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DEVELOPMENT OF CONTEXTUAL STUDENT WORKSHEETS BASED ON THE JAMBI ENVIRONMENT TO ENHANCE NUMERACY

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Abstrak

Tantangan dalam keterampilan numerasi murid masih menjadi persoalan yang terus berlanjut di kelas-kelas matematika di Indonesia, terutama ketika bahan ajar tidak terhubung dengan konteks kehidupan nyata murid. Menjawab kesenjangan tersebut, penelitian ini bertujuan untuk mengembangkan Lembar Kerja Murid (LKM) yang dirancang berdasarkan kontekstual lingkungan lokal Jambi dalam perspektif *Education for Sustainable Development* (*ESD*) pada materi bilangan untuk meningkatkan pencapaian numerasi murid. Penelitian ini menggunakan model pengembangan Plomp yang terdiri atas tiga fase, yaitu investigasi awal, perancangan dan realisasi, serta evaluasi. Pengumpulan data dilakukan melalui lembar validasi ahli, wawancara, dan tes literasi numerasi. Hasil penilaian para ahli menunjukkan bahwa produk tersebut sangat layak ditinjau dari aspek materi, bahasa, dan desain. Uji coba lapangan di kelas VII A SMP N 11 Kota Jambi, menunjukkan hasil rata-rata tes numerasi 34 murid sebesar 80,47 yang melampaui Kriteria Ketuntasan Minimun (75). Temuan ini mengindikasikan bahwa LKM berbasis kontekstual efektif dalam meningkatkan numerasi serta memperkuat keterhubungan murid dengan konteks lokal untuk menanamkan kesadaran keberlanjutan.

Kata Kunci: Konteks Lokal, Lembar Kerja Murid, Numerasi.

Abstract

Challenges in students' numeracy skills remain a persistent issue in mathematics classrooms in Indonesia, particularly when teaching materials are not connected to students' real-life contexts. Addressing this gap, the present study aims to develop a Student Worksheet designed based on the local environmental context of Jambi within the Education for Sustainable Development (ESD) perspective on number topics to enhance students' numeracy achievement. This study employs the Plomp development model, which consists of three phases: preliminary investigation, design and realization, and evaluation. Data were collected through expert validation sheets, interviews, and numeracy literacy tests. The results of expert assessments indicate that the developed product is highly feasible in terms of content, language, and design. Field testing conducted in Class VII A of SMP N 11 Kota Jambi showed that the average numeracy test score of 34 students reached 80.47, exceeding the Minimum Mastery Criterion (75). These findings indicate that the contextual-based Student Worksheet is effective in improving students' numeracy and in strengthening their connection to local contexts as a means of fostering sustainability awareness.

Keywords: *Local Context, Numeracy, Student Worksheet.*

INTRODUCTION

Mathematics instruction equips students with critical thinking, analytical reasoning, and problem-solving skills. Yet in practice, many students still perceive mathematics as a difficult subject, a pattern that several studies continue to highlight (Mohamed et al., 2020; Ningsih et al., 2019). One essential lens for understanding this challenge is numeracy, which encompasses the ability to understand, use, and interpret mathematical ideas across various contexts (Adelia et al., 2024).

Numeracy is defined as the ability to analyze and comprehend statements within activities involving the manipulation of symbols or language encountered in everyday life and to express these statements verbally and in writing (Ekowati et al., 2019). Students' literacy and numeracy skills are not just academic requirements, they are foundational capabilities that directly influence their readiness to navigate real-world demands. Numerical, in particular, enables students to interpret data, make informed decisions, and solve everyday problems that increasingly rely on quantitative reasoning. These abilities play a strategic role in shaping high-quality human resources who can adapt, innovate, and contribute productively in a data-driven society. When students develop strong numericy, schools are better positioned to build an education ecosystem that is resilient, relevant, and aligned with national development goals, thereby strengthening the education system as a whole (Yuan et al., 2022).

