Design Of Mathematics Worksheets Uses RME Approach To Improve Communication Capabilities

Farida Kurniawati, Suparman

Abstract— Mathematics is a compulsory subject that is taught both to students of basic education, secondary education and even college education. Communication skills are one of the abilities needed in learning the 2013 curriculum. Mathematics is also one of the lessons for developing communication skills. Communication skills are important and must be mastered by students. This study aims to design learning media needs in the form of Student Worksheets using the Realistic Mathematics Education approach to improve communication skills. The research model uses the ADDIE model. This research was developed based on comments and suggestions from the validator. The instruments used were media validation sheets and material validations. The results showed that the design of Student Worksheets with the RME approach could improve students' communication skills. The components of the Student Worksheet include the cover, preface, table of contents, instructions for using the Student Worksheet, basic competency or indicators of achievement of competencies and student activity sheets. Design with social arithmetic material deserves to be a learning medium. Therefore, the need for the development of instructional media in the form of Student Worksheets on social arithmetic materials with the Mathematics Education Realistic approach to improving communication skills.

Index Terms— ADDIE, communication skills, instructional media design, Realistics Mathematics Education.

1 INTRODUCTION

Mathematics is a compulsory subject taught to students of basic education, secondary education and even education in college [1]. Mathematics is not only a tool for thinking or counting but also a tool for communicating ideas or ideas precisely and clearly, this can be seen from the interaction of teachers to students or students with students [2]. Mathematics is not only about mathematical concepts but also relates to applications in everyday life, applied mathematics such as collecting, presenting, analyzing, and interpreting data and communicating [3]. Mathematics requires the process of developing students' thinking abilities [4]. One of the goals of learning mathematics is to develop communication skills [5],[6]. Mathematical communication skills are important to be developed [7],[8],[9] and must be mastered by students [3],[10]. Communication skills are one of the abilities needed in the 2013 curriculum learning process [9]. This is supported by NCTM and Wahyudin [11] that the ability of mathematical communication is the ability to communicate in the form of (1) reflecting real objects, images or mathematical ideas (2) conveying orally, in writing, using real objects, graphics and algebra (3) using the ability to read, write, and analyze to translate and interpret mathematical ideas, symbols, terms, and information (4) answer different problems of ideas. Learning media aims to help teachers convey information or communicate the material to students [12]. One of the learning media needed by students is Student Worksheet (LKS) [13]. LKS is a media that facilitates mathematical concepts [14],[15]. The LKS components are material, summary, and instructions that are following basic competencies [16]. By using LKS students are more independent, creative, innovative, effective, and efficient [17]. Realistic Mathematics Education (RME) is that learning becomes more meaningful by applying the problems of daily life [18]. Learning with the RME Approach always connects with everyday problems [19]. The characteristics of RME learning [20] are that it can connect problems with everyday contexts, identify relevant mathematical concepts, solve problems, and explain the basic problems of context. Whereas according to [21] stages in RME learning there are 5 stages (1) building and concretising, (2) levels and models, (3) reflecting and assigning, (4) social context and interaction, (5) structuring and interviewing. By using the RME approach it is expected to improve students' communication skills. This is supported by research [7] implementing RME learning that can improve students' mathematical communication skills. Worksheets with an attractive RME approach can lead students independently to find concepts [22]. Based on the results of the needs analysis that students rarely explain mathematical situations orally, rarely state the problems of events in everyday life, and rarely formulate definitions and terms in mathematics using their language. On the other hand, based on media validation, the existing worksheets are less attractive, the components are not appropriate and students are inadequate to convey ideas. Therefore, researchers feel that the approach to RME is appropriate and effective using LKS. LKS is planned for 7th-grade students even semester social arithmetic materials at SMP Muhammadiyah Pakem. It is expected that with RME-based LKS communication skills will increase.

2 RESEARCH METHODS

This research is a product development research (research and development). The model uses the ADDIE model. ADDIE is a research model that consists of several stages namely: analysis, design, development, implementation, and evaluation [23],[24],[25]. The ADDIE model optimizes processes to measure results [26]. The study only focused on measuring the validity of media designs. The procedure using the ADDIE model [23] can be seen in Figure 1 below:

- Farida Kurniawati is currently pursuing a master's degree program in Mathematics Education at Ahmad Dahlan University, Indonesia, PH:+6285743707507. E-mail: kurniawatifarida40@gmail.com
- Suparman is an associate professor in mathematics at Ahmad Dahlan University, Indonesia, PH:+6281328201198. E-mail: suparman@pimat.uad.ac.id.
This study uses a Realistic Mathematic Realistic Education (RME) approach. The research objective is to develop media in the form of product design. The product developed is the design of Student Worksheets (LKS) to improve communication skills. The analysis phase of this research is to identify the problem, identify the source of the problem, find possible solutions, and analyze the needs. Then create a media design as needed. The experts will validate the design to determine the quality of media and material. The experts also provided input for the research revision material. The research instrument used was a media and material validation sheet. Validation sheets are given to teachers who are in charge of mathematics.

