

DEVELOPMENT OF LEARNING MEDIA MATH SETS GAME BASED ON CONSTRUCT 2 WITH SCIENTIFIC APPROACH

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ABSTRACT

The purpose of this study is to find out the quality of Math Sets Game learning media that have been developed from the perspective of validity, practicality, and effectiveness in mathematics subjects. This research is a type of Research and Development research with the ADDIE model (Analysis, Design, Development, Application, and Evaluation). Students of class X SMK Negeri 6 Makassar are the subject of trials in this study. The instruments used are validation sheets, observation sheets, response questionnaires, and learning results tests. The results showed the resulting learning media was valid, practical, and effective, with the average validity of Math Sets Game learning media and research instruments being in the highest proper category with a score of 4.3. Practically, with an average percentage of learners' response questionnaires 86.8% and teacher response questionnaires are 84%. Effectively, the average rate of learners' learning completion is 89%.

Keywords: Math Sets Game, Construct 2, Scientific Approach, Learning Media

1) INTRODUCTION

Along with the development of science and technology, teachers, as a significant component in education, are required to compensate beyond the development of science and technology in society. Teachers must create a compelling and innovative learning process, including learning media that is carried out as effectively as possible in a fun and vibrant and meaningful atmosphere. (Ramadhani et al., 2016: 34).

Indonesia is currently one of the countries affected by the Covid-19 pandemic that occurred almost all over the world. Since Covid-19 was declared a global pandemic by WHO, President Jokowi has urged people to remain calm, and it is time for people to work from home, learn from home, and worship from home. The Minister of Education and Culture coordinates learning through online or online systems by getting free help from teacher rooms, Zenius, Google, Microsoft, Quipper, Your School, and Smart Classrooms. President Jokowi believes the online system will reduce the mobility of students, students and reduce the spread of Covid-19. (Pakpahan & Fitriani, 2020: 31). In other words, today's education system is highly demanded to create creative and innovative learning by utilizing technology.

Permendiknas No. 22 of 2006 states that Mathematics is a universal science that underlies the development of modern technology has a vital role in various disciplines and advances human thinking. The rapid growth in information and communication technology today is based on the development of mathematics in number theory, algebra, analysis, opportunity theory, and discrete mathematics. To master and create the technology of the future requires a vital mastery of mathematics early on (Depdiknas, 2008: 5). A math lesson is a lesson that deals with many concepts. Concepts are abstract ideas by which we can group objects into examples or not examples. Concepts in mathematics are related to each other (Novitasari, 2016: 8). Learning mathematics during the current pandemic is very difficult for learners and educators. This is because learning does not take place optimally. Learning mathematics online makes learners lazy to learn because learners do not understand what educators teach. Especially math learning, which is considered a difficult lesson. Mathematics is a vital and valuable lesson both in the school and community.

Researchers developed a technology in the form of learning media that can be a tool to create innovative and creative learning during a pandemic. Learning media, when used appropriately, can help overcome the weaknesses and shortcomings of teachers in education, both material mastery and learning methodology (Ramli, 2012: 2). Learning media can be interpreted as a deliberately designed procedure to help learners learn better to achieve learning goals more effectively (Pegawai, 2017: 2). The position of the media in learning is significant. Because the media can support the success of education. Even if studied further, the media is not only a distributor of messages that must be controlled entirely by the source of people but can also replace some of the teacher's duties in presenting the subject matter (Nurdyansyah, 2019: 54). Media has a vital role in classroom learning, which affects the quality and success of education (McKenzie, 2005: 45).

One electronic learning medium that can support the process of learning mathematics and follow mathematical learning is Scirra Construct 2. Scirra Construct 2 is a games engine used to create HTML 5-based games and make them into several platforms. Using Scirra Construct 2, the fun we have created can also be built on platforms such as Web Browser, Desktop, and Mobile (Rukmana, 2014: 1). Construct 2 is different from other tools requiring programmers to write line by line to create an object. Construct two is already object-based, so it is elementary to develop and set its attributes. Construct two also has features that are easy to use and understand by novice programmers (Apriyanto & Lasodi, 2016: 67). From the explanation above, it can be concluded that Construct 2 is very suitable for newbies because Construct 2 does not use a programming language. Construct two is ideal as a supporting application for learning media. In addition to making games, Construct two is also suitable for quiz creation.

Researchers conducted observations to obtain preliminary data related to mathematical learning media used before and during pandemics. Based on the statements made at SMK Negeri 6 Makassar, the mathematical learning process before the pandemic conducted by teachers, Yuyu Musdalifa A, S.Pd., has not developed learning media using specific learning methods thoroughly, including technology-based learning media with scientific approaches. But since it is required to learn from home caused by Covid-19, teachers began to use technology-based learning media. The learning media used are Whatsapp Group and Google Classroom. Based on the survey results, the learning media used is dominated by Whatsapp Group with 52.5%. All 40 learners stated that online learning is considered less effective.