One of the topics that supports the development of numeracy is integers, integer concepts are fundamental in mathematics and are often the foundation for more complex mathematical concepts (Harisman et al., 2023). However, the test results show that many students struggle to understand integers, especially when the material is presented in an abstract manner without connections to real-life situations. The author administered a test to 88 students, which can be seen in Table 1.

Table 1: Test Result

No	Range of scores	Criteria	Number of Students
1	80 – 100	Excellent	1
2	66 – 79	Good	1
3	56 – 65	Fair	3
4	40 – 55	Poor	18
5	< 40	Very Poor	65

Based on Table 1, the test results indicate that students' abilities remain at a low level, with a strong dominance in the Very Poor and Poor categories. Out of a total of 88 students, 65 obtained scores below 40 and 18 scored within the range of 40–55, meaning that more than 90% of the students have not yet achieved an adequate level of competency mastery. Only a small proportion of students fell into the Fair (3 students), Good (1 student), and Excellent (1 student) categories, reflecting a substantial disparity in learning outcomes. These findings suggest that the current instructional process has not been fully effective in fostering conceptual understanding and the ability to apply learned material, nor has it sufficiently addressed the needs of the majority of students. This condition underscores the need to strengthen instructional strategies and to develop teaching materials that are more

contextual, relevant to students' learning environments, and oriented toward sustainable improvement of competencies.

A contextual learning approach can be utilized to address this issue. This approach integrates everyday contexts into the learning material, enabling students to apply their knowledge and skills from one problem or context to another (Muhartini et al., 2023). This approach is supported by empirical findings showing that learning becomes more effective when instructional materials are connected to students' real-life contexts (Kementerian Pendidikan dan Kebudayaan, 2021). Several studies report that context-based mathematics instruction increases student engagement, improves conceptual understanding, and strengthens literacy and numeracy outcomes (Mohamed et al., 2020; Ningsih et al., 2019).

The Province of Jambi, with its rich cultural heritage and natural potential, offers numerous local contexts that can be utilized in education. In the learning process, it is essential for teachers to select appropriate methods and teaching materials to create an active, creative, and enjoyable learning environment. Moreover, student-centered learning should be the primary focus. Student worksheets are one such teaching material that can serve this purpose (Pane et al., 2022). These worksheets are designed to guide students in independent learning and assist them in understanding the learning material (Ladona et al., 2022). Through this approach, students not only grasp mathematical concepts but also gain insights into their local environment and culture.

Student worksheets are an effective educational medium that can be developed to support contextual learning. They function as structured and directed learning guides designed to help students comprehend material effectively. The integration of contextual elements makes the learning process more relatable and enjoyable for students, thereby reducing boredom and increasing participation (Kelly, K. (2022) aiming not only to enhance conceptual understanding but also to motivate independent learning.

In this study, the Student Worksheet is developed by integrating local Jambi contexts into the topic of integers, with the aim of producing a Student Worksheet that is valid, practical, and effective in enhancing students' numeracy achievement through a sustainability-oriented, environmentally contextualized perspective.

Despite the growing body of research on contextual mathematics learning and the use of student worksheets, most existing studies focus primarily on improving cognitive outcomes without explicitly integrating local environmental contexts through a sustainability-oriented perspective. In addition, research examining the development of contextual student worksheets specifically designed to enhance numeracy achievement in the topic of integers remains limited, particularly in the context of local Indonesian environments such as Jambi. Therefore, this study offers novelty by developing and validating a Student Worksheet that integrates local Jambi environmental contexts through the lens of Education for Sustainable Development (ESD) to enhance students' numeracy achievement.

METHODS

This study was conducted using a development method (research and development) with the Plomp model (Plomp & Nieveen, 2010) which consists

of three phases: preliminary research, design and realization (prototyping phase), and evaluation (assessment phase). This model was chosen because it provides a systematic framework for designing and evaluating learning products. The activities of each phase are described as As shown in Table 2.