3 RESULT AND DISCUSSION
3.1 Analysis
Based on observations and interviews with learning, researchers obtain some information. First, learning is following the Learning Implementation Plan (RPP) but still often uses the lecture method. Second, students rarely explain mathematical situations verbally, rarely express the problem of events in daily life and rarely formulate definitions and terms in mathematics using their language. Third, students still experience difficulties in communication skills in social arithmetic material to reflect real objects, convey verbally, write using graphics and algebra, interpret ideas, symbol symbols, and mathematical information. Fourth, the teacher prepares the media for photocopies of books packaged in the form of worksheets. Fifth, the lack of teaching using LKS media. Analysis of needs, the researcher concluded that teachers and students needed learning media in the form of worksheets with the RME approach to improve communication skills as a facility in learning activities.

3.2 Design
Learning media in the form of worksheets. Components in the worksheet include the cover, preface, table of contents, instructions for using the worksheet, basic competency or indicators of achievement of competencies, and student activity sheets [26]. The cover design can be seen in Figure 2 below:

Next to the instructions for using LKS, there are icons regarding the syntax of the RME approach and communication skills. There are also sub-chapter title icons, examples, competency test exercises, conclusions, and analyzes. Design instructions can be seen in Figure 4 below:

The cover design includes the LKS identity such as the chapter title, school level, class, and semester to be taught. Furthermore, for the preface and table of contents can be seen in Figure 3 below:

The worksheet also includes Core Competencies, Basic Competencies, and Competency Achievement Indicators. The design can be seen in Figure 5 below:
Besides that, there are student activity sheets in the form of worksheets, for example, exercises, assignments, competency tests, conclusions, and analyzes. The design can be seen in Figure 6, Figure 7, and Figure 8 below:

At the development stage, the validator validates the LKS design. The validator here is a mathematics subject teacher. Validation consists of media validation and material validation, each of which is one validator. The instrument uses a validation sheet that has been previously validated. The validator gives a good or proper assessment of the worksheet design.

3.4 Implementation
In the implementation phase, the product will be used for grade 7 Muhammadiyah Pakem Middle School as a learning medium in the form of worksheets.

3.5 Evaluation
The results of the validation of the feasibility learning design scoring can be seen in the following Table 1 below:

<table>
<thead>
<tr>
<th>Validator</th>
<th>Skor</th>
<th>Kriteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fadzilah Oktaviyana</td>
<td>106</td>
<td>Sangat Baik</td>
</tr>
<tr>
<td>Kurnia Fermoni</td>
<td>87</td>
<td>Sangat Baik</td>
</tr>
<tr>
<td>Totals</td>
<td>193</td>
<td></td>
</tr>
<tr>
<td>Rata-rata</td>
<td>96.5</td>
<td>Sangat Baik</td>
</tr>
</tbody>
</table>

Table 1 shows the results of the validation of the LKS design with a very good category. The learning design is said to be feasible with the revision requirements from the experts. Revisions are adjusted to the comments and suggestions provided by the validator. The results of comments and suggestions can be seen in the following Table 2 below:

<table>
<thead>
<tr>
<th>No</th>
<th>Komentar</th>
<th>Saran</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Belum dilengkapi dengan uji kompetensi dan penentup Penggunaan gambar sesuai konteks belum menarik dari setiap contoh soal kontekstual yang diberikan.</td>
<td>Disampaikan Uji Kompetensi</td>
</tr>
<tr>
<td>2</td>
<td>Misalnya penjualan balok bisa di ilustrasikan dengan gambar jualan balok buku.</td>
<td>Misalnya siapa yang berbicara atau pun dijelaskan situasi yang terjadi keterkaitan perkataan berlangsung.</td>
</tr>
<tr>
<td>3</td>
<td>Pada awal pembelajaran (hal 0) narasi dibuat lebih jelas.</td>
<td>Sebaiknya LKPD menggantungkan kata-kata ajakan keterkaitan akan melacak untuk kegiatan.</td>
</tr>
<tr>
<td>4</td>
<td>Mungkin pertanyaan tidak jelas.</td>
<td>Ajakan dapat di berikan misalkan, ayo beri fasih.</td>
</tr>
</tbody>
</table>

After the researcher receives comments and suggestions such as Table 2, the researcher revises the designed design. So that the design becomes a product that is worth testing out to students.

4 Conclusion
This research resulted in product development in the form of LKS design. Design worksheets with the RME approach to improving students' communication skills. The LKS design components include the cover, preface, table of contents, instructions for using the worksheet, basic competency or indicators of competency achievement and student activity sheets. Design with social arithmetic material deserves to be a learning medium. This LKS design research can be continued into research by developing media in the form of LKS approached with RME to improve communication skills on Social Arithmetic material.

Acknowledgment
Researchers would like to thank Ahmad Dahlan University,
especially the Masters in Mathematics Education who have provided encouragement and facilities to researchers to complete this research. The researcher also thanks to the teachers and students at Muhammadiyah Pakem Middle School who have permitted to conduct research.

REFERENCES


