



Mathematical Learning Media in Set Material with The Futsal Context

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Abstract. Mathematics learning activities are currently changing along with the Coronavirus outbreak in Indonesia. A teacher should compile innovative learning and be supported by various aspects that optimize learning outcomes, one of which is learning media. Learning media must have an interesting context and be close to students. The futsal context will be the starting point in learning mathematics in the set material so that students can feel that learning mathematics is different and fun. This study aims to develop valid and practical mathematics learning media in set material with the futsal context. This research is development research using the 4D model (Define, Design, Develop, and Disseminate). In this study, prototypes were developed to determine the practicality of the developed learning media. This study's subjects were junior high school students in Karawang Regency. The instruments used were questionnaires, interview guides, and documentation. The results obtained from data analysis show that the product produced in the form of junior high school mathematics learning media with the futsal context is valid and practical with very good criteria.

Keywords: Learning Media, Futsal, Mathematics, Set Material.

1 Introduction

Mathematics education is a science that is needed in everyday life. So, mathematics needs to be taught in schools so everyone can understand it. Mathematics is one of the compulsory subjects given to elementary, junior, and senior high school students, which is also included in the national exam subjects. Thus, students must be able to master mathematics. Mathematics learning must be carried out as well as possible to create quality learning. Learning in the era of the covid pandemic must be considered carefully because this condition significantly impacts education, especially in schools. During the COVID-19 pandemic, the learning process drastically changed, so all learning activities were carried out online, from elementary school to college [1]. Online learning can allow students to be directly involved in a particular learning process [2].

Learning with an online system is an effort made by educators to take advantage of conditions during the pandemic era so that the learning process of students continues

to run well. One of the goals of online learning is to comply with government regulations to practice social distancing, namely to keep the distance between educators and students, stay away from activities in all crowds, and avoid gatherings involving many people. In distance learning, educators must be more creative and innovative in utilizing the online learning process. One of them is taking advantage of online teaching and learning conditions by developing learning media because no learning media can hinder the learning process [3].

Students' response to learning mathematics is still low, especially during online learning due to the Covid-19 pandemic, which impacts students' mathematics learning outcomes [4]. There are still students with mathematics learning outcomes below the specified Minimum Completeness Criteria (KKM). Mathematics teachers play an essential role in managing mathematics learning in the classroom, especially when teaching algebra material in 7th grade. Teachers can help students introduce abstract mathematics to be more concrete and easier to learn. The challenge for a teacher is to package learning to be more interesting and easily understood by students, namely by making updates in learning mathematics. Not only renewal in the learning model but also in the learning media used.

Learning media is a tool used by educators to deliver the subject matter to students and plays an important role in the world of education [5]. Learning media also contributes to improving the quality of learning [6]. One of the learning media used by educators must also bring students closer to the contexts they find in their daily lives, such as sports activities. Sports contexts can help students express their mathematical ideas because they can be more comfortable and confident [7]. The sports context that will be used is futsal, where the futsal context in learning mathematics will be the initial display in the mathematics learning process, especially on set material. Mathematics learning in the context of futsal is a learning activity through situations close to students so that it can accelerate the accommodation between incoming information (assimilation) and the knowledge that students already have [8].

The learning media used must be adapted to the needs of the learning process on the material being studied. The media used in this study were printed media in the form of student worksheets and audio-visual media. Using student worksheets in the teaching and learning process will open up opportunities for students to be active and creative in the learning process [9]. Student worksheets are printed teaching materials in the form of sheets of paper containing materials, summaries, and instructions for implementing learning tasks that must be done by students referring to the basic competencies that must be achieved [10]. While audio-visual media is one of the alternative media for optimizing the learning process because several aspects include being easy to package in the learning process, more interesting for learning, and can be edited at any time [11] This collaborative learning media will make learning activities more lively and increase the focus of students at each stage of the learning process, where the use of student worksheets as a media to guide students in building a concept of junior high school mathematics and audio visuals as a media of supporting the formation of student's perspectives in learning.

