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Developing Contextual-Based Worksheets on Prism and Pyramid for Junior High School Students

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ABSTRACT
Students' understanding and mastery in determining the surface area and volume of geometric shapes, especially flat-sided shapes, is an important ability due to many applications of it in real life. The concepts of surface area and volume not only expand students' understanding of spatial measurements, but also can develop students' understanding in multiplication, fraction, algebraic multiplication and dilation. However, based on results of previous studies, difficulties often faced by students in solving surface area and volume problems which are related to conceptual errors. Many students also have difficulties in understanding and applying concepts and skills involving this concept. Therefore, teachers should select and use relevant teaching materials. One of them is that teachers can arrange teaching materials consisting of several activities that can be made in the form of worksheets that can help students build knowledge independently. One form of teaching materials that can be developed in order to meet this need is the Student Worksheet (LKPD). Therefore, this research is about the development students' worksheet in Prism and Pyramid concept within contextual problems for VIII grade students. The type of research used is Research and Development (R&D) research, by adapting ADDIE model. The results show that the Prism and Pyramid worksheet within contextual problems are valid and practical. Besides that, the results of the implementation of the Contextual-Based Worksheets on Prism and Pyramid in this study showed that the use of context-based worksheets effectively helps students understand the mathematics material.

***Keywords**: Students' Worksheet; Prism; Pyramid; Contextual; Junior High School.*

INTRODUCTION
Surface area and volume of geometric shapes are studied at the Junior High School (SMP/MTs) level where one of the basic competencies in this material is to determine the surface area and volume of prisms and pyramids (Kemendikbud, 2013). Sisman & Aksu (2015) emphasized that determining the surface area of geometric shapes not only develops students' understanding of spatial measurements, but it supports students' abilities on the basics of multiplication, fractions, algebraic multiplication and dilation. Thus, the concepts of surface area and volume not only expand students' understanding of spatial measurements, but can also develop students' understanding abilities in multiplication, fraction concepts, algebraic multiplication and dilation.

The understanding and mastery of students in determining the surface area and volume of geometric shapes, especially flat-sided shapes, is an important ability for students because of its many applications in real life. Based on the results of previous studies, the difficulties often faced by students in solving surface area and volume problems are related to conceptual errors (Yan et al., 2013). This is in line with the results of research conducted by Sisman & Aksu (2015), namely students have difficulty understanding and applying concepts and skills involving surface area. In connection with the still weak ability of students to understand the concepts of surface area and volume, these concepts must be taught properly so that students understand and understand the concepts being studied.

Sariono (2016) states that with the 2013 curriculum, teachers are no longer busy thinking about the syllabus, but teachers are free to develop creativity in teaching and focus on developing students' creativity. Teachers are expected to be able to create learning activities that are able to facilitate students

to develop their knowledge and potential so as to enable them to learn and build knowledge independently. However, the facts on the ground show that there are still many teachers who have difficulty in providing learning materials, especially for mathematics teacher Sariono (2016). In addition, in the implementation of learning in schools, there are still many shortcomings and limitations, especially in providing the real context of the material presented, so that this has a direct impact on the low and uneven learning outcomes achieved by students (Sundayana, 2015).

To optimize learning and learning outcomes, teachers should select and use relevant teaching materials (Yaumi, 2018). One of them is that teachers can arrange teaching materials consisting of several activities that can be made in the form of worksheets that can help students build knowledge independently and allow students to learn actively (Atika & Mz, 2016). One form of teaching materials that can be developed to meet this need is the Student Worksheet (LKPD).

The Student Worksheet (LKPD) is one of the tools that can help and facilitate learning so that the learning that occurs is able to lead students to find concepts that can be used to solve problems systematically (Rudy, 2017). In the learning process, the LKPD provided can guide students to find and investigate the mathematical concepts being studied so that it emphasizes the activities of students (Saltifa, 2016). In addition, based on the results of Amalia's research (2017), it shows that learning mathematics using valid LKPD is more effective than learning mathematics without the help of LKPD.

