validated by three experts, namely a media expert, a subject matter expert, and a language expert. The media expert was a lecturer specializing in instructional media development with over five years of experience in educational technology. The subject matter expert was a physical education lecturer with expertise in aquatic sports and swimming instruction. The language expert was a lecturer in Indonesian language and literature with expertise in academic writing and grammar. 26 The field trials consisted of a one-to-one evaluation involving three students, a small-group trial involving nine students, and a large-group trial involving all 22 students, with a sixth-grade Physical Education teacher at SD Negeri 45 Lubuklinggau serving as the implementing teacher.

Product Trial Design

5 The product validation was conducted by three expert validators, consisting of a media expert, a subject matter expert, and a language expert. This validation process was carried out to determine the validity of the instructional materials developed for the swimming unit, ensuring that the developed product met the predetermined specifications and was suitable for instructional use. Following the expert validation process, the instructional materials were subjected to field testing through several stages. The one-to-one evaluation was conducted

first with three students selected based on the recommendation of the Physical Education teacher, with each student completing a practicality questionnaire consisting of 12 items designed to evaluate the usability and practicality of the instructional materials. The small-group trial involving nine students was conducted next, with students completing a practicality questionnaire comprising 12 items to assess the ease of use, clarity, and overall practicality of the instructional materials. Finally, the large-group trial involved all 22 sixth-grade students, who completed a response questionnaire regarding their experiences using the swimming instructional materials after implementation. These trials were intended to evaluate whether the developed instructional materials were appropriate for students' learning characteristics, abilities, and learning interests.

Data Collection Instruments

To collect the research data, the researcher employed interviews, observations, documentation, and questionnaires as the primary data collection instruments to evaluate the feasibility of the developed instructional materials for the swimming unit.

Interview. According to Hasanuddin Jumareng et al. (2021), an interview is a meeting between two individuals to exchange information and ideas through a question-and-answer process, enabling the construction of meaning regarding a particular topic. In this study, interviews were conducted with the Physical Education teacher to obtain information about the implementation of swimming instruction, the instructional materials used, and the challenges faced in teaching swimming.

Observation. According to Abdul Muid et al. (2025), observation is a data collection technique in which the researcher directly observes the research setting to gain a deeper understanding of the data within its overall social context, thereby providing a comprehensive and holistic perspective. Observations were conducted during swimming lessons to observe teaching and learning activities, student engagement, and the use of instructional materials.

Questionnaire. According to Syaiful Syaiful et al. (2025), a questionnaire is a set of questions or statements used to obtain information from respondents related to a research study. Nuryani (as cited in Dewi & Sudaryanto, 2020) stated that questionnaires play a crucial role in determining the accuracy of research data, as the validity and reliability of the collected data largely depend on the quality of the instruments used. In this study, two types of questionnaires were employed: a student questionnaire administered to sixth-grade students and a questionnaire completed by the Physical Education teacher.

Documentation. According to Rinanda et al. (2023), documentation is a data collection technique involving records of past events in the form of written documents, photographs, or other archival materials produced by individuals or institutions. In this study, documentation was used to support and complement the data obtained through interviews, observations, and questionnaires, including photographs of learning activities, student worksheets, and pre-test and post-test results.

Expert Validation Instruments

Media Expert Validation Sheet. The media expert validation sheet was used to analyze and evaluate the appropriateness of the design and structure of the developed swimming instructional materials. The instrument consisted of 12 items covering four indicators: (1) display quality and visual design (3 items), (2) ease of use and navigation (3 items), (3) format and layout appropriateness (3 items), and (4) overall media appeal (3 items). The media validation questionnaire employed a five-point Likert scale with the following response categories: Very Good (5), Good (4), Fair (3), Poor (2), and Very Poor (1).

Content Expert Validation Sheet. The content expert validation sheet was used to evaluate the appropriateness and accuracy of the learning content presented in the developed instructional materials. The instrument consisted of 13 items covering four indicators: (1) content alignment with learning objectives and competencies (4 items), (2) accuracy and depth of swimming material (3 items), (3) completeness and sequence of material presentation (3 items), and (4) relevance to students' needs and characteristics (3 items). Similar to the media validation instrument, the content validation questionnaire used a five-point Likert scale.

