Development of Android-Based Mathematics Learning Media

at SMP Negeri 4 Padangsidimpuan

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Abstract

The purpose of this research is to develop learning media tools that use Android cellphones with Construct 2 software on the sequence and series material for class VII students at the junior high school level. This research uses a research development model that uses the ADDIE type development model, namely: (1) analysis, whether analyzing needs, analyzing participant characteristics, or analyzing the learning curriculum, (2) design, namely display design on the learning media prepared, (3) development, namely, developing mathematics learning media products with Construct 2 software, (4) implementation, namely implementing the use of learning media products in the field (5) evaluation, namely: in the form of assessment questionnaires from users of learning media products and questionnaires from the product development design expert team. Based on the questionnaire assessment that has been distributed by media product users and product developers, it was concluded that users of junior high school level mathematics learning media products using Construct 2 software based on Android cellphones obtained a percentage score of 77.3%, and from the development design expert team, the product is 73% so it can be categorized as good and meets valid qualifications. Therefore, the media developed in this research is considered suitable for use as a mathematics learning medium.

Keywords: *Mathematics Learning Media; Development of Mathematics Learning Media; Android-Based Learning; Software Construct 2.*

Abstrak

Tujuan dilakukan penelitian ini adalah demi mengembangkan alat bantu media pembelajaran yang menggunakan *handpone android* dengan perangkat lunak *Construct 2* pada materi barisan dan deret untuk siswa kelas VII di tingkat SMP. Pada penelitian ini memakai sebuah model pengembangan penelitian yang menggunakan model pengembangan tipe ADDIE yakni: (1) *analysis* (analisis), baik menganalisis pada kebutuhan, menganalisis karakteristik peserta, maupun menganalisis kurikulum pembelajaran, (2) *design* (perancangan), yakni rancangan tampilan pada media pembelajaran yang disiapkan, (3) *development* (pengembangan), yakni, pengembangan produk media pembelajaran matematika dengan *software Construct 2,* (4) *implementation* (implementasi), yakni mengimplementasikan penggunaan produk media pembelajaran di lapangan (5) *evaluation* (evaluasi), yakni: berupa

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angket penilaian dari para pengguna produk media pembelajaran dan angket dari tim ahli desain pengembang produk. Berdasarkan penilaian angket yang sudah disebar oleh para pengguna produk media dan pengembang produk, diperoleh kesimpulan bahwa pada para pengguna produk media pembelajaran matematika tingkat SMP menggunakan perangkat lunak *Construct 2* berbasis *handphone android* memperoleh nilai persentase sebesar 77,3%, dan dari tim ahli desain pengembangan produk 73% sehingga dapat dikategorikan baik dan sudah memenuhi kualifikasi valid. Oleh karena itu, media yang dikembangkan pada penelitian ini dianggap layak dan baik untuk digunakan sebagai media pembelajaran matematika.

Kata Kunci: Media Pembelajaran Matematika; Pengembangan Media Pembelajaran Matematika, Pembelajaran Berbasis Android; *Software Construct 2.*

INTRODUCTION

The quality of human resources can be developed only with education. The development of human potential is expected to be focused and evenly distributed across all children of the Indonesian nation with optimal support from various parties. So it is necessary to develop learning media to develop optimal education as well. By developing learning media, it is believed that there will be positive changes at all levels of the educational unit. It is hoped that these positive changes in education will be able to support the development of student's potential so that students can overcome difficulties and solve the problems they face. Thus, to obtain students who have the best quality, it is deemed necessary to make educational preparations that support each student to grow their potential and support students' ability to develop unlimited knowledge while still adhering to the rules that apply at a particular level of education. It is known that the most basic education is mathematics because mathematics is the most basic education that students must have. Mathematics education has been taught since students were in kindergarten through high school and even to college. Therefore, mathematics is ranked at the top as a science that must be possessed and studied by students.