Table 2: Evaluation Criteria at Each Development Stage

No	Phase	Criteria	Activity Description
1	*Preliminary research*	Emphasis on Content Validity	Problem Analysis and Literature Review
2	*Prototyping phase*	Focus on consistency (construct validity) and practicality. Subsequently, prioritize practicality and gradually move towards efficiency.	Development of the prototype to be tested and revised based on formative evaluation.
3	*Assesment phase*	Practicality and Efficiency	Assess whether users can use the product (practicality) and are willing to apply it. Also, evaluate whether the product is effective

Source: (Plomp & Nieveen, 2010).

In the preliminary research phase, a needs analysis was conducted to understand the issues in teaching integers in seventh-grade junior high school classes. The needs analysis aimed to accommodate the diversity of student profiles and learning situations (Almalki, 2016). Data were collected in the Initial Investigation. This phase aimed to identify the gap between learning needs and the available media, as well as the potential of local Jambi contexts that could be integrated into the student worksheets.

The design and realization phase involves the development of a contextual-based student worksheet prototype, incorporating the Jambi environment. The student worksheet is designed by integrating elements of Jambi's culture, environment, and natural potential into the topic of integers. The prototype is then validated by subject matter experts, learning design experts, and language experts. The validation is conducted to assess the feasibility of the Student Worksheet based on content, language, and design aspects.

In the evaluation phase, a field trial is conducted with seventh-grade students at a junior high school 11 Jambi City. This evaluation uses a posttest design, administering test items to measure students' numerical competence across four categories: 1) special intervention needed, students have limited mathematical knowledge, demonstrating only partial mastery of concepts and constrained computational skills; 2) basic level, Students possess fundamental mathematical skills, including basic computations in straightforward equations, foundational concepts, and the ability to solve simple and routine mathematical problems; 3) proficient level, students are able to apply their mathematical knowledge in a broader range of contexts; and 4) advanced level, Students are capable of reasoning to solve complex and non-routine problems based on their mathematical concepts. To complement the quantitative findings, the practicality

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of the Student Worksheet is further examined through semi-structured interviews with selected students after using the developed material. The interviews reveal that students perceive the worksheet as clear, manageable, and closely connected to real-life contexts in Jambi.

Data Analysis Techniques

To analyze the data collected across the three phases of the Plomp development model, this study employed descriptive qualitative and descriptive quantitative analysis techniques, with expert validation analyzed qualitatively and the field test results analyzed descriptively.

In the preliminary research phase, data from the needs analysis and initial investigation were analyzed using qualitative descriptive analysis. Information obtained through observations and preliminary interviews was examined to identify students' difficulties in learning integers, limitations of existing instructional media, and the potential of local Jambi contexts to be integrated into the Student Worksheet. This analysis served as the basis for formulating the design requirements of the developed product.

In the design and realization (prototyping) phase, the feasibility of the Student Worksheet was evaluated through qualitative expert validation involving subject matter experts, instructional design experts, and language experts. The validation focused on assessing the appropriateness of the worksheet in terms of content accuracy, clarity of language, and instructional design quality. Qualitative data in the form of comments, suggestions, and recommendations provided by the experts were analyzed using descriptive qualitative analysis and used to revise and refine the prototype until it met the expected quality criteria.

In the evaluation (assessment) phase, a limited field test was conducted with seventh-grade students at Junior High School 11 Jambi City. Students' numeracy posttest results were analyzed using descriptive statistical analysis, including the calculation of mean scores and the classification of students into four numeracy levels: special intervention needed, basic, proficient, and advanced. This analysis aimed to describe students' numeracy achievement after the use of the developed Student Worksheet. Furthermore, data from semi-structured interviews with selected students were analyzed using qualitative descriptive analysis to examine the practicality of the Student Worksheet, particularly with respect to clarity, ease of use, and relevance to students' real-life contexts. The integration of these qualitative and quantitative findings provided a comprehensive evaluation of the validity, practicality, and effectiveness of the contextual-based Student Worksheet within the scope of a single-class field trial.

