

Student's Worksheet Design To Improving Problem-Solving Ability Of Seventh Grade With PBL

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Abstract: The purpose of this study was to develop student's worksheet design based on PBL to improve student's problem solving abilities of seventh class. The development model used in this study is the ADDIE development model. The steps in this study are analysis, design, development, implementation, and evaluation. The subjects in this study were seventh grade students of Muhammadiyah 1 Junior high school in Depok, in Indonesia. The objects in this study are curriculum, material, and student characteristics. The results in this study are, first, students need teaching materials that are in accordance with the curriculum, material, and characteristics of students who can improve problem solving skills. Second, the design results in this study include cover, preface, and table of contents, instructions for using student's worksheet, basic competencies, supporting information, work steps, and individual assignments. The results of design validation show that the student's worksheet has very good criteria with an average value of 43.

Index Terms: Student's worksheet, Problem Based Learning, Problem Solving

1. INTRODUCTION

Problem solving ability is one of the important aspects that must be have by students in learning mathematics [1]. Problem solving ability are part of a very important mathematics curriculum [2]. The process in problem solving makes us know the extent to which students understand the concept [3]. Problem solving probes make students able to build many ideas [4]. Problem solving skills will make students feel more meaningful learning [5]. One of the mathematics learning objectives stated is that students are able to solve problems or commonly called problem solving. Problem solving ability is one of the 21st century skills that must be have by students in the 2013 curriculum. Problem solving is the ability needed by all people who apply mathematics in their daily lives [1]. The ability to solve problems seems to be one of the important things and must be developed in mathematics learning [6]. By learning to solve problems in mathematics, students will acquire ways of thinking, habits of tenacity and curiosity, and beliefs in foreign situations they will face in life, outside of mathematics [4]. Problem solving is an important way of carrying out the process of learning and teaching mathematics [7]. Students who have low problem solving skills will have difficulty in working on HOTS type questions. The low ability of students in solving mathematical problems is susceptible to ineffective learning in the classroom. Effective learning is learning that influences students' mathematical skills, one of which is problem solving ability [8]. Based on the results of observations made at Muhammadiyah 1 Junior High School in Depok, it was found that students had low problem-solving abilities. Students have difficulty in solving problems in the form of story problems. Most story problems are in the form of problems in everyday life (contextual problems) that seem long. This is also in accordance with Kartikaningtyas, Kusmayadi, and Riyadi's opinion that some students have

difficulties in solving contextual problems [9]. Various learning models can be applied to improve students' problem-solving abilities. Problem Based Learning (PBL) learning model is one learning model that can be applied.. PBL learning model can improve creative thinking skills and problem-solving abilities in students [10]. The characteristics of the PBL model are learning by solving problems [11]. Using the problem-based learning model, students are expected to be able to master the concepts to solve problems [1]. In the PBL model, students are required to solve the questions given by the teacher [12]. In PBL students collaborate in solving problems, starting from understanding problems, applying concepts, analyzing, and evaluating solution steps [13]. PBL learning model can train students to solve problems related to daily life [14]. Activities in the PBL model allow students to be involved in solving everyday problems, high-level thinking, and motivating students in learning activities [15]. The application of the PBL learning model will be helped by the presence of teaching materials in the form of worksheet. Student's worksheets are sheets of assignments that must be completed by students [16]. Student's worksheet is one of the tools that can facilitate learning activities to run effectively and can build interactions between teachers and students [17]. Student's worksheet contains steps that are arranged in a coherent manner to guide students in carrying out activities to solve problems [18]. Student's worksheet is a tool that is used as a learning facility to facilitate students in understanding the concept of learning [19]. The purpose of this study was to develop Student's Worksheet design to improving problem-solving abilities of seventh grade with PBL.

2 METHOD

The development model in this research uses the ADDIE model. The ADDIE model is a model used in the process of designing learning systems [20]. There are 5 processes in this ADDIE model, namely: Analysis, Design, Development, Implementation, and Evaluation. Firstly is analysis, where at this stage the teacher collects more information about the knowledge, skills and attitudes of students that need to be achieved and taught during learning. The second stage is design. At the design stage, the teacher must design instructions that will be used in learning, including the learning methods to be used and the learning objectives to be achieved. Third is the development stage. At this stage, the

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teacher makes and composes what material will be used in the learning process. The teacher must make a description of the learning steps that are delivered in a practical manner. The fourth stage is implementation. In this implementation phase, products that have been analyzed, designed and developed will be used or tested on students. The last step in this process is evaluating the product. This evaluation phase is used to evaluate whether the product that is prepared has reached the desired goal. This evaluation phase is also the stage of determining the improvement of a product [21], [22], [23], [24], [25], [26], [27], [28], [29]. The steps taken in this study are only limited to the second stage, namely analysis and design. The flow process ADDIE work can be seen in Figure 1.