Mathematics is one of the compulsory subjects at all levels of education. According to Syafri (2016:9) "Mathematics is an organized structural knowledge, the properties in theories are created deductively based on undefined elements, axioms, properties or theories whose truth has been proven are the science of

regularity of patterns or ideas, and Mathematics is an art, its beauty lies in its order and harmony." In line with the opinion of Hasratuddin (2015:27), "Mathematics is a target or way to find answers to problems faced by humans; a way of using information, using knowledge about shapes and sizes, using knowledge about counting, and most importantly thinking within humans themselves to see and use relationships."

Currently, it is still often found that mathematics is taught using only formulas and steps to solve problems. However, it is known that this makes students lazy and lacks motivation and even makes mathematics a boring and scary subject. This fact is what makes innovation in mathematics learning necessary. So that this innovation in mathematics learning makes students feel comfortable, fun, and challenged in mathematics lessons. It is permissible to innovate in techniques And strategies used in the mathematics teaching and learning process.

It cannot be denied that the teacher is the main figure in the learning process, holding the main control over educational development. Like it or not, teachers must have great innovation in improving the quality of learning. The quality of learning can be improved by improving strategies, methods, and learning model designs. Trianto (2011:8) one of the interesting innovations, that can properly develop and explore students' knowledge concretely and independently, is the innovative-progressive learning model. Therefore, a teacher must understand the characteristics of the material, students, and learning methodology, especially those related to modern learning models. Isrok'atun and Rosmala's (2018:27) learning model can create learning activities that feel focused _ until the final evaluation stage which can then obtain the achievements of learning and learning activities. So, teachers must understand the learning model so that it runs effectively and efficiently. Amalia and Safitri (2022) emphasized that it is desirable to apply an effective learning model, that can stimulate learning activities and increase the competency of students' learning outcomes in learning mathematics.

It is undeniable that the progress of the times encourages all individuals to move along with it. Because, if we do not participate in the progress of this era, we will certainly be eroded by the times. The sophistication of technology and information is widespread in various fields, one of which is in the field of telecommunications, namely with the existence of cellular telephones in the form of smartphones. Smartphones are a communication medium that is difficult to separate from society, especially teenagers and even small children. Through the researcher's analysis and interviews with one of the mathematics teachers at SMP NEGERI 4 Padangsidimpuan, information was obtained that students often bring smartphones to school. Because this smartphone is often considered that it cannot help the mathematics learning process, students are not allowed to use it during learning. There should be Android-based learning media using smartphones. Therefore, the ordinary learning that has been carried out so far makes students less interested and unmotivated, as a result, children's interest in learning tends to be low. Information was also obtained that the teaching method used by teachers when learning mathematics is using conventional learning methods according to the media available at school. For materials The teaching materials used are textbooks and student worksheets (LKPD). It was found that students' mathematics scores were still low, below the school's KKM.

It is also known that most students tend to like playing around and have little interest in what the teacher explains, especially when the teaching material is difficult and makes them bored. Explanations by teachers in class and the complicated contents of teaching textbooks make students not understand the teaching materials that have been explained. As a result, the child becomes lazy about reading and looking for other sources of information. Because of this, researchers think a design is needed innovative learning to create It's easy for children to learn and it's not boring to find a solution to a problem, which can be opened and read anytime and anywhere. One is teaching media that uses smartphones, namely Android, appropriate The thing explained by Komariah, et al (2018) is that media in learning mathematics has a concept that makes learning activities easier, especially in mathematics calculation lessons which maximizes

progress in the field of technology, namely Android-based smartphones by making learning media an application that can be accessed anywhere by simply using android smartphones. Such learning media is called interactive media. Interactive media is needed in today's digital era to make it easier for teachers to teach and for students to be able to absorb content easily and happily, or play while learning and learn while playing (Lubis, Eva Monika Safitri, et al. 2023: 24).

By the background of the problem above, researchers want to conduct research by developing learning methods using Android-based learning media to improve students' results and interest in learning mathematics. Learning using Android is considered more flexible, efficient effective too happy and suitable for current advances in science, technology, and communication. So, a type of research was created entitled Development of Android-based mathematics learning media at SMP NEGERI 4 Padangsidimpuan.