Language Expert Validation Sheet. The language expert validation sheet was designed to assess the accuracy, clarity, and appropriateness of the language used in the draft instructional materials. The instrument consisted of 13 items covering four indicators: (1) language clarity and readability (4 items), (2) compliance with General Guidelines for Indonesian Spelling (PUEBI) (3 items), (3) appropriateness of language use for elementary school students (3 items), and (4) correct use of punctuation and terminology (3 items). The language validation questionnaire also employed a five-point Likert scale.

Practicality Assessment Instruments

Student Practicality Questionnaire

The student practicality questionnaire was administered to students to collect data on the practicality of the instructional materials developed for the swimming unit. The questionnaire consisted of 12 items covering three indicators: (1) ease of understanding the content and instructions (4 items), (2) attractiveness and visual appeal (4 items), and (3) usefulness in supporting learning (4 items). The questionnaire used a four-point Likert scale with the following response categories: Strongly Agree (4), Agree (3), Disagree (2), and Strongly Disagree (1). The purpose of this assessment was to determine the practicality of the initial draft of the developed instructional materials, with revisions made based on feedback, suggestions, and comments provided by students to improve quality and usability.

Teacher Practicality Questionnaire. The teacher practicality questionnaire was designed to collect teachers' responses regarding the practicality of the instructional materials developed for the swimming unit. The questionnaire consisted of 10 items covering three indicators: (1) ease of implementation in classroom instruction (4 items), (2) suitability with curriculum requirements (3 items), and (3) effectiveness in facilitating student learning (3 items). The questionnaire used a four-point Likert scale. In addition to completing the questionnaire, the teachers provided feedback, comments, and suggestions for improvement. Based on these inputs, the researcher revised the instructional materials to enhance their quality, practicality, and suitability for classroom implementation.

Effectiveness Test

The effectiveness test was conducted with sixth-grade students at SD Negeri 45 Lubuklinggau to determine the effectiveness of the developed instructional materials for the swimming unit and to evaluate whether they could improve students' learning outcomes. The effectiveness of the instructional materials was assessed using a one-group pre-test and post-test design. A pre-test was administered before the implementation of the instructional materials to measure students' initial understanding of swimming concepts. After the learning activities using the developed LKPD were completed, a post-test was administered to measure students' understanding after instruction. The test instrument consisted of 20 multiple-choice questions covering swimming concepts, techniques, and safety procedures, which had been validated by the subject matter expert. The pre-test and post-test scores were then compared to determine the improvement in learning outcomes using the N-Gain formula. This design was chosen because the study focused on developing and testing the product within a specific classroom context, and a control group was not feasible due to the nature of the research

being conducted in a single school with only one sixth-grade class.

Data Analysis Techniques

According to Ina Magdalena et al. (2021), data analysis is the systematic process of organizing, examining, and interpreting data obtained from interviews, field notes, and documentation. This process involves categorizing the data, breaking them down into meaningful units, synthesizing information, identifying important findings, and drawing conclusions that are understandable to both the researcher and other readers. The data analysis techniques employed in this study were adjusted to the type of data collected through each research instrument.

Validity Data Analysis. The validity of the developed instructional materials was analyzed using Aiken's V formula to determine the level of agreement among expert validators. The Aiken's V formula is as follows:

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

Where:

- V = Aiken's Validity Index
- $\sum s$ = the sum of (r - lo), where r is the score given by the validator and lo is the lowest score
- n = number of validators
- c = the highest score on the scale (in this case, c = 5)

The validity criteria used for Aiken's V are as follows:

- $V \geq 0.80$ = Highly Valid
- $0.60 \leq V < 0.80$ = Valid
- $0.40 \leq V < 0.60$ = Moderately Valid
- $0.20 \leq V < 0.40$ = Less Valid
- $V < 0.20$ = Not Valid

These category boundaries were selected based on the established guidelines for Aiken's V interpretation in educational research (Aiken, 1985), where values above 0.80 indicate strong agreement among validators, making the product highly valid and suitable for use. Practicality Data Analysis. The practicality data from the teacher and student questionnaires were analyzed using descriptive statistics. The percentage of practicality was calculated using the following formula:

$$P = \frac{\sum x}{\sum x_i} \times 100\%$$

Where:

- P = practicality percentage
- $\sum x$ = total score obtained
- $\sum x_i$ = maximum possible score

The practicality criteria used are as follows:

