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Development of Learning Media Using a Realistic Mathematical Approach to Social Arithmetic Material

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Abstract: ***This research aims to produce realistic mathematics learning media on social arithmetic material that has valid, practical, and effective qualifications. Researchers want to develop a learning media in the form of Microsoft PowerPoint which is presented to be as attractive as possible where teachers can take advantage of the gadgets owned by students so that they can be involved directly in their use, as well as adding the use of platforms that can support learning activities such as Quizizz. This research used the Research and Development (R&D). The procedure used is the ADDIE development procedure which consists of five stages, namely Analysis, Design, Development, Implementation, and Evaluation. For the implementation stage, researchers only tested the product on small groups (limited test) by looking at the responses from teachers and students' responses to the learning media that had been developed. This limited trial consisted of 1 subject teacher and 14 students of SMP Negeri 6 Tondano. The research instruments in this research were documentation, validation, questionnaires, and learning achievement tests. The result shows that validation based on expert validation results is good, lesson plan validation obtains 87.54% is categorized as strongly valid, media validation obtains 80.83% is categorized as strongly valid, validation of the learning outcomes test obtains 81.48% is categorized as strongly valid, questionnaire validation the teacher's response obtained a result of 84.44% and validation of the student response questionnaire obtained a result of 86.14% where both are categorized as strongly valid, while the validation of the observation sheet obtained a result of 84.76% is categorized as strongly valid. Practical based on the results of the teacher response questionnaire which obtained 80% and the student response questionnaire which obtained 86.14% and both are categorized as strongly practical. And effective based on the test scores of students' learning outcomes obtained results of 85.71% of the number of students who scored more than the KBM at SMP Negeri 6 Tondano namely 70, it can be interpreted that the learning outcomes of students with learning media using a realistic mathematical approach to arithmetic material effective social. As for the observation results of the implementation of learning is 91.11 in the very good category.***

Keywords: Development of learning media, realistic mathematics approach, quizizz

1. Preliminary

The COVID-19 pandemic has made us aware that the use of technology in education is very helpful as a learning medium that makes it easier for teachers to provide learning both online and offline learning which has been re-implemented in this new normal era. According to Khairunnisa, et al (2020) learning media has an important role for the education sector, especially in the field of mathematics studies because learning media is one of the educational innovations that can support the improvement of 4C skills, namely communication, collaboration, critical thinking and problems. solving (critical thinking and problem solving), as well as creativity and innovation (creativity and innovation). So with the development of the current era, teachers are required to be able to innovate in implementing learning media using existing technology. This is supported by the opinion of Hanum (2013) in Muthy and Pujiastuti (2020) that the existence of e-learning as a learning medium increases the enthusiasm of students and provides new experiences for students. One example of e-learning learning media or media that utilizes technology is Microsoft PowerPoint. Microsoft PowerPoint is a presentation program used to display information, generally in the form of a slideshow.This presentation program can be utilized in various fields, including education. According to Tarmoko, et al (2015) Microsoft PowerPoint can be used to assist in the learning process, namely as follows: (a) Explain something abstract so that it looks more real/real, (b) Make learning more interesting and more memorable so that it is remembered longer by students, (c) Create interactive learning by utilizing animation, video and audio, (d) Can help clarify concepts. In the learning process, the use of Microsoft PowerPoint has been implemented by almost all teachers. However, in the implementation of learning, teachers are still not able to maximize its use so that learning still seems monotonous and students become less enthusiastic and interested in participating in learning. As a result, students have difficulty understanding the material being taught, leading to low learning outcomes. Therefore, teacher creativity is needed in an effort to optimize the use of Microsoft PowerPoint. One of the efforts to optimize the use of Microsoft PowerPoint is to develop it. For example, the teacher can make the material presented as interesting as possible where by utilizing the gadgets that students have, they can be directly involved in their use. Teachers can also add the use of platforms that can support learning activities such as Quizizz. Quizizz is a simple tool that is easy to use and innovative, which will challenge students to work hard because there is a score of speed and accuracy. In addition, students will be competitive because Quizizz will provide a live ranking between participants each time they solve a problem.Besides being easy to access from elementary school to tertiary institutions, Quizizz is very beneficial to educators when carrying out evaluations because there is no place limit, the appearance is attractive and there is a time

