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The development of contextual-based LKPD with Islamic values to improve students' ability to understand mathematical concepts

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Abstract
This research addresses the issue of the perceived lack of attractiveness of the current teaching materials, as well as the students' limited ability to understand mathematical concepts. The aim of this research is to develop contextually based LKPD (Student Worksheets) incorporating Islamic values that are feasible, engaging, and capable of enhancing students' comprehension of mathematical concepts. This study employs a developmental research methodology, specifically using the ADDIE model, which includes the stages of Analysis, Design, Development, Implementation, and Evaluation. The data collection instruments utilized in this study comprised expert validation instruments, student response questionnaires, and tests. The findings indicate that the developed LKPD meets the eligibility criteria, with material experts rating it at 80%, media experts at 88%, and religious experts at 92%. Student responses yielded an average score of 92.4%, categorizing the LKPD as "attractive." The calculation of the average N-Gain Score is 0.82, placing it in the high category. Consequently, it can be concluded that the developed LKPD meets the criteria of eligibility and attractiveness, and significantly enhances students' ability to comprehend mathematical concepts.

Keywords: Ability to Understand Concepts, Contextual Approach with Islamic Values, LKPD

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Introduction

Education is one of the essential needs that must be fulfilled for every individual. Through education, individuals can acquire knowledge, insights, experiences, and skills, which can serve as capital to live in accordance with the progress of the times (Fachrurazi, 2017). Mathematics is a mandatory subject that students must study as an integral part of their education. Mathematics is inherently associated with the science of numbers. It plays a crucial role in everyday life, as every aspect of life is closely linked to mathematical principles (Fajar et al., 2019).

Despite the fact that mathematics is an important subject to study due to its relevance to various aspects of life, the majority of students still perceive it as a difficult and complex subject to learn (Kholil & Zulfiani, 2019). The formulas found in mathematics are considered

relatively lengthy and numerous. Most students opt for a quick method by memorizing these formulas. This approach contributes to their low ability to comprehend mathematical concepts.

Mathematical conceptual understanding refers to students' ability to comprehend instructional material, including the skills to express ideas, process information, and communicate the acquired content using simpler language to solve problems in accordance with the concept (Febriyanto et al., 2018). One of the primary factors in the mathematics learning process is conceptual understanding, as it forms the foundational ability that can serve as a basis for mastering higher-level skills (Annisa et al. 2021).

However, the reality is that research conducted by Seirli et al. indicates that students' understanding of mathematical concepts is in the low category, at 39%. A significant proportion of students have not mastered mathematical learning concepts, as seen in their ability to recall previously learned mathematical concepts, present these concepts in various mathematical representations, and relate different mathematical concepts internally or externally (Fauziah et al., 2022). This finding is supported by research conducted by Ayu et al., which states that students' ability to understand mathematical concepts is in the low category, with 87% of 30 students falling into this category. The challenges faced by students include their inability to correctly and accurately solve concept comprehension problems as per the established procedures (Fajar et al., 2019).

The issue of low mathematical conceptual understanding is further supported by a preliminary survey conducted by the researchers at SMAN 2 Seikampung through interviews with mathematics teachers at the school. The teachers indicated that students' mathematical conceptual understanding remains in the low category. Students continue to struggle with understanding the concepts presented, particularly in the topics of arithmetic sequences and series. When asked to provide examples of arithmetic sequences and series, students often give incorrect or mixed-up answers. Additionally, teachers noted that students still experience difficulty in re-explaining the material they have learned using simpler and more comprehensible language. For example, when asked to explain the definition of arithmetic sequences and series, students merely read the definitions from the textbook. Furthermore, when given problems that are slightly different from the examples provided, students become confused and uncertain about how to solve them.

Furthermore, during the interview, the researchers also obtained information from the mathematics teacher at SMAN 2 Seikampung, highlighting that the problem is not only the low level of conceptual understanding but also the teaching materials used in the learning activities. The only teaching material used by the teacher is the textbook provided by the school. The mathematics teacher at SMAN 2 Seikampung stated that the teaching materials provided by the school are generally good and adequate. However, there are some shortcomings, as the textbooks only present material in a standardized format and rarely relate it to everyday life.