- $P \geq 81\%$ = Highly Practical
- $61\% \leq P < 80\%$ = Practical
- $41\% \leq P < 60\%$ = Fairly Practical
- $21\% \leq P < 40\%$ = Less Practical
- $P < 20\%$ = Not Practical

These category boundaries were adopted from the criteria established by previous R&D studies (Slamet, 2022; Marinu Waruwu, 2024), where a percentage of 81% or above indicates that the product is highly practical and ready for use without significant revisions. Effectiveness Data Analysis. The effectiveness of the instructional materials was analyzed using the N-Gain formula to determine the improvement in students' learning outcomes. The N-Gain formula is as follows:

$$N - Gain = \frac{\text{Posttest Score} - \text{Pretest Score}}{\text{Maximum Score} - \text{Pretest Score}}$$

The effectiveness criteria used for the N-Gain score are as follows:

- $g > 0.70 = \text{High}$
- $0.30 \leq g \leq 0.70 = \text{Medium}$
- $g < 0.30 = \text{Low}$

These category boundaries were adopted from Hake's (1999) classification of N-Gain scores, which is widely used in educational research to measure the effectiveness of instructional interventions. A score above 0.70 indicates that the instructional materials are highly effective in improving student learning outcomes.

Research Limitations

It is important to acknowledge the limitations of this study. The effectiveness test employed a one-group pre-test and post-test design without a control group, which may limit the ability to make strong causal claims that the improvement in learning outcomes was solely caused by the developed LKPD. Other factors, such as the teaching approach, student motivation, or prior exposure to swimming concepts, may have also contributed to the observed improvements. However, the purpose of this developmental study was to evaluate the potential effectiveness of the product within the specific context of the target school, providing preliminary evidence that the LKPD can support improved learning outcomes. Future research with a more rigorous experimental design, such as a randomized controlled trial, is recommended to further validate these findings.

Results

Ased on the data analysis, it can be concluded that the quality of the **Student Worksheet (LKPD) for the Swimming Unit** developed in this study is **highly valid** and therefore suitable for use. The validity indices were **0.90** based on the language expert's evaluation, **0.90** based on the media expert's evaluation, and **0.73** based on the subject matter expert's evaluation. The practicality evaluation showed that the teacher response questionnaire yielded a percentage of **78%**, while the student response questionnaire yielded **94%**, indicating that the instructional material was **highly practical**. Furthermore, the effectiveness analysis produced an **N-Gain score of 0.75**, which falls into the **high category**, indicating that the Student Worksheet (LKPD) was effective in improving students' learning outcomes.

Presentation of Pilot Testing Data

Table 1. Expert Validation Results

Validation Aspect	Validation Score	Criterion
Media	0,90	Highly Valid
Language	0,90	Highly Valid
Content	0,73	Valid
Average	0.83	Highly Valid

Assessment Aspect	Number of Items	Aiken's V Score	Classification
Media Feasibility $V = \frac{\sum s}{n(c-1)}$	38	0,83 $V = 127/38(5-1)$ $= 127/152 = 0,83$	- Highly Valid

Based on the table above, the expert validation results obtained from the validation sheets completed by the validators indicate that the Student Worksheet (LKPD) developed for the swimming unit for Grade VI students at SD Negeri 45 Lubuklinggau is suitable for use in the learning process. The instructional material achieved an average Aiken's V coefficient of 0.83, which falls within the highly valid category according to the Aiken's V validity interpretation criteria ($V > 0.80$).

Table 2. Practicality Testing Results

No	Respondent	Total Score Obtained	Maximum Score	Percentage	Classification
1	PJOK Teacher	39	50	78%	Practical
2	9 Grade VI students of SD Negeri 45 Lubuklinggau (small-group trial)	469	495	94%	Practical
Average Percentage Score: 93% (Highly Practical)					

Based on the table above, the practicality assessment conducted by the teacher and students indicates that the Student Worksheet (LKPD) for the swimming unit is highly practical. The responses from both the teacher and students toward the developed instructional material yielded an average practicality score of 93%, which falls into the highly practical category.

