Vol. 8, No. 1 (2024) 75-84 ISSN: 2597-4866
Indonesian Journal of Primary Education

Development of Mathematics Student Worksheets Based on Contextual Teaching and Learning for Elementary School Student

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Submitted/Received 18 May 2024; First Revised 24 May 2024; Accepted 26 May 2024
First Available Online 1 June 2024; Publication Date 1 June 2024

Abstract

The goal of this project is to provide a high-quality, contextually-based mathematics student worksheet product in mathematics topics that meets the highest standards for validity and specificity. With stages for definition, planning, development, and distribution, the development model used in this research was modified from a 4D model. Teachers and students in grade V at SD Negeri 33 Lubuklinggau participated in this study. Interviews and validity, practicality, and effectiveness questionnaires are the data gathering tools employed in the study. The Aiken's V formula was utilized for data analysis, encompassing the phases of instrument setup, expert evaluation, assessment collection, and score computation. The interview was conducted with the aim of obtaining information from student worksheet practicality teachers and expert validation questionnaires and practicality questionnaires for teachers and students as many as 20 people. With an average score of 0.77, the evaluation of linguists, material experts, and media experts revealed that they satisfied the valid requirements. Contextual teaching and learning-based mathematics worksheets of statistical materials meet the criteria of validity, practicality, and learner-friendliness; in the meantime, the results of the teachers' and students' practicality sheet assessment revealed that the contextual teaching and learning-based mathematics student worksheet met the practical criteria with an average score of 95.8%. Contextual teaching and learning-based learning through statistical materials offer educators a theoretical framework for creating various teaching materials. Additionally, it can serve as a means of conducting follow-up research on different subjects and educational levels at every school level.

Keywords: *Development; mathematics; student worksheets; contextual teaching & learning; elementary school.*

INTRODUCTION

Among the subjects that can help with problem-solving in the workplace, enhance critical thinking and argumentation, and offer assistance in the fields of science and technology is mathematics. So far, the learning process, especially mathematics learning carried out by teachers, still uses learning that emphasizes memorization and finding the right answer to the questions given, high-level and creative thought processes are rarely trained. So students are less motivated to learn math. As a result, a teacher needs to be able to integrate different teaching methods, adapt to the needs of their students, and select the most appropriate teaching resources when it comes to teaching mathematics (Isnawati & Astriani, 2022; Jamaludin, Unnafsyah, Agustin, Nuryadin, & Wahid Muharram, 2022). Therefore, there is a need for improvement and improvement in mathematics learning such as interesting, innovative and varied teaching materials (Nisa, Alfi, & Fatih, 2023).

The results of initial observations made at public elementary school 33 Lubuklinggau obtained information that the problems that occurred in the school were that teachers in delivering the learning process were still not interesting, the delivery of learning still applied conventional learning using question and answer methods, lectures and assignments so that it could not optimize student activity, teachers did not associate learning materials with students' daily lives, The teaching materials used are only textbooks.

Another issue that has been discovered is that teachers continue to have the majority of the learning process, with students merely having to show up, sit, listen, record information, and complete teacher-given

questions. The teaching materials used by the teacher are only grade V elementary school mathematics subject books whose material coverage is still general and not in accordance with students' daily lives, less attractive to students to solve problems, the problems in the book are difficult for students to understand. This situation has a bad impact on students, namely students are only able to master the material provided without knowing the benefits and how to apply these mathematics subjects in everyday life (Syibli, Abidin, & Noviartati, 2021). So that it can make students less motivated to learn mathematics.

The usage of innovative, creative and fascinating teaching materials in the learning process can make students become active and creative and motivated in learning. Any type of material used to help teachers and instructors carry out teaching and learning activities is referred to as teaching material (Haryani, Fakhrudin, & H.M Lubis, 2022). The availability of varied teaching materials will make students feel interested and eager to learn (Aswarliansyah, 2020). In addition, students also have many opportunities to learn independently and reduce dependence on teachers. One of the teaching materials according to its type is printed materials, printed materials consist of various kinds of student worksheets.