The researcher also interviewed a student who stated that they often feel bored during learning activities. Students only pay attention to the teacher's explanations and are then given practice problems to solve. Teacher-centered learning leads to less active student engagement. Additionally, students find mathematics lessons less interesting when only using the textbooks provided by the school. Students desire supplementary printed teaching materials that are more concise, visually appealing, encourage independent learning, and promote active involvement

in learning, as well as effective communication with the teacher. Furthermore, students also wish for mathematics lessons to be integrated with Islamic values to gain additional knowledge.

According to researchers, one alternative solution to address this issue is through the development of teaching materials. One of the teaching materials that can be independently developed by teachers to overcome this problem is LKPD (Student Worksheets). The process of developing LKPD can be tailored to the problems faced by students, school conditions, the instructional materials provided, and the teacher's capabilities. LKPD serves as teaching material that can be utilized by teachers to support the learning process. LKPD comprises worksheets, task instructions, and learning evaluations that students must complete, organized based on the fundamental competencies that need to be achieved (Pawestri & Zulfiati, 2020). The utilization of LKPD in mathematics learning will make the learning process more interesting and enjoyable. Students are effectively encouraged to engage in learning by being guided by the teacher to discover the concepts of a material on their own, enabling them to understand the concepts provided without having to memorize them (Sagita et al., 2020). Additionally, another objective of using LKPD in learning activities is to support the achievement of learning indicators and competencies.

The development process of LKPD itself needs to be based on a learning approach, specifically the contextual approach. This is because one of the problems is that students are less interested in mathematics, which is often filled with numbers, numerous formulas, and abstract concepts. Additionally, the lack of student engagement in the learning process also underlies the use of the contextual approach in this research. The contextual approach is a learning approach that centers on the student (Sunaryo & Fatimah, 2018). The contextual approach can facilitate students' understanding of mathematical concepts (Mardati, 2017). This is because the contextual approach emphasizes active student involvement in the learning process, where students are guided to discover the relationship between the learning material and real-world situations (Asyiah et al., 2022). Thus, students are not merely given formulas to memorize but are trained to understand the concepts behind these formulas. Students are encouraged to connect and apply the material they have acquired during the learning process to their everyday lives. Consistent with Ali Husin's research, which demonstrates that the development of LKPD using the contextual approach can positively impact learning activities (Husin, 2018).

The development process of LKPD should also incorporate Islamic values. The aim is to provide students with a balanced knowledge between general science and religious studies (Abdussakir, 2017). Furthermore, embedding Islamic values in LKPD is a form of teaching material innovation aimed at strengthening character education, particularly students' religious character (Fitrah & Kusnadi, 2022). This approach is supported by previous research, which concluded that the developed mathematics LKPD integrated with Islamic values is valid, practical, and effective for use as a learning medium for SMP/MTs students (Artalia, 2022).

Based on the aforementioned explanations, the researcher conducted a study titled “The Development of Contextual-Based LKPD with Islamic Values to Improve Students’ Ability to Understand Mathematical Concepts”. The purpose of this research is to understand students' responses to the contextual-based LKPD with Islamic values, to comprehend the feedback from students regarding the contextual-based LKPD with Islamic values, and to evaluate the

effectiveness of using the contextual-based LKPD with Islamic values in improving students' ability to understand mathematical concepts.

Method

The research method employed in this study is research and development (R&D) using the ADDIE model, which consists of the stages of Analysis, Design, Development, Implementation, and Evaluation (Lestari et al., 2023). The analysis stage in the ADDIE development model includes needs analysis, curriculum analysis, material analysis, and student analysis (Lestari et al., 2023). The design stage involves creating the LKPD (Student Worksheets) design and developing instruments to assess the quality of the LKPD and gather student responses to the developed product. The development stage includes the feasibility assessment of the developed LKPD by validators who complete evaluation questionnaires. If the product does not meet the feasibility criteria, revisions are made based on the validators' suggestions. The subsequent stage is implementation, during which the product is tested to determine the attractiveness of the LKPD and its impact on improving students' understanding of mathematical concepts. The final stage is evaluation, conducted to make further improvements to the LKPD if the established feasibility criteria are not met. Revisions are made based on feedback from material experts, media experts, and religious experts to ensure the developed product is appropriate and can be used in schools.