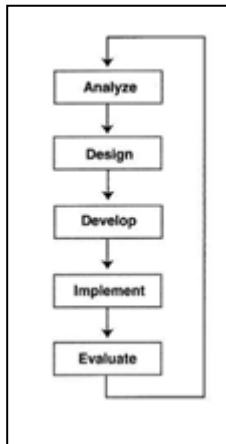


Fig 1. Flow Process ADDIE Work [30]

The subjects of this study were seventh grade students of Muhammadiyah 1 Junior High School in Depok, Yogyakarta. The sampling technique is done by random sampling technique. Data collection techniques used tests and interviews. Tests are conducted to determine students' problem-solving abilities. The problem used for the test is the question of quadrilateral and triangles. Interviews were conducted to seventh grade mathematics teachers.

3 RESULT AND DISCUSSION

This research was conducted to design student's worksheets with PBL to improve problem-solving abilities of seventh class Muhammadiyah 1 Junior High School in Depok, Yogyakarta. The following are the results of the ADDIE stages that have been carried out.

3.1 Analysis Stage

3.1.1 Analysis Curriculum

Based on the results Interview with one of teacher at Muhammadiyah 1 Junior High School in Depok , Yogyakarta was obtained that the curriculum used in schools is 2013 curriculum . Competence Core and Competence bases used already based on with what was stated on 2013 curriculum.

3.1.2 Analysis Material

The materials in class VII in second semester are proportion, social arithmetic's, and angles, quadrilateral and triangles, and data presentation. Based on the results Interview and observation, obtained that students difficulty in complete problem contextually related with rectangular and triangle.

3.1.3 Analysis Student's Characteristic

Student experience difficulty in do question the story. This caused because students already especially first feel confused

and lazy when read question enough story long. Students' assume that about the length is difficult problem for done. Moreover again teaching materials used in school only the book that looks less interesting for students. So that development of this student's worksheet expected could improve will students in learn mathematics, specifically in complete issues related with quadrilateral and triangles.

3.2 Design Stage

During this period, researchers designed several parts of Student's Worksheets. The parts that have been designed include covers, introductory words, table of contents, basic competencies, material, exercise and assignments.

3.2.1 Covers

Cover from this Student's worksheet entitled "Problem Based Learning Based Worksheets for Class VII SMP/ MTs". The cover of this Student's worksheet can be seen in Figure 2.



Fig 2. Covers

3.2.2 Introductory Word

The introduction contains thanks to God. The preface also contains the author's expectations of the worksheets that have been compiled, hopefully this worksheet can be useful for the readers. The introductory page can be seen in Figure 3.

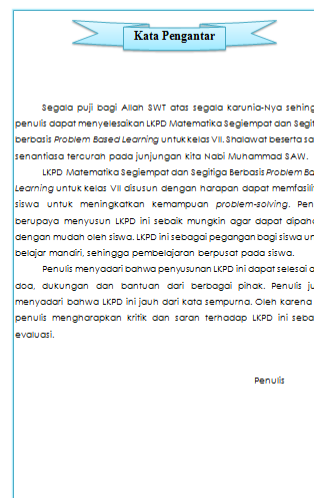


Fig 3. Introductory Word

3.2.3 Table of Contents

The table of contents contains a list of pages that will make it easier for readers to find the material they want. The table of contents can be seen in Figure 4.

Daftar Isi	
Kata Pengantar	1
Daftar Isi	ii
Petunjuk Penggunaan LKPD	iii
Kompetensi Dasar	iv
Informasi Pendukung	1
Langkah Kerja	2
Tugas Individu	3

Fig 4. Table of Contents

3.2.4 Instructions

The instructions for using the student's worksheet contain information about the steps in using the student's worksheet. The Guidance Sheet for using student's worksheet can be seen in Figure 5 below.

PETUNJUK PENGGUNAAN LKPD

- Mulailah dengan berdoa terlebih dahulu.
- Bacalah LKPD ini dengan teliti dan cermat.
- Diskusikanlah dengan kelompok untuk memahami konsep.
- Berdiskusilah dengan teman sekelompok untuk menyelesaikan tugas kelompok.
- Kerjakan setiap langkah pada tugas kelompok.
- Bertanya dan berdiskusilah dengan guru ketika mengalami kesulitan.
- Presentasikan hasil diskusi tugas kelompok di depan kelas.
- Kerjakan latihan soal secara mandiri.