RESULTS AND DISCUSSION

Research Results

1. Initial Investigation Stage

At this stage, a needs analysis and preliminary study were conducted to examine the specific requirements for supporting the learning of integers among Grade VII junior high school students (Umrati et al., 2022) The analysis involved administering a numeracy assessment consisting of items designed to measure students' understanding of integer operations, their ability to interpret contextual problems, and their capacity to apply integer concepts in real-life situations.

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The results indicated that most students struggled to connect integer concepts with everyday contexts. Further analysis showed that students' numeracy competence remained in the low category, as summarized in Table 3.

Table 3: Results of Student Numeracy Competence Evaluation

No	Numeracy Competence Level	Average Score	Percentage (%)
1	Special Intervention Needed	25,5	79,69
2	Basic Level	19,25	60,16
3	Proficient Level	11,25	35,16
4	Advanced Level	13	40,63

Table 3 presents the evident of the numeracy competence of students at State Junior High School 11 Jambi City is still at a level that requires serious attention, with the majority of students falling into the "Special Intervention Needed" and "Basic" levels. The findings indicate that the existing conditions require meaningful innova-tion in the learning process. In response, the researcher developed a context-based Student Worksheet that utilizes the local environment as a learning medium while simultaneously integra-ting elements of local wisdom into mathematics education (Suciati et al., 2024).

2. Design and Implementation Stage

This stage involves the design and development of a context-based Student Worksheet that draws extensively on the environmental characteristics of Jambi. The worksheet incorporates elements such as local ecosystems, river-based livelihoods, regional agri-cultural practices, and common socio-environmental issues faced by the community. These contextual features are intentionally embedded into the problem scenarios and learning activities to ensure that students engage with mathematical concepts through situations that reflect their immediate surroundings, making the learning experience more meaningful and relevant, such as:

1) Environmental Conditions
   The condition of the Jambi environment is used as an illustration and context for the problems.
2) Natural Resources
   Numerical examples are derived from geographical data, such as the Batanghari River.

The structure of the Student Worksheet consists of:

1. Problem Orientation

The Student Worksheet presents an introduction to a real-life situation or problem to be understood.

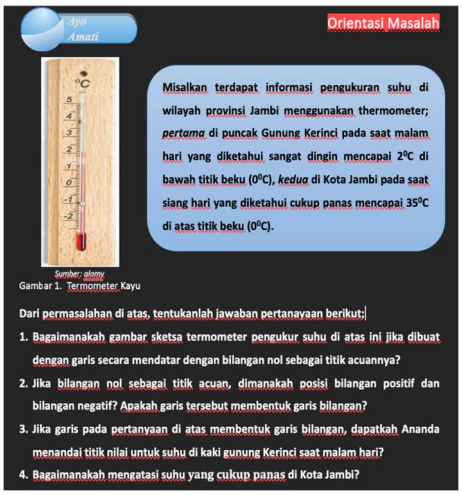

Figure 1: Problem Orientation Stage

The instructions in this stage are designed to trigger curiosity, encourage exploration, and assist students in

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defining the problem clearly as a foundation for further learning.

2. Organizing the Students

The content of the Student Worksheet directs students to form groups, assign roles, and plan strategies for problem-solving.

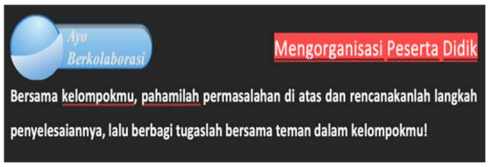

Figure 2: Organizing Stage

The instructions in this step aim to foster effective collaboration, allowing students to work together in a structured manner to understand and solve the problem.

3. Guiding Group Investigation

The Student Worksheet guides students to gather information, analyze data, and explore solutions to the problem at hand.