However, based on the results of research conducted by Ula & Sa'dijah (2013) showed that various kinds of student worksheets from various subjects circulated in schools, including student worksheets for mathematics subjects, in general the LKPD only contained a summary of the material or a collection of mathematical formulas / formulas. Therefore, it is necessary to develop LKPD that is relevant to today's academic needs, namely LKPD that is able to accommodate the application of the material learned in school to solve problems from the real-life context of students. Thus, it is important to develop LKPD in which the activities in it are built from the real-life context of students.

Stacey (2015) describes context as an area of real life where mathematical skills are needed to solve problems in it. This context can come from everyday life situations as well as professional career life. Thus, the context used in the development of LKPD in this study is an area of everyday life, in which mathematical activities are built based on the situation. Therefore, in this study, a Contextual-Based Worksheet for Prism and Limas Materials was developed. This LKPD is intended for class VIII SMP/MTs students.

METHOD

The type of research used is Research and Development (R&D) research. According to Borg and Gall in Saputro (2017), Education Research and Development (R&D) is a research approach to produce a new product or refine an existing product. This study adapts the ADDIE development model with five stages, namely analysis, design, development, implementation and evaluation (Sugiyono, 2018). The steps of research with the development of ADDIE in this study if presented in chart form as follows.

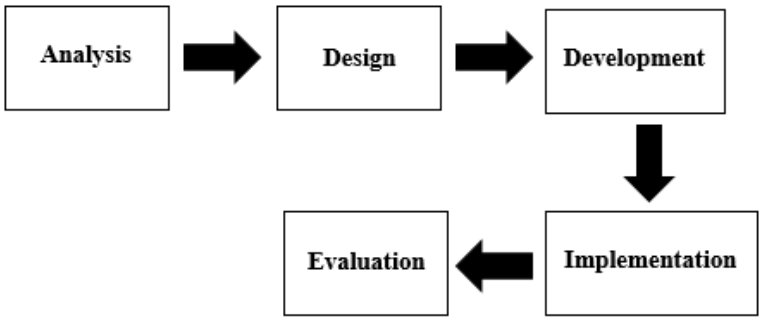

Figure 1. The steps of ADDIE development model (Sugiyono, 2018)

The result of this research is a product in the form of contextual based worksheets on concept of prism and pyramid for junior high school students grade VIII. The trial process starts from content validation by mathematics education lecturers. Then proceed with content validation by the mathematics teacher as a practitioner. Mathematics subject teachers also conduct an assessment of the practicality of the worksheet that was developed. After the product developed has obtained an assessment with valid

criteria, the questions are implemented (tested) in the real class. Due to the current situation, full in-class data collection in schools is not yet possible. Therefore, data collection was carried out at a tutoring institution (LBB) for class VIII students. This study aims to develop contextual based worksheets on concept of prism and pyramid for junior high school students grade VIII.

RESULT AND DISCUSSION

The following is a description of the results of the development of contextual based worksheets on concept of prism and pyramid for junior high school students (SMP) grade VIII in accordance with the flow of the ADDIE research model.

Result

Analysis

- Needs Analysis

  Mathematics activities that students learn and do at school are sometimes different from what they encounter in real life, which it might make it difficult for the students to grasp the meaning of mathematics learning (Agustini et al., 2019). Mustamin (2017) stated that if children learn mathematics apart from their daily experiences, children will quickly forget and cannot apply mathematics. In conducting the needs analysis, the researcher conducted interviews with several neighbors in the neighborhood where the researcher lived, which were junior high school (SMP) students and one of the mathematics teachers at IT AL-KHAWARIZMI SMP, Tanah Grogot, East Kalimantan. Based on the results of interviews obtained from several students, information was obtained that they had used the 2013 curriculum. Curriculum 13 was a curriculum that implemented student-centered learning activities. However, the results of observations and interviews showed that the implementation of the 2013 curriculum encountered several obstacles. This is because both teachers and students are familiar with teacher-centered learning methods. In addition, based on the results of observations, it is known that the learning media used does not attract students' interest in learning. This is because the learning media contains long descriptions and the material presented is less relevant to its application in the daily lives of students.