setting that can be adjusted to the needs of students in solving questions. Easy use and fast results in the assessment process make this application suitable for use as a learning application that supports the 4.0 learning revolution, so that students have a strong interest and motivation to learn (Mulyati&Evendi, 2020). Based on the results of research conducted by Latif (2022) it shows that the use of Quizizz-assisted e-learning can improve student learning outcomes. However, the use of learning media will not be meaningful if it is not supported by the application of the right learning approach. In order to make it easier for students to understand the material easily, especially in learning Mathematics, a learning approach related to everyday life is needed. Context-oriented approaches such as Indonesian Realistic Mathematics Education (PMRI) can be an alternative solution (Mangelep, 2018a in Domu et al., 2022). Realistic (PMR) or known as Realistic Mathematics Education (RME). The PMR approach is an approach used to connect mathematical concepts to problems that are contextual with students' daily lives (Afriansyah, 2013 in Asdar, et al, 2021: 3).The realistic mathematics approach is meaningful learning, which relates mathematical material to the daily life of students who are realistic (Ransulangi, 2022). Munadi (2013) in Domu&Mangelep (2019) states that one of the benefits of using a contextual/realistic learning approach is to increase learning motivation. In realistic mathematics learning real problems are used as the beginning of learning which are then used by students in developing mathematical models. The real world is defined as everything that is outside of mathematics, such as everyday life, the surrounding environment, can be considered as the real world. The real world is used as a starting point for learning mathematics. From the results of Domu&Mangelep's research (2020) it shows that the use of the PMRI approach provides a role in learning arithmetic sequences and increases learning motivation, makes students enthusiastic and pays attention to learning activities. Putra (2021) has also conducted research in which the learning outcomes of students using a realistic mathematics learning approach are higher than the learning outcomes of students participating in conventional learning. One of the mathematics learning materials that must be mastered by class VII students is social arithmetic. In everyday life, everyone must have used the concept of social arithmetic both consciously and unconsciously.Even so, there are not a few students who do not really understand social arithmetic learning. An example that occurred at SMP Negeri 6 Tondano. Based on interviews with math teachers, it turns out that there are not a few students who have not been able to solve questions in the form of social arithmetic. Researchers also found that when learning mathematics took place, students preferred playing gadgets rather than paying attention to the teacher who was teaching in class. One of the contributing factors is learning activities that have not involved students optimally, thus making students less interested in learning activities.

2. Research Procedure

The focus of the research is the development of mathematics learning products which consist of Learning Implementation Plans (RPP), Student Worksheets (LKS), and Learning Outcomes Tests (THB) to teach Data Concentration Measures material to class XII SMK students.

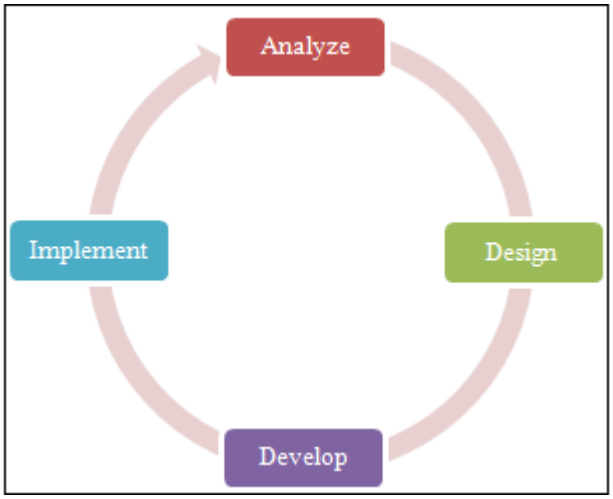

Figure 1: ADDIE development model stage (Branch, 2009)

The development of learning tools is based on the Flipped Classroom Type Blended Learning model. This type of research is development research using the ADDIE model (Branch, 2009) which includes 5 stages, namely Analyze, Design, Develop, Implement, and Evaluate. Each stage of activity in the development model consists of several sub-activities that are cyclical in nature. The number of cycles carried out depends on the achievement of the decision criteria (Nieveen, 1999) at each stage, with the direction of development shown in **Figure-1**.Validity data was obtained through the assessment of experts and practitioners of mathematics education. The assessment is carried out in cycles on the learning devices that are being developed. Field trials were carried out at SMK Negeri 1 Tondano to obtain data on the practicality and effectiveness of learning tools. Practical data obtained from observations on the skills of teachers in carrying out learning using learning tools that are being developed. Effectiveness data was obtained through student learning outcomes tests, observations of student activities and questionnaires on student responses to learning and its devices.