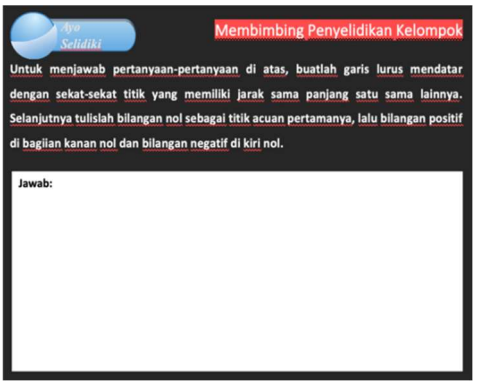

Figure 3: Group Investigation Stage

The instructions in this step guide students to engage in the investigation process, facilitating active and critical discussions within the group.

4. Development and Presentation of Work Results

The content of the Student Worksheet directs students to formulate solutions or final products based on the results of the investigation.

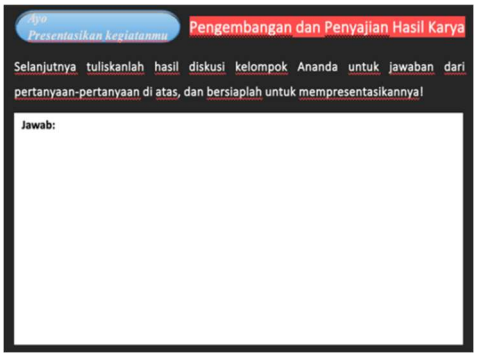

Figure 4: Presentation of Work Results Stage

The instructions in this step guide students to present their solutions in the form of a presentation or tangible work to other groups, teachers, or relevant audiences, in order to receive feedback and evaluate the success of the learning process.

5. Analysis and Evaluation

The content of the Student Worksheet guides a reflection process where students and facilitators review the solutions developed, the effectiveness of the strategies employed, and the understanding gained.

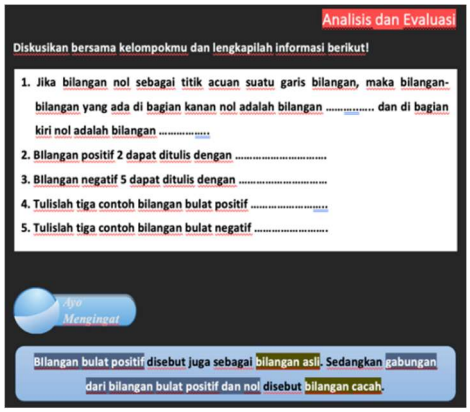

Figure 5: Analysis and Evaluation Stage

The instructions in this step guide students to evaluate the strengths and weaknesses of their work, refine their thinking processes, and ensure that the learning objectives have been achieved.

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The result of the Student Worksheet design was designated as Prototype I. This prototype served as the initial version of the product and became the basis for further evaluation, revision, and refinement in subsequent development stages.

After the design stage, a self-evaluation was conducted on the developed Student Worksheet to identify the alignment among the initial design, learning objectives, and students' characteristics. This evaluation aimed to examine the clarity of instructions, completeness of learning components, relevance of the local context, and coherence of learning activities with the expected numeracy competencies, serving as the basis for refinement prior to the expert validation stage. The results of the self-evaluation are presented in Table 4.

Table 4: Results of Self Evaluation

No	Evaluation Indicators	Checklist
1	The development of the Student Worksheet is based on the results of the needs analysis and students' characteristics.	√
2	The design of the Student Worksheet integrates sustainability issues into mathematical contexts.	√
3	The Student Worksheet encourages students' emotional engagement with environmental issues.	√
4	The Student Worksheet provides opportunities for students to reflect on sustainability.	√
5	The content and activities in the Student Worksheet promote environmental awareness.	√
6	The problems presented are contextual and relevant to real-life situations.	√
7	The design of the Student Worksheet supports 21st-century skills, such as communication and collaboration.	√
8	Students are encouraged to think systemically and critically about environmental issues in Jambi.	√
9	The Student Worksheet includes sections that provide students with opportunities to design solutions to environmental problems.	√
10	The Student Worksheet promotes collaboration and discussion among students.	√
11	The Student Worksheet includes learning objectives that are aligned with the Learning Outcomes and Instructional Objectives.	√
12	The Student Worksheet features exploratory activity designs that promote students' active engagement.	√
13	The design of the Student Worksheet considers the differentiation of students' learning needs.	√
14	The Student Worksheet presents problem-solving steps in a systematic manner.	√
15	The Student Worksheet demonstrates coherence and continuity across learning topics.	√
16	The tasks in the Student Worksheet are directed toward concrete and sustainable actions.	√