Student worksheets is the most widely used teaching material in schools. In addition, student worksheets is also one type of learning aid (Haryonik & Bhakti, 2018). In general, student worksheets is a learning tool as a complement or supporting means of implementing learning plans. Student worksheets are sheets of paper with information or questions on them that the students must answer. Worksheets for students are an excellent tool for promoting their engagement with the material. It is anticipated that using student worksheets in the classroom will facilitate students' independent learning of the topic (Anggraini, Lestari, & Firduansyah, 2023). With so many activities to practice and develop student independence, student worksheets can help students better understand the subject presented. Student worksheets also include practice questions and a synopsis of the topic to aid and support students in their study (Susiloningsih, 2015). It is anticipated that the creation of student worksheets will aid pupils in their understanding of mathematics.

Worksheets for students serve as teaching resources, assisting them in understanding the topic and the questions and assignments that teachers assign. However, in actuality, teachers only employ extremely basic, uninteresting teaching materials—mathematics books—which makes it difficult for pupils to understand the topic and deters them from learning mathematics (Yulia & Gusniarti, 2019). It is expected of teachers to be able to design an engaging and innovative learning process utilizing the appropriate learning models, methodologies, and approaches in order to maximize student learning and foster a love of mathematics in their pupils (Husain, Agustina, Rohmana, & Alimin, 2023). As a result, the learning technique known as contextual teaching and learning is one that is connected to the everyday lives of the students.

The contextual teaching and learning approach is a learning approach that is associated with the context of students' daily lives (Ratnawati, Trisnawati, & Prasetyo, 2020). The characteristic of contextual learning is to associate the topic or concept learned with the context of children's daily lives and psychological development. When related to the context of hobbies and needs, students will be easily interested in paying attention to the concepts being studied (Astutik, Kirana, & Widodo, 2021). So it is expected that students can understand the subject matter easily and be more enthusiastic in the mathematics learning process and can improve student learning outcomes (Lukman Hakim, Anggraini, Fitriani, & Haqiqi, 2019). Multiple scholars conducted study through the creation of worksheets for math students based on contextual teaching and learning, including social arithmetic material (Syibli, Abidin, & Noviartati, 2021), geometry material (Haryani, Fakhrudin, & H.M Lubis, 2022), temperature and heat material (Anggraini, Lestari, & Firduansyah, 2023)

and set material (Mariana, Yulia, & Rusliah, 2021). Different from previous studies, this study focuses on statistical material.

Therefore, in order to effectively connect mathematics learning to everyday life in accordance with student life, it is required to construct math student worksheets based on contextual teaching and learning during the learning process (Susilawati, 2022). The goal is that students can more easily understand mathematics and its relation in everyday life. Using math student worksheets based on contextual teaching and learning can increase students' enthusiasm for the subject matter (Wahyuni & Rochmah, 2022). Researchers are interested in creating math student worksheets based on contextual teaching and learning for grade V pupils in elementary schools because of the aforementioned issues. The goal of this project is to create products for mathematics student worksheets that are grounded in contextual teaching and learning on superior mathematics subjects, with an emphasis on participation and validity.

RESEARCH METHODS

Researchers employ a 4-D development paradigm (research and development) includes stages of research and development, including 1) defining, 2) designing, 3) developing, and 4) disseminating.

(Sugiyono, 2017).

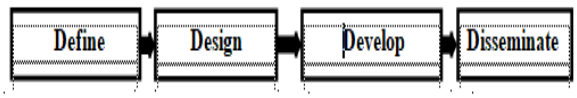

Figure 1
Research Stages of 4-D Model Development

This research led to the creation of math worksheets for kids that are based on contextual teaching and statistics education in grade V elementary schools. Using a 4-D development model, student worksheets are produced in several stages: 1) define, 2) design, 3) develop, and 4) distribute (Akmal Rijal & Egok, 2019).