From the observation of the initial data, researchers can conclude that online learning is considered less effective due to one of the media limitations. Researchers argue that media is needed to generate motivation and fun for learners for learning to be effective. In line with Nurdiansyah & Amalia (2015: 5) that learning should be done in an inspiring, interactive,

challenging, motivating, and fun for learners so that they can play an active role, as well as provide enough space for learners.

The scientific approach is learning about the experience (Lang, 2016: 6). Fendos (2017: 1) reinforced Lang's opinion that the scientific approach is learning by conducting experiments. The scientific method is intended to provide learners with the knowledge and understanding of various materials using scientific processes. Information can come from anywhere, anytime, not depending on the information in the direction of the teacher. (Nurdyansyah & Fahyuni, 2016: 5).

Based on previous research conducted by Anisah et al. (2018: 12) entitled "Development of Android-Based Learning Media on Social Arithmetic Materials Using Construct 2 Assisted Scientific Approach in Class VII of State Junior High School 137 Jakarta" shows that the resulting learning media can overcome the difficulties of learners in social arithmetic material. Thus, the researcher intends to conduct application development research for vocational learners, especially SMK Negeri 6 Makassar.

Researchers will develop fun learning media by using appropriate learning to increase learners' interest in math lessons and creativity. In line with the phrase Setyono et al. (2016: 1) that to support the ability of learners in learning mathematics, learners are taught using a variety of teaching resources and media that can increase the capacity of learners in being active, logical thinking, creative and systematic. Based on this background, researchers researched the development of math sets game learning media based on Construct 2 with a scientific approach.

2) METHODS

This type of research is research and development. Research and development are used to produce a particular product and test its effectiveness. To create a specific product, research is used that is a needs analysis and test the product's efficacy (Sugiyono, 2017: 297). The development model selected in this research is the ADDIE development model consisting of 5 stages (Analysis, Design, Development, Implementation, and Evaluation) developed by Dick and Carry. The product produced in this research is a learning medium in a Math Sets Game application based on Construct 2.

The subject of the product trial or the target of media users is a student of class X Accounting SMK Negeri 6 Makassar. The data collection techniques used in this study used questionnaires, study outcome tests, and observations. The instruments used in this study, namely validation sheets, observation sheets, teacher response questionnaires, student response questionnaires, and learning outcome tests. There are three types of data analysis used in this study: data analysis of validity, practicality data, and analysis of effectiveness data.

3) RESULTS

Math Sets game based on Construct 2 learning media development using the ADDIE development model. This research aims to produce a Math Sets Game learning medium based on Construct 2 by meeting valid, practical, and effective criteria.

This stage of analysis is the initial activity before development. This stage is done to identify the problems faced by teachers and learners in the teaching and learning process.

At this stage, the research analyzes the problems faced by teachers and learners. This analysis is done in two ways, namely observation and interview. Based on the results of words, the learning resources used by learners are only in the form of math package books curriculum 2013 revision and learning media used in the form of google classroom, google meet, and zoom. Based on the results of an interview with one of the subject teachers, Yuyu Musdalifah A, S.Pd., stated that learners' interest in learning math subjects is very lacking because learners assume that math subjects are complex. Currently, learners are more interested in playing than learning to especially play games on mobile phones (mobile phones) and computers. As for the results of

interviews with some learners, they stated that during the teaching and learning process, teachers were impressed to provide monotonous learning materials in the form of learning videos and soft files. So that learners have difficulty understanding the material and working on different problems with the examples given.

The design stage is the stage researchers start designing learning media. The process of learning media design requires a concept of images to be used as a benchmark in creating teaching media. The concept of the picture is poured into a flowchart and storyboard. In addition, at this stage, researchers also make instruments used in this study.

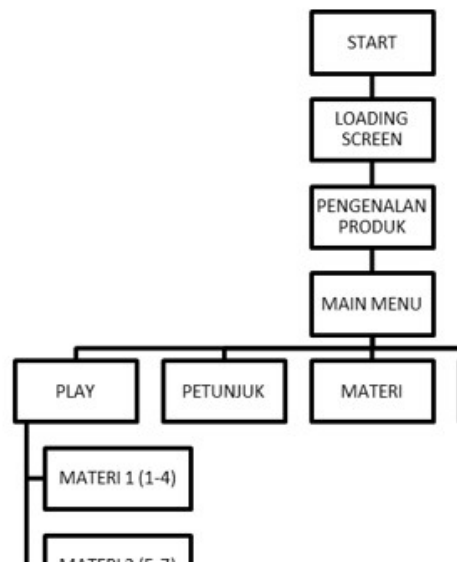


Figure 1. Flowchart

Next is the development stage; at this stage, the researcher develops a learning media that has been designed before at the design stage. Learning media created in teaching media Math Sets Game based on Construct 2. A team of experts then validates the product produced after the development process.

After making revisions based on validator criticisms and suggestions, the revised results are then shown to the validator team to be assessed and re-examined. After that, a validation value obtained against the math sets game learning media and the instrument to be used concluded that the average validator assessment is in the category of very valid with a value of 4.33. Thus, it can be said that the learning medium Math Sets Game and research instruments are worth testing.