The subjects of this study are the eleventh-grade students of SMAN 2 Sekampung. The research instruments include validation sheets to assess the feasibility of the developed product, student response questionnaires to gauge their reactions to the attractiveness of the developed LKPD, and test instruments. The analysis of pretest and posttest answer sheets on students' mathematical conceptual understanding shows an improvement in each indicator. The tests consist of open-ended questions designed to measure students' mathematical conceptual understanding. The data analysis techniques used in this study include LKPD feasibility analysis, attractiveness analysis, and analysis of the improvement in students' mathematical conceptual understanding.

The feasibility data of the developed product is calculated using Formula 1 (Malik & Chusni, 2018).

$$P = \frac{f}{N} \times 100\% \quad (1)$$

Notes:
P = Percentage of the data
f = Total score obtained
N = Maximum score

The feasibility criteria for the learning media can be seen in Table 1.

Table 1. The Feasibility Criteria

Score	Feasibility Interpretation Criteria
$81\% \leq P \leq 100\%$	Highly Feasible
$61\% \leq P < 81\%$	Feasible
$41\% \leq P < 61\%$	Quite Feasible
$21\% \leq P < 41\%$	Not Feasible
$0\% \leq P < 21\%$	Highly Not Feasible

Source : (Masyhuri et al., 2015)

The formula used to calculate student responses to the attractiveness of the developed LKPD is as Formula 2 (Malik & Chusni, 2018).

$$P = \frac{f}{N} \times 100\% \quad (2)$$

Notes:
P = Percentage of the data
f = Total score obtained
N = Maximum score

The criteria for the attractiveness of the learning media can be seen in Table 2.

Table 2. Attractiveness Criteria

Score	Attractiveness Interpretation Criteria
$81\% \leq P \leq 100\%$	Very Attractive
$61\% \leq P \leq 81\%$	Attractive
$41\% \leq P \leq 61\%$	Quite Attractive
$21\% \leq P \leq 41\%$	Unattractive
$0\% \leq P \leq 21\%$	Very Unattractive

Source: (Putra & Pamungkas, 2019)

The analysis of the improvement in students' mathematical conceptual understanding can be seen from their achievement in completing pretest and posttest results, calculated using the N-Gain Score formula. The N-Gain formula is as Formula 3 (Latri et al., 2021).

$$N - Gain = \frac{postest\ score - pretest\ score}{skor\ maksimal - skor\ pretes} \quad (3)$$

The criteria for N-Gain scoring can be seen in Table 3.

Table 3. N-Gain Scoring Criteria

Score	Classification
$(g) \geq 0{,}7$	High
$0{,}3 \leq (g) < 0{,}7$	Medium
$(g) < 0{,}3$	Low

Source: (Latri et al., 2021)

In this study, the product in the form of contextual-based LKPD with Islamic values is categorized as capable of improving students' mathematical conceptual understanding if the average N-Gain Score is at least in the medium category.

Results

The result of the development research is a contextual-based LKPD (Student Worksheets) incorporating Islamic values. According to the stages of the LKPD development research conducted by the researchers, the following results were obtained:

Analysis stage

The analysis stage is the initial phase before designing the product to be developed. In this phase, needs analysis, curriculum analysis, material analysis, and student analysis are conducted (Lestari et al., 2023). Needs analysis was performed by interviewing teachers and students at SMAN 2 Sekampung. According to the results of the interviews with the mathematics teacher at SMAN 2 Sekampung, the teacher has not used supplementary teaching materials alongside the textbook to support the learning process in mathematics instruction. Additionally, the teacher has not developed teaching materials that relate mathematics to everyday life. The researcher also interviewed eleventh-grade students, who stated that they are not very interested in the media used by the teacher. Students often feel bored with mathematics lessons, and some students perceive mathematics as an abstract subject that cannot be implemented in everyday life (Santoso, 2017). Students need supplementary printed teaching materials that are more concise, visually appealing, encourage independent learning, engage students actively in the learning process, and facilitate effective communication with the teacher. Furthermore, students also desire teaching materials with an Islamic perspective to gain dual understanding, both in mathematics and Islamic values. Based on the interview results with teachers and students, there is a need for mathematics LKPD presented using real-life problems linked to Islamic values.