BERDOALAH TERLEBIH DAHULU SEBELUM MENGERJAKAN

Fig 5. Instructions

3.2.5 Base Competencies

Basic competencies contain learning goals that must be achieved by students after studying the material on the worksheet. Basic competency can be seen in Figure 6.

SEGIEMPAT DAN SEGITIGA

Kompetensi Dasar:

- 3.11 Mengaitkan rumus keliling dan luas untuk berbagai jenis segiempat (persegi, persegipanjang, belahketupat, jajargenjang, trapesium, dan layang-layang) dan segitiga
- 4.11 Menyelesaikan masalah kontekstual yang berkaitan dengan luas dan keliling segiempat (persegi, persegipanjang, belahketupat, jajargenjang, trapesium, dan layang-layang) dan segitiga

Indikator

- Menyebutkan rumus keliling berbagai segiempat
- Menyebutkan rumus keliling berbagai segitiga
- Menyebutkan rumus luas berbagai segiempat
- Menyebutkan rumus luas berbagai segitiga

Fig 6. Base Competencies

In base competencies, there are indicators of ability achievement which are abilities that must be possessed by students after learning the material on the worksheet.

3.2.6 Supporting Information/ Material

The material contains a summary of the material about quadrilaterals and triangles. Giving material aims to facilitate students in getting the knowledge they need. Knowledge that has been obtained by students is expected to help students in solving problems that will be presented. The material on worksheet can be seen in Figure 7.

INFORMASI PENDUKUNG

Berisi materi yang disajikan secara singkat dan jelas. Ringkasan materi disajikan dengan tujuan pembelajaran yang akan didapat sebagai tahap awal langkah pembelajaran Problem Based Learning yaitu Orientasi pada masalah.

Fig 7. Supporting Information

3.2.7 Work Step

The work step contains questions and completion steps that must be completed by students. Questions on training can be done in groups or individually. The work step can be seen in Figure 8.



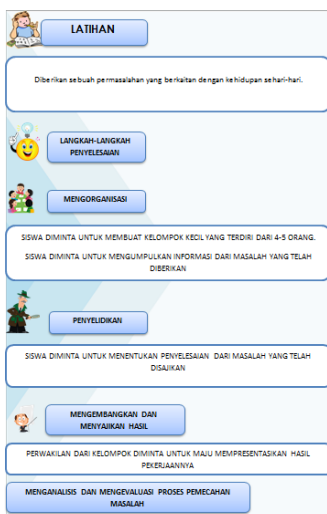


Fig 8. Work Step

3.2.8 Individual Task

Individual tasks must be completed by students. Tasks function to measure students' ability to solve problems. Individual assignments given to each student can be seen in Figure 9.

Fig 9. Individual Task

This student's worksheet design has been validated by two validators. The first validator was Ms. Sri Yuni Astuti, S. Pd. Si, as the mathematics teacher at Muhammadiyah 1 Junior High School in Depok. The second validator is Mr. Eddy Supriyadi, S.Pd, as the mathematics teacher at Muhammadiyah 2 Junior High School Kalasan. Comments and suggestions given by the validator regarding the student's worksheet design can be seen in Table 1 below.

TABLE 1. COMMENTS AND SUGGESTIONS FROM THE VALIDATOR

Comments	Suggestions
The picture on the cover less Describes the shape of the Quadrilateral and triangle	Look for images that are truly Rectangles and triangles
Too many indicators written on The Basic Competency page	Material must be presented Clearly Indicators do not need to be written all, select the indicators to be achieved through the student's worksheet The student's worksheet must load the material and sample questions. Giving questions and material accompanied by pictures

The comments and suggestions given by validator are used as references to revise the design of the student's worksheet. Then, the design feasibility is assessed by both validators. The following is the calculation of the questionnaire from the student's worksheet presented in Table 2.

TABLE 2. CALCULATION OF THE QUESTIONNAIRE

Validator	Position	Score	Criteria
Sri Yuni Astuti, S.Pd.Si	Mathematics teacher in SMP Muhammadiyah 1 Depok	42	Very Good
Eddy Supriyadi, S.Pd	Mathematics teacher in SMP Muhammadiyah 2 Kalasan	44	Very Good
Total		86	
Average		43	Very Good

The table above shows that the average student's worksheet design value is 43. These results indicate that the student's worksheet design has a very good category.

4 CONCLUSION

Student's worksheet development has been carried out in the analysis and design stages. At the design stage, researchers have designed covers, preface, and table of contents, instructions for using student's worksheet, basic competencies, supporting information, work steps, and individual assignments. The student's worksheet developed has the advantage of being able to improve students' problem-solving abilities. Student's worksheet was made using Corel Draw and Microsoft Word 2010. Based on the results of design validation, it was found that student's worksheet was in a very good category with an average of 43.

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