RESEARCH METHODS

This development research, which was carried out in the odd semester of the 2022/2023 academic year, took place at SMP NEGERI 4 Padangsidimpuan. The method used is the development research method, namely the ADDIE (Analysis; Design; Development; Implementation; and Evaluation) learning tool development model. The ADDIE design learning development model was refined again by Reiser and Mollenda in the 1990s. Mulyatiningsih (2016) states that the ADDIE model can be used in various types of product updating models in teaching and learning activities, namely learning methods, learning strategies, learning models, media, and learning materials. Development The learning activity model is believed to be effective and right on target so that it can help teachers.

The data collection technique used was initial observation and interviews with mathematics subject teachers. Meanwhile, data collection uses interview guidelines with teachers, then data from student report cards and observations of the use of intermediary tools study materials. In analyzing the data, the techniques

used are: This is qualitative descriptive statistics. Qualitative descriptive statistics are used in analyzing data with action descriptions of the data collected. At this time, there is no intention to draw conclusions or make comprehensive generalizations (Sudjiono, 20 13:145).

RESULTS AND DISCUSSION

Developing learning media is guaranteed to be appropriate to the stages of Research and Development research policy in the ADDIE model includes stages: 1) Analysis (Analysis); 2) Design (Design); 3) Development (Development); 4) Implementation; _ and 5) Evaluation which is transformed by research. Five steps on current ADDIE Developing this learning media was carried out logically and coherently. Below is a systematic explanation of the development of children's learning media when learning to calculate appropriate mathematics, right? according to the ADDIE model.

1. **The First Research**

    The beginning To develop this children's learning media, the researcher first conducted preliminary research at the junior high school level using interviews and direct observation of students and mathematics teachers at SMP NEGERI 4 Padangsidimpuan. The research carried out aims to obtain appropriate and appropriate results for the needs of this research. By paying attention to interviews between mathematics teachers and researchers, teachers have the answer that when choosing learning methods they often still use conventional (ordinary) learning, namely lectures, discussions, and exercises using books and blackboards.

    In the introduction to this research, the fact was found that using learning media in the learning and teaching process was trusted need more time, good at times prepare or prepare for the teaching and learning process. _ _ Meanwhile, the method used by Today's teachers is expected to be easy in learning application and it doesn't require it _ _ to whom it is difficult. Even with basic methods, it is very easy to use and suitable for use in the classroom for learning mathematics.

2. **Needs Analysis**

Based on the results of interviews with several students, it is known that students admit that they feel bored when learning is carried out by the teacher using normal learning. Many teachers who are still teaching do not use teaching aids or materials that they think are easy to apply and do not require complicated preparation. However, in general, many students still lack concentration when studying with the learning methods used. Therefore, a medium is needed to support students' learning activities so that there is no boredom or lack of concentration when learning is carried out, especially mathematics so that students' creativity can be stimulated.

So there is a real need for improvements, especially regarding teaching materials in mathematics that have been used by teachers, especially regarding sequences and series. Because sequences and series are one of the mathematical materials that students need to understand, they are also one of the materials that is the main basis for various applications of the material in the next chapter. The researchers also concluded that interviews with students at SMP NEGERI 4 Padangsidimpuan showed that when learning mathematics, especially studying sequence and sequence material, most students found it difficult and even bored and boring because the learning style was just the same. The teachers at this school also felt that there were obstacles in core topics. So, for the sake of continuity of lesson material, teachers are forced to repeat some basic material first, then catch up on the remaining material because you have to spend more time learning how to repeat the basic material.

To the needs, researchers created media works in learning that make it easier for teachers and students to learn mathematics, especially regarding operations on sequences and series. By developing learning tools based on multimedia and technology that can be used to be something f solution options that can fit the needs of teachers and students.

This learning material can then be applied at school during the learning process and can also be used at home as a practical learning tool for

students when studying material on straight line and line arithmetic operations. After determining the material from which the vehicle is made, the researcher will analyze the characteristics of the material by the objectives of the mathematical literature for the flow and sequence in which the vehicle will be produced as well as the learning and assessment strategies.