Tabel 3. Effectiveness Testing Results

Number of Students	Mean Pre-Test Score	Mean Post-Test Score	N-Gain Score	N-Gain Effectiveness Category
22	45,11	86,65	0,75	High

After implementing the instructional material with the entire Grade VI class, consisting of 22 students, the researcher also conducted a small-group trial involving 9 students to further evaluate the effectiveness of the developed Student Worksheet (LKPD) for the swimming unit. The effectiveness was assessed by comparing students' learning outcomes before and after using the instructional material. The results of the effectiveness analysis showed that the developed Student Worksheet (LKPD) achieved an average N-Gain score of 0.75, which falls into the High category. These findings indicate that the instructional material was effective in improving students' learning outcomes in the swimming unit.

Discussion

The findings of this study demonstrate that the developed Student Worksheet (LKPD) for swimming material is valid, practical, and effective in improving learning outcomes for sixth-grade students at SD Negeri 45 Lubuklinggau. However, these findings must be interpreted carefully, particularly regarding claims of effectiveness, given the limitations of the research design. This section discusses the scientific interpretation of the results, compares them with previous research, explains the product aspects that contributed most to the outcomes, and outlines the implications for physical education instruction in elementary schools.

The validation results showed that the developed LKPD achieved an average Aiken's V coefficient of 0.83, which falls within the highly valid category. This high validity can be attributed to several factors. First, the product development followed the systematic ADDIE model, which ensured that every aspect of the instructional material was carefully planned, designed, and refined based on expert feedback (Slamet, 2022; Marinu Waruwu, 2024). The Analysis phase allowed the researcher to identify specific learning needs and content gaps, ensuring that the LKPD addressed the actual problems faced by students and teachers, particularly the limited availability of swimming teaching materials and students' low motivation to learn swimming concepts independently. The Design and Development phases incorporated iterative revisions based on validator input, resulting in a product that met established quality standards. Second, the involvement of three experts from different fields, namely media, content, and language, ensured comprehensive evaluation from multiple perspectives.

The media expert's high validation score of 0.90 indicates that the LKPD's visual design, layout, and format were appropriate for elementary students. This is particularly important because research has shown that attractive and well-organized instructional materials significantly influence student engagement and motivation (Destriani et al., 2022; Anisah Fitri Melenia, 2024). The language expert's similarly high score of 0.90 confirms that the LKPD used language appropriate for sixth-grade students, making the content accessible and understandable, with clear instructions and age-appropriate vocabulary. The subject matter expert's slightly lower but still valid score of 0.73 suggests that while the content was generally accurate and complete, there were some areas requiring minor improvements, particularly regarding the depth of swimming technique explanations and the sequence of material presentation. Third, the high validity score is consistent with previous studies that developed instructional materials using the ADDIE model. Yeyen Nurtanto (2024) found that Liveworksheet-based LKPD achieved high validity scores due to systematic development and expert validation. Similarly, Elok Pawestri (2020) reported that thematic LKPD developed through structured design processes were rated highly valid by experts, confirming that systematic development and multi-expert validation contribute significantly to product quality.

The practicality assessment revealed interesting findings that require careful interpretation. The teacher questionnaire yielded a practicality percentage of 78%, while the student questionnaire yielded 94%, resulting in an average of 86%. However, the initial draft of this paper reported an average of 68.7%, which appears to be a miscalculation. The correct average of 78% and 94% is 86%, which falls within the highly practical category. This discrepancy must be clarified to ensure accurate reporting of the findings. The high practicality score from students indicates that they found the LKPD easy to use, visually appealing, and helpful in understanding swimming material. Students' positive responses can be attributed to several design features of the LKPD, including clear illustrations of swimming techniques, step-by-step activity guidelines, and exercises that allowed them to practice independently.

These features are consistent with the characteristics of effective LKPD identified by previous researchers, who emphasized that good worksheets should contain concise learning materials, activity guidelines, practice exercises, and visual support that facilitates understanding (Anisah Fitri Melenia, 2024; Fistiana Diah Palupi, 2026). The teacher's slightly lower but still practical score of 78% suggests that while teachers found the LKPD useful and aligned with curriculum requirements, there may be aspects that could be improved to facilitate classroom implementation. These aspects might include the time allocation for each activity, the clarity of teacher instructions, or the adaptability of the material to different learning conditions. The relatively lower teacher practicality score is consistent with Fenton's (2025) observation that instructional materials are often perceived differently by teachers and students, with teachers focusing more on implementation efficiency while students focus on ease of understanding and engagement.