  Based on the results of the interviews and observations above, it can be concluded that it is necessary to increase the use of contextual problems for learning mathematics at school. Therefore it is needed to develop and employ learning material that utilizes contextual problems as mathematics activities.

- Material Analysis

  The material analysis on the worksheet developed is about the concept of prism and pyramid for junior high school students employing contextual activities.

Based on the needs analysis and material analysis carried out, the researcher felt the need to develop the contextual based worksheets on concept of prism and pyramid to support mathematical understanding of junior high school students' grade 8.

Design

The purpose of this stage is to design the basic form of the Prisms and Pyramids worksheet within contextual problems. At this design stage consists of the following steps:

- The formulation of contextual based worksheet on concept of Prisms and Pyramids.
  Develop a framework for making contextual Prisms and Pyramids worksheet for 8^{th} graders. In this case the contextual Prisms and Pyramids worksheet are Prisms and Pyramids worksheet that are contained with mathematics problems of daily life which are sourced from Articles or Journals and books, then developed.
- Format Selection
  The format selection for this contextual Prisms and Pyramids worksheet is in the form of a printed paper format that is presented to students

Development

At this development stage, the following steps are carried out:

- Examining the Contextual Prisms and Pyramids Worksheet that have been designed before material validation is carried out.
- Compilation of the content validity questionnaire of the Contextual Prisms and Pyramids Worksheet that was developed. Validation was carried out by material experts, namely mathematics education

lecturers or lecturer of pure mathematics and mathematics teachers. Indicator of the suitability of the questions developed with the characteristics of Prisms and Pyramids curriculum.

- Preparation of a questionnaire for the practicality assessment of the Contextual Prisms and Pyramids Worksheet developed. The practicality assessment is carried out by the mathematics subject teacher as a practitioner.

Furthermore, the validation of the Contextual Prisms and Pyramids Worksheets that was developed was carried out. Through this validation activity, an assessment of the developed questions was obtained. To assess the validity, the following references are used:

$$P = \frac{\sum x}{\sum xi}\ x\ 100\%$$

Description:
P : Percentage (valid)
∑x : Total number of answer scores
∑xi : The total number of highest answer scores
In giving meaning and making decisions, the following references are used:

Table 1. The Qualification of Product Validity Level

No	Percentage	Validity Criteria
1.	80%– 100%	Valid/no need to be revised
2.	60% – 79%	Quite valid / no need to be revised
3.	40% – 59%	Less valid / partial revision
4.	0% – 39%	Invalid/ need to be revised

(Syafaáh, 2018)

The Contextual Prisms and Pyramids Worksheet for 8th graders that was developed is feasible to be implemented if it obtains a minimum assessment of "quite valid" and has been revised according to the validator's suggestion. Based on the results of validation by mathematics education lecturers, the percentage of validity was 93,4%% so that it met the "Valid" validity criteria. While the results of the validation by the mathematics teacher, the percentage of validity is 85,86% so that it meets the "Valid" of validity criteria. Thus, it can be concluded that the Contextual Prisms and Pyramids Worksheet for 8th graders developed is valid and feasible to be implemented. Based on the results of the assessment by experts, lecturers and teachers as practitioners, the results of the "Valid" assessment were obtained. With the validation of the material expert being assessed as "Valid", this shows that the Contextual Prisms and Pyramids Worksheet for 8th graders developed are appropriate to support students' mathematical understanding and competencies.

Implementation

The implementation phase will be carried out face-to-face. Due to the current situation, full in-class data collection in schools is not yet possible. Therefore, data collection was carried out at a tutoring institution (LBB) for class VIII students. In addition, students were also asked to fill out a student response questionnaire after using the Contextual Prisms and Pyramids Worksheet that were developed. At the implementation stage, a practical assessment was also carried out by the mathematics subject teacher as a practitioner.

To assess the practicality of the questions developed, the following references are used:

$$P = \frac{\sum x}{\sum xi}\ x\ 100\%$$

Description:
P : Percentage of practicality
∑x : Total number of answer scores
∑xi : The total number of highest answer scores

In giving meaning and making decisions, the following references are used:

Table 2. The Qualification of Product Practicality Level

No	Percentage	Practicality Criteria
1.	80%– 100%	Practical
2.	60% – 79%	Quite practical
3.	40% – 59%	Less practical
4.	0% – 39%	Impractical

(Syafaáh, 2018) with researcher modification.