3. Results and Discussion

Analysis Results: Needs analysis was carried out by first observing at SMP Negeri 6 Tondano. The results of observations made by researchers in class VII, the use of learning media in the learning process is still minimal and less interesting for students' curiosity. In learning activities, students are more likely to play cellphones than pay attention to the teacher who is teaching. The results of this analysis are the reference in the development of learning media using a realistic mathematical approach to this social arithmetic material. Curriculum analysis is carried out by taking into account the characteristics of the curriculum being used in a school. The curriculum used at Tondano 6 Public Middle School is the Independent Curriculum which in learning is more relevant and interactive and can be adapted to the learning needs and interests of students (https://ditsmp.kemdikbud.go.id). Therefore, researchers are interested in developing this learning media. Analysis of Student Characteristics was carried out to see the attitudes of

students in participating in learning. This is done so that the development carried out is in accordance with the characteristics of students.

Design Results: At this stage the researcher designed PowerPoint learning media connected to the Quizizz hyperlink and collected materials to be used to make learning media. The following shows the appearance of each page of learning media:

a) The design for the display of the home page. This page is the initial display that appears when the learning media is opened. This page contains the title of the learning media, start button, background and exit.
b) Main page display design. This page contains menu options in the form of media info, media instructions, developer profiles, basic competencies, indicators, learning objectives, materials, learning outcomes tests and exits which have been hyperlinked.
c) This page has a background, home and exit buttons that have been hyperlinked.
d) Design of basic competency page displays, learning indicators and learning objectives. This page has a background, home button, exit, back, next which has been hyperlinked.
e) Design the appearance of the page of the material to be studied. In each meeting there is a sub menu for the material for each meeting, material conclusions and realistic problems that students can work on in the media and on Quizizz. This page has a background, home button, exit, back, next which has been hyperlinked.
f) The design of the display of the learning outcomes test page. On this page students will be directed to work on questions on Quizizz. This page has a background, home and exit buttons that have been hyperlinked.

Results of the Development Stage: (a) Creating Social Arithmetic Learning Media. At this stage the researcher made learning media based on designs that had been made using Microsoft PowerPoint as well as additional application assistance to make the media an application that students could use via their respective cell phones. The following is the display of the learning media page: (1) Display of the home page. This page is the initial display that appears when the learning media is opened. This page contains the title, start button, background and exit.

Figure 3.1: Start Page Display

(2). Main page layout design. This page contains menu options in the form of media info, media instructions, developer profiles, basic competencies, indicators, learning objectives, materials, learning outcomes tests and exits which have been hyperlinked.

Figure 3.2: Home Page Display

(3) Display of media info pages, media instructions and developer profiles. This page has a background, home and exit buttons that have been hyperlinked.

Figure 3.3: View Media Info Page

Figure 3.4: Display the Media Guide Page

Figure 3.5: Developer Profile Page Display

(4) Display of basic competency pages, learning indicators and learning objectives. This page has a background, home button, exit, back, next which has been hyperlinked.

Figure 3.6: Basic Competency Page Display

Figure 3.7: Learning Indicator Page Display

Figure 3.8: Learning Objectives Page Display

(5) Display of the material page to be studied. In each meeting there is a sub menu for the material for each meeting, material conclusions and realistic problems that students can work on in the media and on Quizizz. This page has a background, home button, exit, back, next which has been hyperlinked.