After passing the development stage, then proceed to the implementation stage. The application of learning media is intended to determine the effectiveness and practicality of the developed media. The point of learning media can be seen from the test of learning results. The learning results of learners showed a percentage of learners' completion of 89%. The practicality of learning media can be seen from the portion of the analysis of learners' responses, teacher responses, and the implementation of teaching media. The results of the student response by 87% and the teacher's response by 92% proved that the learning media developed met the criteria of practicality. The analysis of learning media implementation uses shows that each component is fully implemented.

The final stage is evaluation. At the evaluation stage, not much is done because the learning media based on trial analysis has shown positive results based on various assessment forms.

4. DISCUSSION

The design of game-shaped learning media using the Construct 2 application can be utilized by teachers to attract learners in the learning process. The beginning of making this learning media is to determine the components used in the game-shaped learning media. The selected features are the initial appearance of the game, menu display, material display, the appearance of questions on each level, animations, and music that will be used as a background of the game-shaped learning media to be created.

In making this learning media is adapted to the design in the storyboard that has been made at the design stage. Learning media is created using Construct 2 software. After the creation process, the export file becomes a .apk extension. This is done to facilitate the process of guidance and research.

After creating a learning media is completed and approved by the supervisor, the validator team carries out the validation stage. According to Muhtasyam (2018: 29), developed media needs to be validated by media experts and material experts to ensure that the media produced is content quality and purpose, instructive quality, and technical quality. In addition, this validation instrument is also used to measure the feasibility of learning media development. The validator team will provide assessments and suggestions before learning media and tools are used at the implementation stage. The results of validation by the validator team showed that the material, media, teacher response questionnaire, student response questionnaire, learning implementation plan (RPP), observation of student activity, observation of teacher's ability to manage to learn, and learning outcome test (THB) as a whole when viewed from the average value had an assessment of $4.3 \leq V_a < 5$ with a perfect category.

After the learning media and research instruments are declared valid at the validation stage by the validator team, the trial phase is carried out into the field. But at this stage of the trial can not be implemented perfectly. This is due to conditions that do not allow for implementing a thorough learning process in the classroom due to the Covid-19 pandemic. Therefore, researchers conducted a trial with one of the subject teachers conducted directly at the school, and 60 learners worked online and offline.

The trial was conducted as many as two meetings where; at meeting one, the learning process was carried out using Math Sets Game learning media through WhatsApp media for learners who conducted online learning and face-to-face learning process using Math Sets Game learning media. And at the 2nd meeting, the study results test (THB) was given to students. The study results test (THB) is shown as many as seven description questions. Learners carry out the learning results test (THB) for 40 minutes. After the learning results test (THB) is completed by learners, then the provision of questionnaires to learners is carried out. The teacher response questionnaire has been given before at the time of the validation stage.

According to Miftahuddin (2019: 27), the angle is a benchmark for the practicality of a learning medium. The usefulness of learning media is ease felt by teachers and learners when using math sets game teaching media. The suitability of learning media can be seen from the analysis results of teacher response questionnaires and student response questionnaires. Based on the teacher response analysis results, the teacher gave a very positive response to using math sets game learning media in the learning process. The results of the analysis of learners' answers can be seen that learners also respond positively to the use of Math Sets Game learning media in the learning process. Based on the results of the analysis of teacher response and student response, the learning media Math Sets Game developed has met the criteria of practicality.

The use of Math Sets Game learning media also attracts learners in learning that can be seen based on learners' enthusiasm in the learning process by using this learning media. So it can be said that this learning media motivates learners in learning mathematics. This is in line with the opinion of Siregar (2007: 159). Learning media as everything that can channel the message can stimulate learners' minds, feelings, and willingness to create a learning process in learners.

In addition, to test the effectiveness of a product, according to Rizkiyanto et al. (2018: 716), tests are conducted to find out the efficacy of products developed to be used in learning. Based on the analysis of learning outcome tests (THB) for class X Accounting SMKN 6, Makassar obtained a high percentage of learners' learning completion. Therefore, based on the results of the analysis of learning outcome tests (THB), the math sets game learning media developed has met the effectiveness criteria.

Math Sets game learning media makes it easier for learners to understand the material in the learning process that can also be seen based on the results of high learning completion. This is in line with the opinion of Aslamiyah et al. (2017: 45). The use of media in learning can also generate learning motivation and facilitate learners in understanding what they learn to achieve the expected learning outcomes.

According to Nienke Nieveen (dalam Rizal & Hernawati, 2017: 2), A good math education game is an educational game that meets valid, practical, and effective criteria. Good math education games are math education games that have quality material by the science studied and the components in educational games consistently with each other. Math education games are said to be practical if valid and can be used by teachers and learners easily by the purposes and objectives of the developer. Effective math education games provide influence and results according to the desired goal.

The last stage of developing math sets game learning media is the evaluation stage. At this stage, improvements were made based on the advice obtained at the implementation stage, but there was no significant change to the learning medium math sets game developed.

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