The next stage is curriculum analysis. Curriculum analysis was conducted at SMAN 2 Sekampung through interviews. The results indicate that the curriculum used is the revised 2013 curriculum, and thus, the development of the LKPD refers to this curriculum.

The following analysis is material analysis. This analysis was carried out by reviewing various books, particularly the revised 2017 edition of the eleventh-grade mathematics textbook for the second semester published by the Ministry of Education and Culture. This book is the primary resource used in mathematics instruction at SMAN 2 Sekampung.

The next stage is student analysis. Student analysis was conducted by interviewing one of the mathematics teachers at SMAN 2 Sekampung. The interview results revealed that eleventh-grade students often feel bored with mathematics lessons, which they perceive as abstract, making it challenging for teachers to explain the material effectively. Students are less interested in learning when only using the provided textbook. Additionally, students still experience difficulties in solving problems related to real-life situations. They have not yet developed the ability to understand mathematical concepts comprehensively.

Designing stage

At this stage, the researcher begins designing the LKPD based on the results of the analysis stage. The activities in the design stage include creating a framework for the LKPD that encompasses the entire content to be developed, aligning it with the learning indicators. In

addition to designing the product to be developed, the researcher also prepares assessment instruments during this stage. The LKPD assessment instruments consist of evaluation sheets for content experts, media experts, religious experts, and student response questionnaires. The validated instruments are used to assess the quality of the developed LKPD.

Development stage

The product that has been designed in the design stage is then validated by experts to determine its feasibility. The expert validation includes content experts, media experts, and religious experts. However, before the LKPD assessment sheet is provided to the validators, the assessment sheet itself must first be validated. The validation results can be seen in Table 4.

Table 4. Validation Results of the Questionnaire

No	Aspects	Score
1	Content	14
2	Content Accuracy	4
3	Relevance	9
4	Content Validity	5
5	Language Accuracy	12
	Total Score	**44**
	Maximum Score	**50**
	Percentage	**88%**
	Feasibility Category	**Highly Feasible**

Based on Table 4, the validation results of the expert assessment sheet obtained an average score of 88%, which falls within the range of $81\% \leq P \leq 100\%$ in the "highly feasible" category.

Table 5. Content Expert Validation Results

No.	Aspects	Item	Score
1	Content	1	4
		2	3
		3	5
		4	4
		5	5
		6	4
		7	5
		8	5
		9	4
		10	4
		11	4
		12	4
		13	4
		14	5
		15	4
2	Language	16	4
		17	4
	Total Score		**68**
	Maximum Score		**85**
	Percentage		**80%**
	Criteria		**Feasible**

Next, the validation results from the content experts obtained an average score of 80%. This score falls within the range of $61\% \leq P < 81\%$ in the "feasible" category. The calculation

results can be seen in Table 5. Thus, the developed LKPD is feasible for use in mathematics learning.

The validation results from media experts obtained an average score of 88%. This score falls within the range of 81% ≤ P ≤ 100% in the "highly feasible" category. The calculation results can be seen in Table 6.

Table 6. Media Expert Validation Results

No	Aspect	Item	Score
1	The length of LKPD (student worksheets)	1	5
2	LKPD (student worksheets) cover design	2	4
		3	4
		4	4
		5	5
		6	4
3	LKPD (student worksheets) content design	7	4
		8	5
		9	4
		10	5
		11	5
		12	4
		13	4
		14	5
		15	5
		16	4
		17	4
		18	4
	Total score		**79**
	Maximum score		**90**
	Percentage		**88%**
	Category		**Very feasible**

Thus, the developed LKPD is feasible for use in mathematics learning.

The validation results from religious experts obtained an average score of 92%. This score falls within the range of 81% ≤ P ≤ 100% in the "highly feasible" category. The calculation results can be seen in Table 7.

