

Development of Contextual Triangles and Quadrilaterals Worksheets for 7th Graders

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ABSTRACT

Mathematics has a very important role in everyday life, where almost everything around us is related to mathematics, including culture in our society, especially concept of geometric shapes. However, the mathematics lessons that students learn at school are sometimes different from the mathematical problems encountered in everyday life, which makes it difficult for students to relate mathematical concepts to problems from real-world contexts. Therefore, teachers and educators could employ innovative and relevant teaching materials, which is also intended to increase the motivation of students to learn the theoretical material presented. Which is an abstract mathematical concept. One of teaching materials that can be used is the Student Worksheet (LKPD). In order for LKPD to be relevant to the real life of students, mathematical activities in LKPD are arranged using activities related to the daily lives of students, especially for junior high school students (SMP/MTs). Therefore, this research is about the development students' worksheet in Triangles and Quadrilaterals concept within contextual problems for VII grade students. The type of research used is Research and Development (R&D) research, by adapting ADDIE model. The study was conducted at a class of VII at MTsN 4 Jombang. The results show that the Triangles and Quadrilaterals worksheet within contextual problems are valid and practical. Besides that, the results of the implementation of the Triangles and Quadrilaterals worksheet within contextual problems in this study showed that only focus on mathematical activities to solve procedural problems without relating them to real contexts in everyday life.

Keywords: *Students' Worksheet; Triangles and Quadrilaterals; Contextual; Junior High School.*

INTRODUCTION

Mathematics has a very important role in everyday life, where almost everything around us is related to mathematics, including culture in our society (Darmayasa et al., 2018). The mathematics lessons that students learn at school are sometimes different from the mathematical problems encountered in everyday life, which makes it difficult for students to relate mathematical concepts to problems from real-world contexts (Agustini et al., 2019). If children learn mathematics apart from their daily experiences, children will quickly forget and cannot apply mathematics (Mustamin, 2017). In fact, with the increasing number of real-life situations that require some level of mathematical understanding, it is very important for students to have a good understanding of mathematics (Stacey, 2015). (Satiti & Wulandari (2021) added that an understanding of mathematical concepts and materials not only supports a student's success in academics, but it is also important to develop critical mathematical thinking needed in everyday life.

One of the mathematical concepts that is closely related to the context of everyday life is the concept of geometric shapes. At the high school level, the material for geometric shapes begins with triangles and quadrilaterals. However, many students have difficulty understanding and applying concepts and skills involving the concept of a quadrilateral triangle (Sisman & Aksu, 2015). Therefore, teachers and educators need to use innovative learning to support the application of

mathematical concepts in everyday life.

Mathematical communication skills are needed in learning mathematics in order to make it easier for students to understand mathematical concept in everyday learning. In addition, it can also be an important asset in completing, exploring, and investigating mathematics and is a forum for social activities with friends, assessing and sharpening ideas to convince others (Senjawati, 2017). Mathematical communication skills are also one of the important mathematical abilities to be possessed and developed by students who study mathematics. This is in accordance with the goals of mathematics education in Indonesia, namely so that students have the ability to communicate ideas with symbols, tables, diagrams or other media to clarify a situation or problem (Wijayanto et al., 2019).

Nowadays, many students are not able to understand mathematical concepts well. This is because most mathematical concepts are abstract concepts that are difficult for students to understand, so a mathematical ability is needed that is able to help students understand mathematical concepts (Senjawati, 2017). Many students have difficulty in understanding mathematical problems. This statement is relevant to the findings (Denia et al., 2018) in their research, which shows that mathematics learning is still fixated on textbooks and less related to the daily lives of students. This condition results in learning that students cannot interpret as an activity to solve realistic mathematical problems or in accordance with real-life contexts. Therefore, in order for mathematics learning to be meaningful, the teacher or educator must always try to find out and explore the concepts that students already have and help integrate these concepts harmoniously with new knowledge to be taught and link the material being taught with students' real world situations and encourage students to make connections between their knowledge and its application in their lives as family and community members (Wijayanto et al., 2019).

One of the efforts that can be made to overcome the problems described above, teachers can use innovative and relevant teaching materials. It is also intended to increase the motivation of students to learn the theoretical material presented. Which is an abstract mathematical concept. The prepared teaching materials are intended to facilitate maximum achievement of mathematics learning outcomes. One of the materials that can be used is the Student Worksheet (LKPD).