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17	The Student Worksheet incorporates learning activities that encourage reflection and the reinforcement of sustainability values.	√

Based on the results of the self-evaluation presented in Table 4, all evaluation indicators were fulfilled, indicating that the developed Student Worksheet aligns with the intended learning objectives, sustainability principles, and students' characteristics. The results further indicate that the worksheet integrates sustainability into mathematical contexts, supports active and reflective learning, and promotes environmental awareness and 21st-century skills. Based on these findings, the development process proceeded to the expert validation stage.

After the design and self-evaluation stages, the Student Worksheet underwent expert validation conducted by specialists in mathematics education, comprising four academic experts and one practicing mathematics teacher. This validation was conducted to examine the content validity, instructional design consistency, and linguistic clarity of the worksheet. The validation process was conducted through three to five sessions for each validator, depending on individual availability, using both face-to-face and online formats, which enabled experts to provide structured feedback and recommendations. The validation results served as the basis for revising and refining the Student Worksheet to ensure its feasibility and readiness for the subsequent stage, namely field testing.

The validation results indicated that the Student Worksheet met the criteria of being "suitable" based on:

1) Content Aspect

The material aligns with the curriculum and the environmental context of Jambi because it is designed based on the competencies outlined in the national mathematics curriculum while integrating environmental, social, and economic elements. By incorporating examples, problem situations, and illustrations drawn from the Jambi environment, such as the Batanghari River and daily community interactions, the material ensures curricular relevance while making learning more meaningful and easier for students to understand. This dual alignment enhances conceptual understanding and supports numeracy achievement grounded in students' real-life experiences.

2) Language Aspect

Using simple, clear language appropriate to the students' developmental level ensures that instructional materials are accessible and understandable, allowing students to focus on the underlying mathematical concepts rather than struggling with complex wording. This approach reduces cognitive load, supports comprehension, and enables students to engage more confidently with the tasks.

3) Design Aspect

The design is engaging and facilitates students' understanding of the instructions because it uses visual cues, structured layouts, and intuitive formatting that help students navigate the tasks with ease. An attractive and well-organized presentation captures students' attention, reduces confusion, and guides them step-by-step through the learning process.

The revised product resulting from the design stage, self-evaluation,

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and expert validation was designated as Prototype II of the Student Worksheet, which was subsequently implemented in the field testing stage through one-to-one and small-group evaluation activities.

1) One to one

The one-to-one activity in this study constituted an individual trial of Prototype II conducted with three eighth-grade students at SMPN 11 Jambi City representing high, medium, and low achievement levels. The Student Worksheet was provided to the students to be studied and completed, after which they were asked to fill out a questionnaire consisting of 16 positive statements covering three main aspects:

(1) Presentation, which assessed readability, design, and the organization of the material;
(2) Content Feasibility, which evaluated the alignment of the material with the expected competencies and its relevance to students' needs; and
(3) Language, which examined the clarity and comprehensibility of the language used in the worksheet.

Students' responses at the one-to-one stage indicated that the distribution of responses—*Strongly Agree*, *Agree*, and *Disagree*—for each questionnaire item was dominated by the *Agree* category, reflecting a positive reception of the Student Worksheet design. Nevertheless, students provided several comments regarding the use of terms that were difficult to understand and visual elements that required simplification, which were used as the basis for revisions prior to the small-group trial stage. In addition to the questionnaire results, follow-up interviews conducted by the researcher revealed that students perceived the Student Worksheet as easy and practical to use, particularly in terms of following instructions and completing learning tasks.