With a total of 20 students and teachers, the data collection method employed in the mathematics student worksheets for contextual-based development research teaching and learning for grade V students of SD Negeri 33 Lubuklinggau included questionnaires and interviews with statistical material. The selection of students is based on two factors: experienced professors and differences in ability. The purpose of the interview with the class V teachers of public elementary school 33 Lubuklinggau was to gather information. The questionnaire utilized in this inquiry consisted of questions for specialists, teachers, and students. To gather information about the reliability and usefulness of the student worksheets utilized in this study, surveys and interviews were conducted.

The data analytic methods employed with validity tests at this time use a Likert scale of 1 to 4, with a score for each item with an excellent answer (4), good (3), not good (2), and extremely bad (1). This is known as theoretical validity, or validation by subject-matter experts. The attributes that require verification are related to language, content, and medium. Aiken's V formula will be used to investigate these qualities, and the process will involve many stages: instrument and expert panel preparation, expert evaluation, assessment collection, and Aiken's V value calculation (Aswarliansyah, 2020; Febriandi, Susanta, & Wasidi, 2019). The worksheets will be math student assignments for grade V primary school statistical topics, using a contextual teaching and learning approach. The procedures involved in identifying data for the mathematics student worksheet validity evaluation sheet are scoring each item with an answer, assigning a validity score, and comparing the average validity with the student worksheet validity criteria. Data from linguists, subject matter experts, and media specialists is used to evaluate the authenticity of the student worksheets (A Rijal & Azimi, 2021).

RESULTS AND DISCUSSION

Result

Before being put to the test in the field, student worksheets in mathematics using a contextual teaching and learning approach for prepared statistical information for elementary school pupils in grade V must be validated. After the student worksheets are

finished, each expert receives a validation sheet, completing the validation stage. To ascertain the validity of mathematics student worksheets based on contextual teaching and learning for grade V elementary school kids on statistical data that was collated and prepared, the results of the linguist's assessment were examined using Aiken's V formula. Table 1 below displays the validation results that have been examined through the application of Aiken's V formula.

Table 1
Results of Linguist Validation Analysis Using Aiken's V

Aspects	Assessment Indicators	Multiple Grains	Number Aiken's	Aiken's Coefficient Criteria V
Language feasibility	Businesslike	3	0,7	Enough
	Communicative	1	0,7	Enough
	Dialogical and interactive	1	0,7	Quite High
	Student development suitability	3	0,7	Quite High
	Compliance with language rules	6	0,7	Quite High
	Total	0,7		Cukup Tinggi

Numbers based on assessment indicators found in the validation sheet items can be obtained based on table 1's qualitatively deciphered computations using Aiken's V formula from the analysis of all aspects evaluated by linguists against mathematics student worksheets based on contextual teaching and learning. Linguists changed the meaning of Aiken's V validity to include the category of $0.60 \leq V < 0.80$ with a very good information or can be stated to be valid based on the assessment of all items, yielding a value of 0.7.

The results of the validation analysis of linguists' assessments of mathematics student worksheets indicate that mathematics student worksheets based on contextual teaching and learning for grade V elementary school students on statistical material that is compiled and developed are valid for use in the learning process. This conclusion can be drawn from the results of the language assessment calculated using Aiken's V formula.

A scope assessment of the statistical content in the mathematics student worksheets based on contextual teaching and learning as well, an assessment of the contextual teaching and learning technique are included in the assessment sheet for material experts. In addition to providing material expert assessments based on contextual teaching and learning for grade V elementary school students on statistical material that still has many errors and inaccuracies, material experts offer suggestions and input on mathematics student worksheets based on their knowledge. Table 2 presents the analysis of the validation results utilizing Aiken's V formula. The table is organized according to the components that have been evaluated.