Atika & Mz (2016) stated that the use of learning media has a very important role in the implementation of learning. One form of learning media that is widely used is the Student Worksheet (LKPD). The Student Worksheet (LKPD) is one of the tools that can help and facilitate learning activities so that the learning that occurs is able to lead students to find concepts that can be used to solve problems systematically (Rudy, 2017). This Student Worksheet is a teaching material that can help students to understand and strengthen the understanding of the mathematical material being studied (Atika & Mz, 2016). In addition, the use of LKPD in learning can facilitate students to participate actively in learning and teachers will find it easier to convey material to students.

In order for LKPD to be relevant to the real life of students, mathematical activities in LKPD are arranged using activities related to the daily lives of students. Especially for junior high school students (SMP/MTs), the context of life that can be used is related to the utilization of their living environment. This can make students able to apply concepts to existing problems and students' understanding of the material is getting stronger.

Based on the above description of the results of several previous studies, it is necessary to increase the use of learning media to help students learn and assist teachers in teaching, namely in the form of Student Worksheets (LKPD). In order for the learning of triangles and quadrilaterals to be meaningful, mathematical activities are adapted from real-life contexts (contextual problems). Triangles and quadrilaterals were first taught at the junior high school level in grade VII. Therefore, this research is about the development of Triangles and Quadrilaterals worksheet within contextual

problems for VII grade 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.

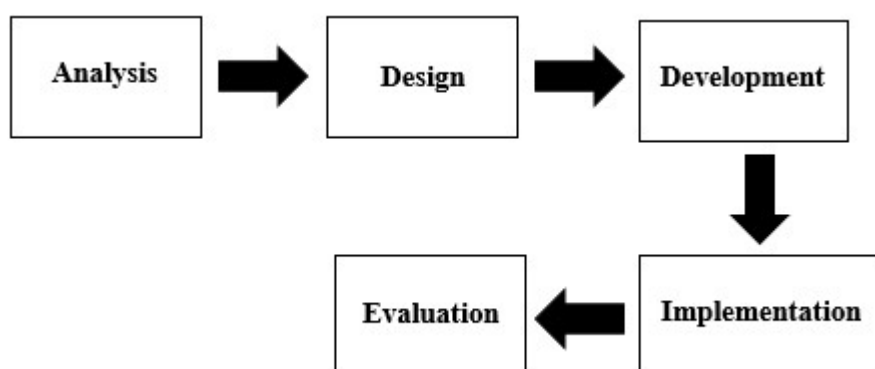


Figure 1. The steps of ADDIE development model (Sugiyono, 2018)

The result of this research is a product in the form of Triangles and Quadrilaterals worksheet within contextual problems for VII grade students. 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 Triangles and Quadrilaterals worksheet within contextual problems that was developed. After the product developed has obtained an assessment with valid criteria, the questions are implemented (tested) in the real class. The test subjects in this study were a class of VII at MTsN 4 Jombang. This study aims to develop Triangles and Quadrilaterals worksheet within contextual problems for VII grade students.

RESULT AND DISCUSSION

Result

The following is a description of the results of the development of the Triangles and Quadrilaterals worksheet within contextual problems in accordance with the flow of the ADDIE research model.

Result

Analysis

- Needs Analysis

Mathematics lessons that students learn at school are sometimes different from what they encounter in everyday life, which makes it difficult for students to relate mathematical concepts to problems from real-world contexts (Agustini et al., 2019). If children learn mathematics apart from their daily experiences, children will quickly forget and cannot apply mathematics (Mustamin, 2017). Based on the description above, 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 relevant with contextual problems.

- **Material Analysis**

The material analysis on the Triangles and Quadrilaterals worksheet within contextual problems developed is about the Triangles and Quadrilaterals worksheet for 7th graders employing personal context.

Based on the needs analysis and material analysis carried out, the researcher felt the need to develop the Triangles and Quadrilaterals worksheet within contextual problems to support the mathematical understanding of junior high school students' grade 7.