2) Small group

The *small-group* activity was conducted with six eighth-grade students at SMPN 11 Jambi City representing high, medium, and low ability levels. The students were organized into three small groups, each consisting of two students with differing ability levels, with the aim of observing learning interactions and students' responses within a collaborative working context.

The implementation of the *small-group* trial followed procedures similar to those used in the *one-to-one* stage, but was conducted collaboratively. Students were asked to study and complete the Student Worksheet in groups and subsequently provide feedback through the same questionnaire used in the *one-to-one* stage. The use of the same instrument aimed to obtain a larger set of student responses and to examine the consistency of findings from the previous stage.

The results of students' responses during the small-group stage indicate that the overall quality of the Student Worksheet received positive evaluations across the three assessed aspects: presentation, content feasibility, and language. The presentation aspect was dominated by *Agree* and *Strongly Agree* responses, indicating that the layout, visual appearance, and instructional flow of the worksheet were perceived as clear and engaging, although minor improvements in visual consistency were still required.

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The content feasibility aspect received the strongest positive responses, confirming that the material was relevant, contextual, and supportive of students' conceptual understanding. With regard to language, although students generally perceived the worksheet positively, several comments indicated that certain terms and instructions were difficult to understand; therefore, revisions were made by simplifying the language to enhance readability and clarity. In addition, follow-up interviews conducted by the researcher revealed that students considered the Student Worksheet easy and practical to use, further supporting its practicality at the small-group stage.

Based on the findings of the *small-group* trial and the feedback obtained, Prototype II was revised and refined into Prototype III, which was subsequently employed in the *field test* stage.

3. Evaluation Stage

A field trial was conducted to test the effectiveness of the Student Worksheet with seventh-grade students at State Junior High School 11 Jambi City. Data collection was carried out through numeracy competency tests and student interviews. The results are as follows:

1) Achieve Numerical Competence

The numeracy competency test results of 34 students in the field test for Grade 7A showed that the average student score after using the Student Worksheet reached 80.47, exceeding the minimum mastery criterion of 75.

2) Student Motivation and Environmental Awareness

Interview results revealed that students felt more motivated to learn because the Student Worksheet was engaging and relevant to their daily lives. Students also expressed that they found it easier to understand the concept of integers as the material was connected to real-life experiences. Furthermore, students demonstrated increased awareness of the importance of environmental preservation.

3) Student Engagement

Observations conducted using a structured observation sheet, containing indicators such as participation in group discussions and degree of collaboration in problem-solving, showed that students were more active throughout the learning activities. The procedures included recording student behaviors at regular intervals and analyzing the frequency and quality of their engagement based on predefined criteria. The integration of the local Jambi context into the Student Worksheet contributed to this increased engagement, as students reported feeling more connected to the material being studied.

Further analysis of interviews conducted with a selected sample of students from the field test class (Grade VII A) revealed that the Student Worksheet was perceived as easy and practical to use during learning activities. Students reported that the clear instructions, structured tasks, and contextual problems helped them understand the material more easily. In addition, students stated that the integration of local environmental contexts increased their awareness of environmental issues, particularly the importance of protecting and preserving their surroundings. These interview findings reinforce the quantitative results by demonstrating that the Student Worksheet not only supports numeracy achievement but

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also enhances learning practicality and fosters environmental awareness among students.