Table 2
Results of Material Expert Validation Analysis using Aiken's V

Aspects	Assessment Indicators	Multiple Grains	Number Aiken's	Aiken's Coefficient Criteria V
Eligibility of contents	Compatibility of the	3	0,8	High
	Accuracy of the material	4	0,85	High
	Material up-to-date	2	1	High
	Encourage curiosity	2	0,85	High
Feasibility aspect of presentation	Serving technique	1	0,7	Quite High
	Presentation support	4	0,85	High
	Presentation of learning	1	0,7	Quite High
Eligibility of contents	Correctness of content or material	3	0,8	High
	The systematic demands of	2	0,85	High
Total		0,82		Tinggi

Based on Table 2, qualitative calculations using Aiken's V can be described, from the analysis of all aspects assessed, the numbers are concluded based on the assessment indicators contained in the validation items. Based on the evaluation of all relevant expert items, Aiken's V's validity was interpreted to have a value of 0.82 and be included in the >

category of 0.80 with high information, meaning it may be considered very valid. The results of the material expert validation analysis indicate that mathematics student worksheets based on contextual teaching and learning for grade V elementary school students on compiled and developed statistical material are valid for use in the learning process, based on the results of the calculation using Aiken's V.

An evaluation of the way that the student worksheets are presented (their structure and format) is included in the assessment sheet for media experts' math lessons. In addition to offering assessments based on their expertise, media specialists also offer guidance and comments on student worksheets based on mathematics, which nevertheless contain a lot of mistakes. To ascertain the validity of the mathematics student worksheets that were created and assembled, the results of the media expert assessment are computed and examined using Aiken's V formula. Table 3 presents the findings of the media expert validation, which have been examined using Aiken's V formula and grouped according to the evaluated aspects.

Table 3
Results of Media Expert Validation Analysis Using Aiken's V

Aspects	Assessment Indicators	Multiple Grains	Number Aiken's	Aiken's Coefficient Criteria V
Feasibility Media	Student worksheet size	2	1	High
	Student worksheet Cover Design	5	0,7	Quite High
	Design Student worksheet	7	0,7	Quite High
	Total	0,8		High

Based on table 3, qualitatively deciphered calculations using Aiken's V from the analysis of all aspects assessed by media experts on mathematics student worksheets can be concluded based on the assessment indicators contained in the validation item. After all media expert items were evaluated and a score of 0.8 was determined, table 4.7 was changed, and the interpretation of Aiken's V validity was placed in the > 0.80 group with high information, meaning it was considered extremely valid. The results of the media expert validation analysis indicate that mathematics student worksheets based on contextual teaching and learning for grade V elementary school students on compiled and developed statistical material are valid for use in the learning process, based on the results of the calculation using Aiken's V.

The validity of the mathematics student worksheets based on contextual teaching and learning for grade V elementary school on statistical material that has been compiled, developed, and produced has been evaluated overall by three experts, namely linguists, material experts, and media experts. Based on their evaluation, the mathematics student worksheets based on contextual teaching and learning have an average score of 0.77 and have adjusted the interpretation of Aiken's V validity included in categories $0.60 \leq V < 0.80$ with high enough information or can be considered valid. Based on the evaluations of all these experts, it can be said that grade V elementary school children' arithmetic student worksheets that are contextually taught and acquire statistical content are appropriate for use in the classroom. Table 4 below provides an overview of the findings from the three experts' validity assessment.

Table 4
Results of All Experts' Assessments

Expert Name	Score obtained			Criterion
	Language	Material	Media	
Dr. Rusmana Dewi, M.Pd	0,7	-	-	Quite High
Maria Luthfiana, M.Pd.Mat	-	0,82	-	High
Dr. Dodik Mulyono, M.Pd	-	-	0,8	High
Total	0,7	0.82	0,8	
Average		0,77		Quite High

The final product of the revision process is a set of mathematics student worksheets based on contextual teaching and learning for grade V elementary school students on final statistical material. These worksheets can be used in the teaching and learning process and have been revised in accordance with suggestions and input from all experts. Table 5 below displays the responses to all of the

questionnaires regarding the practicality of mathematics student worksheets based on contextual teaching and learning for grade V elementary school students in statistical content. The questionnaires were completed by teachers and students.