2 Method

This research is development research that uses a 4D model (Define, Design, Develop, and Disseminate). At the define stage, determine and define the requirements for developing mathematics learning media following the needs by analyzing the needs of learning media through interviews and observations of teachers and students. The design stage aims to design learning media following the content framework of the results of the previous definition stage. At this stage, choose the type of media, and media presentation format, make an initial design, and develop an assessment instrument from the media being developed. The next stage is development which aims to determine the validity and practicality of this learning media through expert validation tests and user trial tests. The dissemination stage aims to disseminate the results of the products that have been developed. In this study, only a limited number of the final results of the learning media were disseminated, namely to the 7th-grade mathematics teacher at a junior high school in Karawang Regency. The instruments used are observation sheets, validations, questionnaires, and interview guidelines. The percentage results from the questionnaire are categorized based on the assessment criteria in Table 1 [12].

Table 1. Assessment Criteria

Percentage (%)	Criteria
$P > 80\%$	Excellent
$60\% < P \leq 80\%$	Very Good
$40\% < P \leq 60\%$	Good
$20\% < P \leq 40\%$	Fair
$P \leq 20\%$	Poor

3 Results And Discussion

At the define stage, it was found that teachers experienced obstacles in learning mathematics, especially during distance or online learning as today. One of them is the low response of students in learning mathematics. The mathematics textbook based on curriculum 2013 from Kemendikbud is still the main teaching material in learning, and other books are still relevant to the material being taught. The teaching methods and materials used by the teacher are inappropriate for online learning. Students tend to be passive when teaching and learning activities take place and impact student learning outcomes, such as in algebraic form material. Teachers feel the need for learning media that can make learning set material into learning that is more attractive to students. To overcome these problems, it is necessary to innovate in learning mathematics, namely by using learning media with contexts close to students' daily lives. The context used is the futsal sport which many people currently like. Multimedia is the right learning media solution because of the combination of several media (writing, sound, images, animation, video, graphics, and others) [13]. The results of the observation sheet show that students also want innovation in mathematics learning so that learning media in the

futsal context is developed in the set material that collaborates with written media, images, and animated videos).

After doing the define stage, the next step is planning (design). The purpose of this stage is to design learning media. The results of this stage are expert validation questionnaires and user trial questionnaires for teachers and students to determine the practicality of learning media. Furthermore, the initial learning media design was designed as student worksheets with illustrations in the futsal context. Student worksheets and videos are made for five subs of the set material with basic competencies: 3.4 Explaining and stating sets, subsets, universal sets, empty sets, complement sets, and performing binary operations on sets using contextual problems. 4.4 Solve contextual problems related to sets, subsets, universal sets, empty sets, set complements, and binary operations on sets. At the development stage, expert validation was carried out to find expert opinions to improve the quality of the developed learning media. In the current situation during the pandemic, expert validation is implemented by sending learning media and media expert validator questionnaires via email and WhatsApp chat to validators. The results are in Table 2.

Table 2. Validators' Comments

Validator	Comment	Follow up
The first validator	The illustration video is not interesting. It is better to make animated characters like sports teachers, students, etc. The student worksheets are good, but some words are still misspelled. It is recommended that the student worksheets write down the learning objectives, which include learning objectives for knowledge and skills.	The illustration video is improved by changing the characters in the illustrations with animations, correcting typos, and writing down the learning objectives, including learning objectives for knowledge and skills.
The second validator	In the student worksheets, there should be a link to view the illustrated video provided. The video already shows illustrations related to the material being studied. However, the appearance of the video will be better if using animation, and at the beginning of the video, an introduction is given that explains the illustrations that will be given. Reduce cartoon images on student worksheets.	The illustration video has been improved by using animation and including a video link on the student worksheet and reducing the cartoon image on the student worksheets.

Based on a questionnaire from expert validation related to media, the overall percentage score was 93% with the "Excellent" criteria, and expert validation related to the material obtained an overall percentage score of 91% with the "Excellent" criteria. Simultaneously with the implementation of expert validation, the researcher conducted a trial with three students to find out the responses and difficulties students would face when reading or answering questions in the text. The responses and difficulties observed focused on the readability and clarity of the worksheets and videos as learning media developed. The results of the readability test questionnaire obtained an overall

percentage value of 93% with the "Excellent" criteria. The results of the revision are based on student comments in Table 3.