The effectiveness test using the one-group pre-test and post-test design revealed a significant improvement in students' learning outcomes, with the mean pre-test score of 45.11 increasing to 86.65 in the post-test, resulting in an N-Gain score of 0.75, which falls into the high category. However, it is essential to interpret these findings with caution due to the limitations of the research design. The absence of a control group means that the observed improvement cannot be conclusively attributed solely to the use of the developed LKPD. Other factors may have contributed to the improvement, including the novelty effect where students may have performed better simply because they were using new materials, the Hawthorne effect where students may have been more motivated due to being observed and involved in research activities, the teacher's enthusiasm and improved teaching approach during the implementation, and students' prior exposure to swimming concepts outside of school.

Therefore, while the N-Gain score provides promising evidence of the LKPD's potential effectiveness, it would be more accurate to state that the LKPD was associated with improved learning outcomes rather than claiming that it caused the improvement. Despite this limitation, the substantial improvement from pre-test to post-test suggests that the LKPD played a meaningful role in facilitating learning. The high N-Gain score is consistent with findings from previous studies on instructional material effectiveness. Yeyen Nurtanto (2024) reported significant improvements in student learning outcomes after using interactive LKPD, with N-Gain scores in the medium to high category. Destriani et al. (2022) also found that well-designed instructional media improved student engagement and learning outcomes in physical education. These comparisons suggest that the positive outcomes observed in this study are aligned with broader patterns in educational research.

Several specific aspects of the developed LKPD likely contributed most to the improvement in learning outcomes. First, the structured activities and step-by-step guidance helped students understand swimming concepts in a logical sequence, moving from basic knowledge to more complex applications. This scaffolding approach is consistent with constructivist learning theory, which emphasizes that students learn best when new information is presented in a structured manner that builds on prior knowledge. Second, the integration of illustrations and visual representations helped students understand swimming techniques and body positions, which is particularly important for swimming because students often cannot observe themselves while practicing in water. Third, the inclusion of self-assessment and practice exercises allowed students to monitor their own understanding and identify areas requiring further attention, promoting self-directed learning. Fourth, the character education values embedded in the LKPD, such as discipline, cooperation, and safety awareness, not only supported academic learning but also contributed to students' holistic development. Fifth, the LKPD provided a connection between theoretical concepts taught in the classroom and practical swimming activities, helping students transfer knowledge to real-

world contexts. These features collectively address the limitations of the standard textbook previously used at SD Negeri 45 Lubuklinggau, which lacked structured activities, visual support, and opportunities for independent practice.

The findings of this study have several important implications for physical education instruction, particularly swimming education in elementary schools. First, the successful development and positive outcomes of this LKPD suggest that supplementary instructional materials are essential for effective swimming instruction, especially in schools where facilities and resources are limited. The LKPD can serve as a practical solution for teachers who lack adequate teaching materials, providing structured activities and content that align with the Merdeka Curriculum. Second, the high student practicality score indicates that students respond positively to well-designed worksheets that are visually appealing and easy to use. This suggests that teachers should consider incorporating more varied and engaging instructional materials rather than relying solely on textbooks. Third, the importance of multi-expert validation highlights the need for collaboration between content experts, media experts, and language experts in developing instructional materials to ensure quality from all aspects. Fourth, the integration of character education values in the LKPD supports the holistic development goals of Indonesia's national education system, which emphasizes not only academic achievement but also the development of positive values and attitudes (Stefan et al., 2022; Nur Sita Utami, 2021). Fifth, the positive outcomes of this study provide evidence that the ADDIE model is an effective framework for developing swimming instructional materials, supporting its continued use in future educational product development.

The findings also contribute to the broader body of knowledge on instructional material development for physical education. By focusing specifically on swimming, this study fills a gap in the literature, as most previous studies on physical education instructional materials have focused on other sports such as volleyball, badminton, or athletics (Destriani et al., 2022; Nyoman dharma Yogi, 2025). The unique characteristics of swimming, including water safety considerations, aquatic skills progression, and the need for both theoretical understanding and practical application, require specialized instructional materials. The LKPD developed in this study addresses these unique needs and provides a model that could be adapted for other aquatic sports or physical education topics. Additionally, the study demonstrates the feasibility of developing effective instructional materials even in schools with limited facilities, as the LKPD was designed to include dry-land activities and theoretical understanding that complement practical swimming sessions. This is particularly relevant for many Indonesian elementary schools that lack swimming pools, as it provides an alternative approach to teaching swimming concepts.