The Contextual Prisms and Pyramids Worksheet for 8th graders is declared practical if it gets a minimum assessment of "quite practical". Based on the results of practicality assessments by practitioners, the percentage of practicality is 82.5% so that it meets the "Practical" practicality criteria.

After the students work on the developed Contextual Prisms and Pyramids Worksheets, students are asked to provide responses by filling out a response questionnaire. Students are asked to choose whether they are Very Appropriate (SS), Appropriate (S), Not Appropriate (TS), or Very Unsuitable (STS) with respect to the given indicator. To assess the students'responses toward the Contextual Prisms and Pyramids Worksheets, the following references are used:

$$P = \frac{\sum x}{\sum xi}\ x\ 100\%$$

Description :
P : Percentage of practicality
∑x : Total number of answer scores
∑xi : The total number of highest answer scores

In giving meaning and making decisions, the following references are used:

Table 3. The Qualification of Students' Responses Level

No	Percentage	Students' Responses Criteria
1.	80%– 100%	Good
2.	60% – 79%	Quite Good
3.	40% – 59%	Less Good
4.	0% – 39%	Not Good

(Syafaáh, 2018) with researcher modification.

Based on the results of student responses, it is known that most of the indicators, namely 12 indicators, received good responses from students. There are 2 indicators that get a pretty good response. Indicators that get a fairly good response are the students' worksheets display indicators and indicators that show how much students know the mathematical activities they are doing. The results of student responses are then used as evaluation material.

Evaluation

At the Evaluation stage, the researcher evaluates the results of the product trials being developed. In the trial to assess the validity of the product, the results obtained are valid products and do not need to be revised. Thus, the Contextual Prisms and Pyramids Worksheet for 8th graders that were developed are suitable for use in real-class trials (Implementation). Based on the practicality assessment, "Practical" results were obtained for the Contextual Prisms and Pyramids Worksheet for 8th graders. Based on students' responses, it is known that most of the indicators, namely 12 indicators, received good responses from students. There are 2 indicators that get a pretty good response, namely Language indicators on Worksheets and hints on Worksheets. Referring to the students' responses, further improvements will be made to the quality of the Language indicators on the Worksheets and the instructions on the Worksheets.

Discussion

Referring to the results of the Worksheets implementation, most of the students scored above the KKM, and the average class score was also above the KKM. Thus, it can be seen that by learning to use contextual worksheets, it supports students' understanding. This result is in line with the findings of Nuryani (2019) in her research, namely the use of context-based worksheets effectively helps students understand

the mathematics material being studied. In addition, Rawa (2020) also found something similar which shows that practical worksheets are teaching materials that facilitate students to build understanding concepts independently.

CONCLUSION

Based on the discussion of the research results above, it can be concluded that: 1)The process of developing the Contextual based Worksheets on concept of Prisms and Pyramids for 8th graders using the ADDIE model by Dick and Carry. This development process goes through several stages, namely analysis, design, development, implementation, and evaluation. 2) The Contextual Prisms and Pyramids Worksheets for 8th graders developed in this study are included in the valid category. This is indicated by the results of the validation from the mathematics lecturer at 93,4% and the mathematics teacher at 85,86%. 3) The Contextual based Worksheet on concept of Prisms and Pyramids are not only valid but also practical. This is evidenced by the practicality value of the mathematics teacher getting 82.5% % which meets the "Practical" practicality criteria. 4) The results of the implementation of the Contextual based Worksheet on concept of Prisms and Pyramids developed in this study showed that the use of context-based worksheets effectively helps students understand the mathematics material being studied.

In this study, the development of students' Worksheet is limited to concept of Prisms and Pyramids. Besides that, this worksheets is designed for 8th graders only. For future development and further research, it can be developed worksheets for other mathematics concepts and another grade of class. In accordance with today's technological developments, it is necessary to develop technology-based students' Worksheet by employing many digital apps and augmented reality.

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