Tabel 7. Religious Expert Validation Results

No	Aspects	Item	Score
1	Alignment with Islamic values	1	5
		2	5
		3	4
		4	5
		5	5
		6	5
		7	5
		8	5
2	Emphasis on the content	9	3
		10	4
	Total Score		**46**
	Maximum Score		**50**
	Percentage		**92%**
	Category		**Highly Feasible**

Based on the validation results from media experts, content experts, and religious experts, the contextual-based LKPD with Islamic values developed is deemed feasible for use in mathematics learning.

According to the expert validation analysis results, this LKPD is suitable for product testing with students at SMAN 2 Sekampung. The results of this study align with the research conducted by Husin (Husin, 2018), which states that the developed contextual-based LKPD possesses good quality and is suitable for use in mathematics learning

Implementation stage (product testing)

The product testing was conducted to determine the students' responses to the attractiveness of the product and the improvement in their mathematical conceptual understanding. The developed LKPD was tested on 31 eleventh-grade science students (Class XI IPA 1) at SMAN 2 Sekampung. After completing the activities, students were given response questionnaires to fill out. The calculation results of the student response questionnaires showed an overall average score percentage of 92.4%. This indicates that the developed contextual-based LKPD with Islamic values falls into the "very attractive" category and can be used in learning. This finding is consistent with the research conducted by Antari et al., which explained that contextual-based LKPD with Islamic content is practical and thus suitable for use in mathematics learning (Antari et al., 2022).

In addition to the response questionnaires, students were also given tests after learning using the developed LKPD. The results were then calculated using the N-Gain Score formula. The average N-Gain Score obtained was 0.82, which falls within the range of $g \geq 0.7$, categorizing it as high. Therefore, it can be concluded that the contextual-based LKPD with Islamic values is capable of improving students' mathematical conceptual understanding. This finding is also consistent with previous research conducted by Yuliana Rizki (Yuliana, 2019), which explained that the developed LKPD is suitable for use in mathematics learning and can enhance students' mathematical conceptual understanding based on the average N-Gain Score calculation.

Furthermore, based on the analysis of pretest and posttest answer sheets on students' mathematical conceptual understanding, there was an improvement in each indicator. The comparison of the improvement in students' mathematical conceptual understanding can be seen in Figure 1.

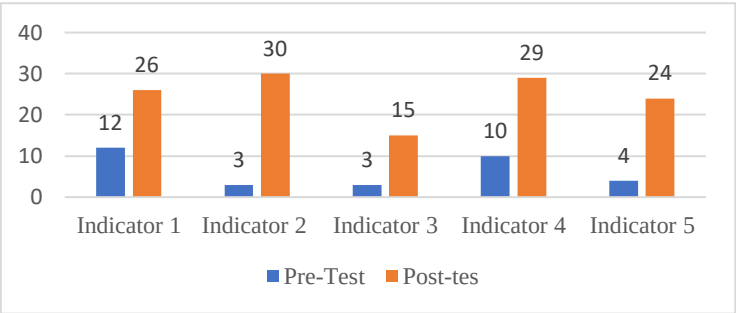

Figure 1. Students' Test Results

Figure 1 shows that students' mathematical conceptual understanding scores increased for each indicator after using the contextual-based LKPD (student worksheets) with Islamic values. Regarding the achievement of students' mathematical conceptual understanding, the diagram indicates that 26 out of 31 students could correctly solve the problem on indicator 1. 30 out of 31 students could correctly solve the problem on indicator 2. 15 out of 31 students could correctly solve the problem on indicator 3. 29 out of 31 students could correctly solve the problem on indicator 4. 24 out of 31 students could correctly solve the problem on indicator 5.

Evaluation Stage

Evaluation is the final stage of the ADDIE development model. This evaluation stage refers to the assessment of the implementation phase. During the implementation phase, the researchers did not encounter any errors or criticism from respondents, thus no final revisions were made to the contextual-based LKPD (student worksheets) with Islamic values.

Discussion

The developed product is a contextual-based LKPD (Student Worksheets) incorporating Islamic values to enhance students' understanding of mathematical concepts. The developed LKPD has met the feasibility criteria based on assessments by content experts, media experts, and religious experts. The validation results from content experts showed an average score of 80%, indicating that the LKPD falls within the "feasible" category. The content included in this LKPD covers arithmetic sequences and series. This material is presented using a contextual approach, which is an alternative method to enhance primary abilities in mathematics learning, particularly conceptual understanding (Asyiah et al., 2022). The contextual approach aims to make students more active in the learning process. The exercises in the LKPD are designed based on indicators of conceptual understanding.