Gambar 3.9: Tampilan Halaman Materi Pembelajaranbagian 1

Gambar 3.10: Tampilan Halaman Materi Pembelajaranbagian 2

Figure 3.11: Display of Learning Material Pages section 3

Figure 3.12: Display of Meeting 1 Learning Material Pages

Figure 3.13: Display of the Work on One of the Problems in Learning Media

Figure 3.14: Display of Problem Working Pages in Quizizz Meeting 1

Figure 3.15: Display of Material and Problem Pages in Quizizz Meeting 2

Figure 3.16: Display of Material and Problem Pages in Quizizz Meeting 3

Figure 3.17: Display of Meeting Material Conclusion Page 3

(6) The design of the learning achievement test page display. On this page students will be directed to work on questions on Quizizz. This page has a background, home and exit buttons that have been hyperlinked.

Figure 3.18: Display of the Learning Outcomes Test Page

Validation Results: Validation sheets made by researchers were given to three validators to validate or test the feasibility of learning media, lesson plans, learning achievement tests, teacher response questionnaires, student response questionnaires and observation sheets. Validator names can be seen in the following table:

Table 3.1: Validator Names

Nama	Pekerjaan/Jabatan
Ichdar Domu	Dosen Pend. Matematika PPs UNIMA
Victor R. Sulangi	Dosen Pend. Matematika PPs UNIMA
Jenny Corneles	Guru Matematika SMP Negeri 6 Tondano

Implementation Results: At this stage, all media designs are implemented after validation. The PowerPoint learning media linked to the Quizizz hyperlink uses a mathematics education approach that has been developed and implemented in real situations, namely in the classroom. However, at this stage, the researcher only got to try out the product on a small group (limited test) by looking at the response from the teacher and the response from the students towards the learning media that had been developed. This limited trial consisted of 1 subject teacher and 14 students of SMP Negeri 6 Tondano. Students are asked to bring their cell phones to support product trials and this learning requires a tool, namely a projector. Before carrying out the trial, students were given instructions regarding the use of instructional media. During the limited trial implementation, the researcher explained what was contained in the learning media. At the trial stage the teacher and students were given a questionnaire. This questionnaire aims to see the level of practicality and the response of teachers and students to the developed learning media.

Evaluation Results: At this stage the researcher analyzes the validation data and research instrument data. The researcher also gave a learning achievement test to 14 students in class VIIA of SMP Negeri 6 Tondano to see the level of effectiveness of learning media.

4. Conclusions and Suggestions

Based on the results of research on the development of instructional media using a realistic mathematical approach to social arithmetic material at SMP Negeri 6 Tondano and the research objectives and the research process for developing learning tools using the ADDIE model, the following results are obtained: (a) Valid based on expert validation results, good lesson plan validation obtained 87.54% in the very valid category, media validation which obtained 80.83% in the very valid category, validation of the learning achievement test which obtained 81.48% in the very valid category, validation of the teacher's response questionnaire obtained 84.44% results and validation the student response questionnaire obtained 86.14% results where both were in the very valid category while the validation of the observation sheet obtained 84.76% results in the very valid category. (b) Practical based on the results of the teacher response questionnaire which obtained 80% and the student response questionnaire which obtained 86.14% and both were in the very practical category. (c) Effectively based on the test scores of students' learning outcomes obtaining results of 85.71% of the number of students who scored more than the KBM at SMP Negeri 6 Tondano namely 70, it can be concluded that the learning outcomes of students with learning media using a realistic mathematical approach in social arithmetic material runs effectively. As for the observation results of the implementation of learning is 91.11 in the very good category.

Based on the conclusions and discussion of the research results, the researcher provides several suggestions related to the development of learning media using a realistic mathematical approach to social arithmetic material, namely as follows: (a) For teachers, it is hoped that this research can be used as input for mathematics teachers so that they utilize learning media and approaches that fun so that students do not feel bored. (b) For students, it is hoped that they can use this learning media seriously so that they can get used to actively participating in the mathematics learning process and can increase students' learning motivation and help students to learn mathematics more easily. (c) For schools, as input so that they can foster more collaboration with teachers and provide adequate facilities and infrastructure to support the implementation of learning, so that teacher problems in the classroom can be solved together. (d) For future researchers, it is hoped that learning media with a realistic mathematical approach need to be developed in other materials.

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