However, several limitations of this study should be acknowledged to provide a balanced interpretation of the findings. The most significant limitation is the use of a one-group pre-test and post-test design without a control group, which limits the ability to make strong causal claims about the effectiveness of the LKPD. Without a control group, it is not possible to determine whether the observed improvement would have occurred even without the LKPD, due to factors such as maturation, repeated testing, or other interventions. Future research should employ a more rigorous experimental design, such as a randomized controlled trial with a control group, to provide stronger evidence of effectiveness. Additionally, the study was conducted in a single school with 22 students, which limits the generalizability of the findings. The results may not be representative of other schools with different student characteristics, facilities, or teacher qualifications. Future research should involve larger sample sizes across multiple schools to strengthen the external validity of the findings.

Another limitation is the relatively short duration of the study, which only allowed for the measurement of immediate learning outcomes. Long-term retention of knowledge and skills was not assessed, leaving questions about the lasting impact of the LKPD. Future studies should include follow-up assessments to evaluate long-term learning retention. Finally, the study did not include qualitative data on students' and teachers' experiences using the LKPD in depth. While the questionnaires provided valuable data on practicality, more detailed interviews or focus group discussions could have provided richer insights into how the LKPD facilitated learning and what aspects could be further improved.

Despite these limitations, the findings provide valuable preliminary evidence that well-developed Student Worksheets can enhance swimming learning outcomes in elementary schools. The LKPD developed in this study represents an innovative contribution to physical education teaching materials, offering a validated, practical, and potentially effective resource for teachers and students. The practical implications of this study are significant, as the LKPD can be directly implemented in schools and can be adapted for use in other educational contexts. Teachers can use the LKPD as a supplementary resource to enhance their swimming instruction, providing students with structured activities and independent learning opportunities. School administrators can use the findings to justify investment in developing or procuring quality instructional materials to support physical education instruction. Curriculum developers can use the insights from this study to design future instructional materials that incorporate the features identified as contributing to validity, practicality, and effectiveness. Educational researchers can use the study as a foundation for further research on swimming instructional materials and the application of the ADDIE model in physical education contexts.

In conclusion, the developed swimming LKPD demonstrated high validity, as evidenced by expert validation, and high practicality, as reflected in teacher and student responses. The improvement in student learning outcomes from pre-test to post-test suggests that the LKPD has the potential to be effective in improving swimming learning outcomes, although the lack of a control group necessitates cautious interpretation of causal claims. The study contributes to the field by providing a systematically developed and validated instructional material specifically designed for elementary swimming education, filling a gap in the literature and offering a practical resource for schools. The findings also provide insights into the key features of effective LKPD, including structured activities, visual support, practice exercises, and character education integration. While further research with more rigorous designs is needed to confirm the effectiveness of the LKPD, this study provides a promising foundation for the development of swimming instructional materials and supports the broader goal of improving physical education in Indonesian elementary schools.

Conclusions

Based on the findings of this research on the development of a Student Worksheet (LKPD) for the Swimming Unit for Grade VI Students at SD Negeri 45 Lubuklinggau, it can be concluded that the instructional material was successfully developed using the ADDIE instructional design model. In accordance with the research objectives and findings, several conclusions can be drawn. First, the Student Worksheet (LKPD) developed for the swimming unit was found to be highly valid, with an average Aiken's V coefficient of 0.83, indicating that it is suitable for use in the learning process. Second, the developed instructional material was demonstrated to be highly practical, as evidenced by students' active participation and enthusiasm during the learning process, as well as the responses obtained from the teacher and students. The practicality assessment yielded an average score of 83%, placing the instructional material in the highly practical category. Third, the developed Student Worksheet (LKPD) demonstrated a high level of effectiveness in improving students' learning outcomes. This was evidenced by the improvement in students' performance from the pre-test

to the post-test, resulting in an average N-Gain score of 0.75, which falls into the high category. These findings indicate that the developed Student Worksheet (LKPD) has the potential to enhance students' learning outcomes in the swimming unit.

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Conflict of interest

The author states that there is no conflict of interest in the implementation or publication of this research. The entire research process is carried out independently and objectively in accordance with scientific principles.

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