Furthermore, the validation results from media experts showed an average score of 88%, indicating that the developed LKPD is in the "highly feasible" category. The LKPD is systematically presented to facilitate students' understanding of arithmetic sequences and series. Additionally, the LKPD is designed to be as attractive as possible to motivate students to learn.

Lastly, the validation results from religious experts showed an average score of 92%, indicating that the LKPD is in the "highly feasible" category. The mathematics content presented with contextual Islamic values aims to make the learning process more meaningful for students. Students can understand the material concepts through direct observation, linked to other concepts they understand (Fitriah et al., 2015). Therefore, this LKPD is suitable for product testing with students at SMAN 2 Sekampung. The results of this study are consistent with research conducted by Husin, which stated that the developed contextual-based LKPD has good quality and is feasible for use in mathematics learning (Husin, 2018).

The developed LKPD is also categorized as "very attractive," with a student attractiveness score of 92.4%. The developed LKPD has met the attractiveness criteria, which include content, response, design, and readability. This finding is consistent with the research

conducted by Antari et al., which explains that contextual-based LKPD with practical Islamic content is suitable for use in mathematics learning (Antari et al., 2022).

The developed LKPD is deemed capable of enhancing students' understanding of mathematical concepts based on the N-Gain Score calculation, which is 0.82, falling into the high category. This indicates an improvement in students' mathematical conceptual understanding after using the contextual-based LKPD with Islamic values. This research is also in line with previous studies conducted by Yuliana Rizki (Yuliana, 2019), which explained that the developed LKPD is suitable for use in mathematics learning and can enhance students' understanding of mathematical concepts based on the average N-Gain Score calculation.

In addition to the N-Gain Score calculations, the improvement in students' mathematical conceptual understanding can also be observed based on the results of pre-tests and post-tests for each indicator. Figure 1 demonstrates that students' mathematical conceptual understanding improved after learning with the contextual-based LKPD with Islamic values. Based on the comparison of scores for indicators 1-5, there are differences in students' mathematical conceptual understanding.

For the first indicator, students found it easier to restate the concepts they had learned after using the developed LKPD. This suggests that when students understand problems using LKPD linked to real-life situations, it becomes easier for them to explain what they have learned (Sulastri, 2023). For the second indicator, students found it easier to classify objects based on whether they meet the criteria forming the concept. This indicates that if students understand problems using LKPD linked to real-life situations, it becomes easier for them to group objects based on their properties (Basri et al., 2020). For the third indicator, students found it easier to apply concepts algorithmically. This suggests that if students understand problems using teaching materials that encourage active learning and are related to real-life situations, it becomes easier for them to solve problems directly related to the real world. Students can connect their prior knowledge with the material being learned (Utamy et al., 2022). For the fourth indicator, students found it easier to determine examples and non-examples of the concepts learned. This means that for this indicator, students can easily determine what constitutes an example and what does not after learning with the contextual-based LKPD with Islamic values. For the fifth indicator, students found it easier to present concepts in various mathematical representations. This shows that after learning with the developed LKPD, students can systematically solve problems using the concepts, as the LKPD serves as one of the teaching materials that can help students understand mathematical concepts easily without memorizing them, simply by following the steps presented sequentially in the LKPD (Febriyani et al., 2018).

Conclusion

Based on the research and development results, the product developed is a contextual-based LKPD (Student Worksheets) with Islamic values that meets the criteria of feasibility, attractiveness, and the ability to improve students' understanding of mathematical concepts. The validation results from content experts categorized the LKPD as "feasible." The validation results from media experts categorized the LKPD as "highly feasible." The validation results from religious experts also categorized the LKPD as "highly feasible." The assessment results

from student response questionnaires regarding the attractiveness of the developed LKPD met the "very attractive" criteria. Additionally, the average N-Gain Score calculation falls into the high category.

Declarations

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Funding Statement	:	No funding.
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