Table 5
Results of All Practical Mathematics Student Worksheets

Observers	Number of Items Statement	The score Retrieved	Average Score	Criteria
Grade 5 Students	20	112	91,6%	Very Practical
Guru Kelas V	22	88	100%	Very Practical
Total	42	200	95,8%	Very Practical

Figure 1 below shows math student worksheets for grade V elementary school pupils that are based on contextual teaching and learning on reliable and accurate statistical content.

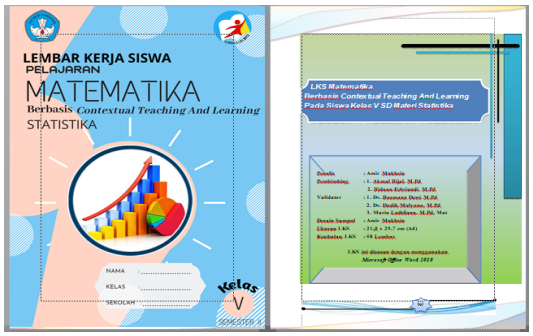

Figure 1
Student Worksheets Mathematics Based on Contextual Teaching and Learning for Grade V Elementary School Students on Statistics Material

Discussion

Worksheets for students can be created using the research products, as explained in the explanation of the research results above. The end product is a set of math student worksheets with statistical content for grade V elementary school, focused on contextual teaching and learning. A 4-D development paradigm was used in the compilation and creation of these student workbooks. This study's discussion presents the findings of an investigation on the reliability and applicability of the created and assembled math student worksheets.

Experts in the field make the decision of validity. A measure of an instrument's validity is called its validity, and an instrument is considered valid if it can accurately articulate data from the variables it has researched and measure what is wanted (Mariana, Yulia, & Rusliah, 2021). To be employed in the learning process, the generated product must therefore be legitimate and useful. This 4-D development model has three steps or stages: define, design, and develop. The stages are meant to represent the phases of the process.

Math worksheets for students were created to address their needs in subjects that are thought to be dull and hard to understand. The created math student worksheets must be legitimate before students can use them to learn as a stand-in for the teacher's role in independent learning. Student worksheets mathematics is designed based on the format of preparing student worksheets, including the front cover, student worksheets description page, preface, table of contents, general instructions, KI, KD, indicators, learning objectives, concept maps, materials, practice pages, individual assignment pages, bibliography, author biodata pages and back covers.

This set of math student worksheets was created with a contextual teaching and learning methodology in mind. Contextual teaching and learning is a notion that encourages students to draw links between their knowledge and its application in daily life, while also assisting teachers in helping students relate the information they teach to real-world circumstances (Pitriana, Testiana, & Zahra, 2022). A contextual teaching and learning strategy connects students' learning to real-world issues. Students participate actively in this learning process, with teachers serving merely as facilitators.

Three specialists in their fields—linguists, material experts, and media experts—have examined the created mathematics student worksheets. According to the validation results, there are still a lot of issues with the created mathematics student worksheets. Validation offers assessment and input to the worksheets based on contextual teaching and learning that has been planned. The mathematics student worksheets that have been developed have been validated by expert

input and advice. This includes the learning materials included in the worksheets, grammar and writing, the arrangement of images, colors, or animations used, questions used in learning evaluation, and the mathematics student worksheets that are based on contextual teaching and learning.

Linguists gave an average rating of 0.7, material experts gave an average rating of 0.82, and media experts gave an average rating of 0.8, based on the findings of the analysis of the validity assessment of mathematics student worksheets based on contextual teaching and learning. With multiple changes based on the advice and input of the three experts, the entire expert assessment yielded an average score of 0.77, which is considered quite high or valid. An instrument is considered valid if it can accurately articulate data from the variables under study and measure what is sought. Validity is a measure that indicates the levels of validity or validity of an instrument. At this point, theoretical validity—validation conducted by subject-matter experts—is the validity test (Febriandi et al., 2019). The qualities that need to be verified include language, content, and media; these can all be tested with minor adjustments based on the opinions and recommendations of the three experts who will be validators.