Discussion

The findings of this study reinforce the theory of contextual learning, which posits that learning experiences connected to students' real-life situations can strengthen under-standing and increase interest. Compared with previous studies cited in the introduction, the results of this research show clear alignment, particularly with studies highlighting that local familiarity and relevance significantly improve students' nume-rical reasoning. However, this study extends earlier findings by demons-trating that the integration of specific Jambi-based contexts, such as the Batanghari River and local community activities, provided an additional layer of meaningful engagement that was not explored in prior research. The effectiveness of the Student Worksheet can be attributed to several factors: students' familiarity with the local context, the structured and step-by-step organization of the worksheet, and the inclusion of contextualized problem types that required students to apply integer concepts directly to authentic situations. These elements collectively supported students' comprehension and may explain why the worksheet produced stronger results than those reported in some earlier studies.

The contextual approach is grounded in the philosophy of constructivism, which emphasizes that learning is not merely about memorization (Suryawati & Osman, 2018). By utilizing the local potential of Jambi, this Student Worksheet successfully integrates local wisdom into the mathematics education curriculum, thereby helping to create more meaningful learning experiences (Mukminin & Kurniawan, 2020).

1. Effectiveness of the Student Worksheet in Enhancing Numeracy

This study shows that the context-based Student Worksheet contributes to improving students' numeracy competence because its design directly supports how students make sense of mathematical ideas. The worksheet incorporates real-life scenarios, local Jambi illustrations, and step-by-step guided activities that require students to interpret information, compare quantities, and apply integer operations to authentic situations. These features help students bridge abstract concepts with concrete experiences, enabling them to reason more effectively and develop stronger numerical understanding. This finding is consistent with prior research showing that context-based instruction strengthens students' ability to connect mathematical knowledge with real-world applications, thereby enhancing comprehension (Shofiyanti, 2025).

2. Utilization of Local Context

Incorporating Jambi's culture and natural resources into the Student Worksheet provides two main benefits:

1) Relevance of Learning

Students find it easier to understand the concept of integers because the context is closely related to their daily lives. Linking mathematics to everyday life fosters a more engaging and meaningful learning environment, motivating students to participate and develop a deeper appreciation for the subject actively (Elsaidi & Egupova, 2021).

2) Strengthening Local Values

Mathematics learning becomes a means of introducing and preserving the local culture to students (Suciati et al., 2024). Mathematics learning serves not

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only as a tool for developing logical reasoning and problem-solving skills but also as a means of introducing and preserving local culture among students. By integrating cultural elements into mathematical concepts and activities, students can explore how traditional practices, patterns, and values are deeply rooted in mathematical principles. This approach fosters a deeper appreciation of cultural heritage, promotes a sense of identity, and enhances the relevance of mathematics in everyday life.

However, this study is not without limitations, particularly because the testing was conducted on a limited scale. The narrow scope of the trial prevents the findings from fully representing the diverse conditions encountered in real classroom settings. Consequently, the generalization of the results should be approached with caution, and further testing with a broader scope is required to strengthen the external validity of the findings and provide a more comprehensive understanding of the effectiveness of the student worksheet developed.

CONCLUSION AND SUGGESTION

This study developed a local context-based Student Worksheet for teaching integers to seventh-grade students at junior high school, integrating the Jambi environment as the learning context. The worksheet met the criteria of validity, practicality, and effectiveness, as evidenced by expert validation results (validity), positive student responses during the one-to-one, small-group, and field testing stages (practicality), and measurable improvements in students' numeracy achievement in the field test (effectiveness).

The Student Worksheet, designed with the Plomp model approach, demonstrated validity based on expert assessments in terms of content, language, and design. The fieldtest proved that the use of this Student Worksheet is effective in enhancing students' numeracy competence. Additionally, the Student Worksheet was found to be engaging and able to motivate students to learn. This product is not only relevant and applicable to learning but also integrates local values, providing students with a meaningful and contextual learning experience.

Despite these promising results, the study's limited testing scope suggests that broader implementation is needed to confirm the product's effectiveness across varied classroom contexts. Future research should expand the trial coverage, refine the worksheet based on diverse student characteristics, and explore its applicability to other mathematical topics or grade levels. Additionally, further development could include digital or interactive versions to increase accessibility and broaden instructional impact.

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