Design

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

- **The formulation of contextual Triangles and Quadrilaterals worksheet**

Develop a framework for making contextual Triangles and Quadrilaterals worksheet for 7th graders. In this case the contextual Triangles and Quadrilaterals worksheet are Triangles and Quadrilaterals worksheet that are contained with mathematics problems of daily life which are sourced from Articles or Journals, then developed.

- **Format Selection**

The format selection for this contextual Triangles and Quadrilaterals 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 Triangles and Quadrilaterals Worksheet that have been designed before material validation is carried out.
- Compilation of the content validity questionnaire of the Contextual Triangles and Quadrilaterals 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 Triangles and Quadrilaterals curriculum.
- Preparation of a questionnaire for the practicality assessment of the Contextual Triangles and Quadrilaterals Worksheet developed. The practicality assessment is carried out by the mathematics subject teacher as a practitioner.

Furthermore, the validation of the Contextual Triangles and Quadrilaterals 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:

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

Description:

P : Percentage (valid)

$\sum x$: Total number of answer scores

$\sum xi$: 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 Triangles and Quadrilaterals Worksheet for 7th 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 85.42% so that it met the "Valid" validity criteria. While the results of the validation by the mathematics teacher, the percentage of validity is 93.47% so that it meets the "Valid" of validity criteria. Thus, it can be concluded that the Contextual Triangles and Quadrilaterals Worksheet for 7th 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 Triangles and Quadrilaterals Worksheet for 7th graders developed are appropriate to support students' mathematical understanding and competencies.

Implementation

The implementation phase will be carried out face-to-face with class VII students at MTsN 4 Jombang. In addition, students were also asked to fill out a student response questionnaire after using the Contextual Triangles and Quadrilaterals Worksheet ers 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:

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

Description :

- P : Percentage of practicality
- $\sum x$: Total number of answer scores
- $\sum xi$: 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 Triangles and Quadrilaterals Worksheet for 7th 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 94.5% so that it meets the "Practical" practicality criteria.

After the students work on the developed Contextual Triangles and Quadrilaterals Worksheets, students are asked to provide responses by filling out a response questionnaire. There are 14 response indicators in the questionnaire given. 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 Triangles and Quadrilaterals Worksheets, the following references are used:

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

Description :

- P : Percentage of practicality
- $\sum x$: Total number of answer scores
- $\sum xi$: 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. Based on the results of student responses, there were 28.2% of participants who did not know or rarely encountered and worked on mathematical activities presented in the context of daily life. 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 Triangles and Quadrilaterals Worksheet for 7th 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 Triangles and Quadrilaterals Worksheet for 7th graders.

Referring to the results of students' responses to the personal context model of mathematics problems developed, in general the products developed received a good response. However, there are 2 indicators that received a fairly 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. Based on the results of student responses, there are 28.2% of students who do not know or rarely encounter and do mathematical activities presented in the context of daily life. This shows that there are students who do not know that the mathematical concepts they learn in school are related to the context of their daily life.

Discussion

Based on the results of student responses to Contextual Triangles and Quadrilaterals Worksheet for 7th graders developed, there are 28.2% of students who are less familiar or rarely encounter and do mathematical activities presented in the context of everyday life. This shows that students do not understand that the mathematics they learn in school is related to the context of their daily lives. This is in accordance with the findings in the research by Satiti & Verdianingsih (2019) which showed that most students only focus on mathematical activities to solve procedural problems without relating them to real contexts in everyday life.

CONCLUSION

Based on the discussion of the research results above, it can be concluded that: 1) The process of developing the Contextual Triangles and Quadrilaterals Worksheet for 7th 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 Triangles and Quadrilaterals Worksheet for 7th 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 85.42% and the mathematics teacher at 93.4%. The PISA-like Mathematics Problems within personal context developed in this study is said to be valid if the percentage obtained is >80%. 3) PISA-like mathematics problems within personal contexts are not only valid but also practical. This is evidenced by the practicality value of the mathematics teacher getting 94.50% which meets the "Practical" practicality criteria. 4) The results

of the implementation of the personal context PISA-like mathematics problems in this study showed that there were students only focus on mathematical activities to solve procedural problems without relating them to real contexts in everyday life.

In this study, the development of students' Worksheet is limited to concept of Triangles and Quadrilaterals. Besides that, this worksheets is designed for 7th 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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