The following step involved testing the mathematics student worksheets in small groups of kids from class V public elementary school 33 Lubuklinggau to determine their viability after revision. Students respond to the presentation of mathematics student worksheets based on contextual teaching and learning by filling out student response sheets after they have finished learning using the worksheets. This allows teachers to assess the usefulness of the created math student worksheets. Students were asked to respond to the student worksheets they had completed during the research process in order to create this product, which is a set of contextual teaching and learning worksheets for mathematics.

Following an initial explanation of the material in the mathematics student worksheets based on contextual teaching and learning, students were given a week to study and complete exercises using the worksheets at home by the researchers. The mathematics worksheets that are given to pupils include exercises, assessments, content or learning materials, and learning objectives all bundled together with a contextual teaching and learning methodology. Students receive a student feedback sheet to the worksheets they used to study after finishing the study for a week. Students' attention to student worksheets during learning, their interest in presenting student worksheets and for further learning, their confidence in their drive to study with a contextual teaching and learning learning style, and other characteristics of their learning are all mentioned in the student response questionnaire. The student response questionnaire covers topics such as students' focus on the worksheets during class, their interest in presenting the worksheets and continuing their education, their confidence in their motivation to learn with a contextual teaching and learning approach, and their satisfaction with the way they were able to express their learning outcomes using the created math worksheets (Nurhalimah, Abdul Muiz Lidinillah, & Haki Pranata, 2020; Syafri, 2023).

During the student worksheet practical trial stage, which involved six students working in small groups, an analysis of the data from 20 statements on student practicality sheets was conducted. Using very practical criteria, the results of the practicality trial, which comprised 20 statements with an average score of 91.6%, were analyzed. In addition, the experiment conducted by the grade V instructors at public elementary school 33 Lubuklinggau aimed to ascertain the efficacious outcomes of the student worksheets in mathematics that were assembled and generated. When the teacher conducted a practical trial of the student worksheets, 22 statements with an average score of 100% using very practical criteria were analyzed to determine the practicality trial results. Thus, based on teacher and student trials, it can be established that the public elementary school 33 in Lubuklinggau has an average practicality score of 95.8%,

which is determined by very practical standards (Indriana, Rijal, & Febriandi, 2023).

Based on the assessment results, the results of calculating teachers' and students' responses to math student worksheets based on contextual teaching and learning are very good, leading to the classification of math student worksheets as very practical. Drawing from the aforementioned explanation, it can be inferred that the mathematics student worksheets, which were created using a contextual teaching and learning approach, are highly useful for teaching grade V elementary school children statistical content both quantitatively and qualitatively.

CONCLUSION

The goal of this project is to generate math student worksheets for grade V students at public elementary school 33 Lubuklinggau. The worksheets will be focused on contextual teaching and learning of statistical content. According to the study's findings, math worksheets for grade V elementary school pupils that are focused on contextual teaching and learning about the statistics content are reliable, useful, and appropriate for use by both instructors and students in the classroom.

For the grade V students at public elementary school 33 Lubuklinggau, this study is developing worksheets for mathematics students based on contextual teaching and learning about statistical content. The research findings indicate that the mathematics worksheets designed for fifth-grade elementary school pupils, which were derived from contextual teaching and learning, are legitimate, useful, and appropriate for both teacher and student use in the classroom.

Based on the research's findings and conclusions, a number of recommendations can be made, including the classification of the student worksheets created for this study as legitimate and useful so that they can be used as instructional resources to support elementary school students' learning of statistical concepts in mathematics by teachers and students. In addition to offering educators a theoretical framework for creating other kinds of instructional materials, the creation of student worksheets based on contextual teaching and learning on statistical materials can also serve as a source of further research for a variety of subjects and academic levels at every school level.

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