Table 3. Students' Comments

Student	Comments	Feedback
Subject 1	Learning to use the student worksheets and watching videos about futsal was very fun. It is not unusual for me to learn by using it. So, I can understand the material. Suggestion: it is good	Comments accepted
Subject 2	It is fun to learn using futsal video-watching shows. I am more interested in and understand learning like this. Suggestion: it is better if the student taking the penalty kick is not a real person but a cartoon.	Video fixed by using animation
Subject 3	It is a new learning experience. The impression is very good, so I understand and know there is a relationship between futsal and set material. Suggestion: the video is monotonous, not brightly colored, and there is no music. That is good to fix.	The video was improved by adding music and a bright color selection.

Based on Table 3, it can be seen that students assess that learning with this media is fun and makes it easier to understand the material being studied. Most students claimed to be happy if learning in class used learning media that made them happy to learn mathematics, and it was easy to understand the subjects explained [14].

- a. Student worksheets revision can be seen in Fig 1 and 2. The revisions made were reducing cartoon images, adding illustration video links, correcting typos, and writing down learning objectives that include knowledge and skills learning objectives.

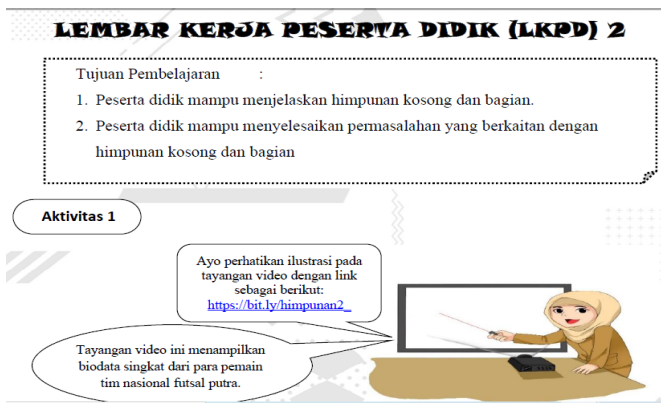


Fig. 1. Student worksheet before revision

LEMBAR KERJA PESERTA DIDIK (LKPD 2)

Materi : Himpunan
 Indikator : Peserta didik mampu menjelaskan himpunan kosong dan bagian.



Fig. 2. student worksheet after revision

- b. Video Revision can be seen in Fig 3 and Fig 4. The revisions made were improving the illustration video by using animation and introduction to start the illustration related to the material being studied.



Fig. 3. Video before revision



Fig. 4. Video after revision

In the next development stage, practical trials were carried out with 12 students whom the 7th grade mathematics teacher recommended. The 12 students are four students with high abilities, four students with moderate abilities, and four students with low abilities. The ability category is seen from the value of student report cards. This trial aims to see the practicality of the learning media developed with practicality indicators, namely easiness, attractiveness, and usefulness. The test results for students on the practical aspect show excellent criteria, which are presented in Table 4.

Table 4. Practicality test results

Indicator	Percentage	Criteria
Easiness	83%	Excellent
Attractiveness	87%	Excellent
Usefulness	81%	Excellent

Practicality is seen as the main quality because a development that is not stated to be practical will only last for a while, no matter how valid and reliable [15]. The response of students as test subjects stated that the use of the futsal context and learning media that started by watching videos and connected to the set material made it easier for them to understand the material being studied. With the use of various learning media, students get a positive response to a very positive response [16]. The futsal context used in mathematics learning has an effect on student interest and learning outcomes [17]. After every stage has been completed and the learning media is declared valid and practical to be used as a learning media, the next is the dissemination stage. At this stage, the researcher disseminates the final results of the limited development of learning media, which is only distributed in one of the Junior High Schools in Karawang, with the aim that the learning media that has been developed can be used as one of the learning media used in learning mathematics.

4 Conclusion

Based on the results of research and development that researchers have carried out, the research conclusions are the learning media for the set material with the futsal context for 7th-grade junior high school students is declared valid. Validity is obtained through expert validation related to media, materials, and readability tests from students. The media expert validation obtained an overall percentage value of 93% with the "excellent" criteria, the material expert validation obtained an overall percentage score of 91% with the "excellent" criteria, and the readability test obtained an overall percentage value of 92% with the "excellent" criteria. Learning media for set material with the futsal context for 7th grade junior high school students is declared practical. The practicality of the media is carried out through user trials, namely, limited students, with the "excellent" criteria.

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