3. **Design on Android-Based Media**

Media is created using basic ideas with the desire to create media for learning mathematics that is educational, of good quality, attractive to students, and makes students more enthusiastic about studying mathematics. Numeracy lessons require media that has concepts to facilitate learning activities, especially in mathematics lessons which of course utilize advanced technology. science and technology such as Android-based smartphones made one of the tools to help in learning mathematics, it has been turned into an application that can be accessed anywhere and anytime by just using smartphones. The lesson material is designed according to the teacher's needs when teaching, namely rows and rows. This material was obtained from various sources such as various mathematics books in middle school.

4. **Learning Media Developed**

The steps in this stage are the activities created to produce media in mathematics lessons such as learning media on lines and series in junior high school from class VII to class IX. Techniques for making learning media This mathematics uses the help of computer software or computer software like PowerPoint application, Construct 2, and Windows 10. The arrangement of teaching materials is in the form of a junior high school mathematics syllabus, observation data, and literature review from researchers, as well as Looking for references on the internet as well as by collecting teaching materials in students' Mathematics handbooks and from online references either from journals or online modules.

After preparing the device you want to develop, continued by the first researchers create the required media such as data in the form of images in media which are the work of researchers manually editing in PowerPoint and

searching on the internet, this makes it easier for researchers to create designs in the form of background, buttons and things necessary for media design, also makes it easier to move each design to the page Software Construct 2. Once the design is placed on the page Software Construct 2, the researcher enters the material that has been provided in advance in the form of writing or animation in each frame in the Construct 2 application which has been downloaded. Below you will see the media display in the software.

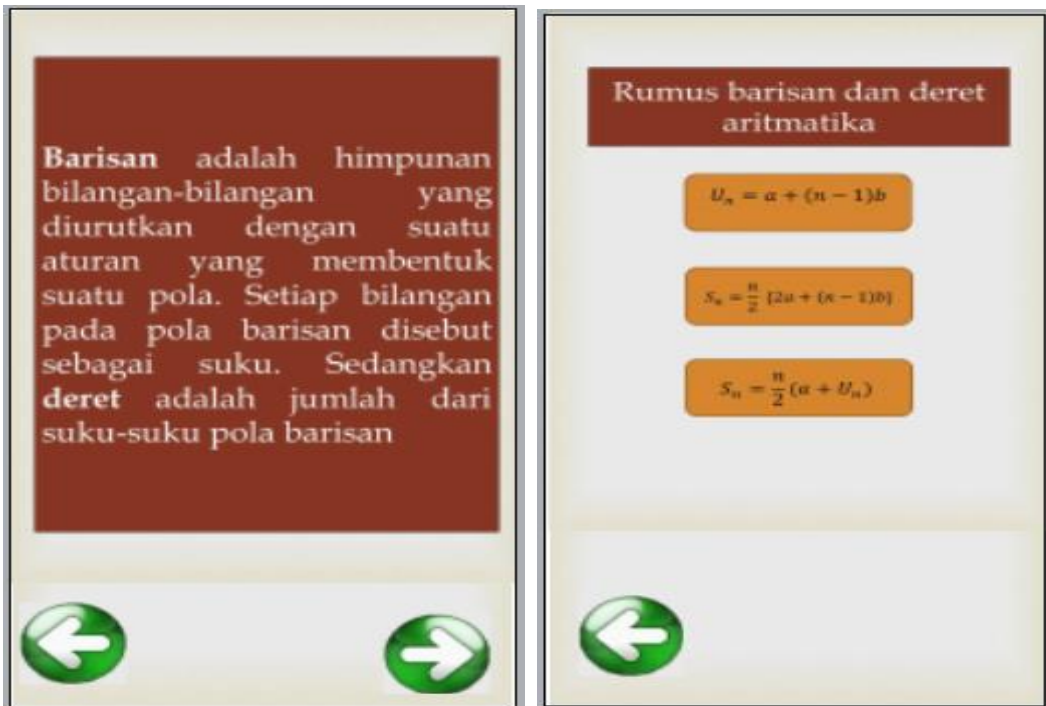**Figure 1. Intro Display**   **Figure 2. Main Menu**
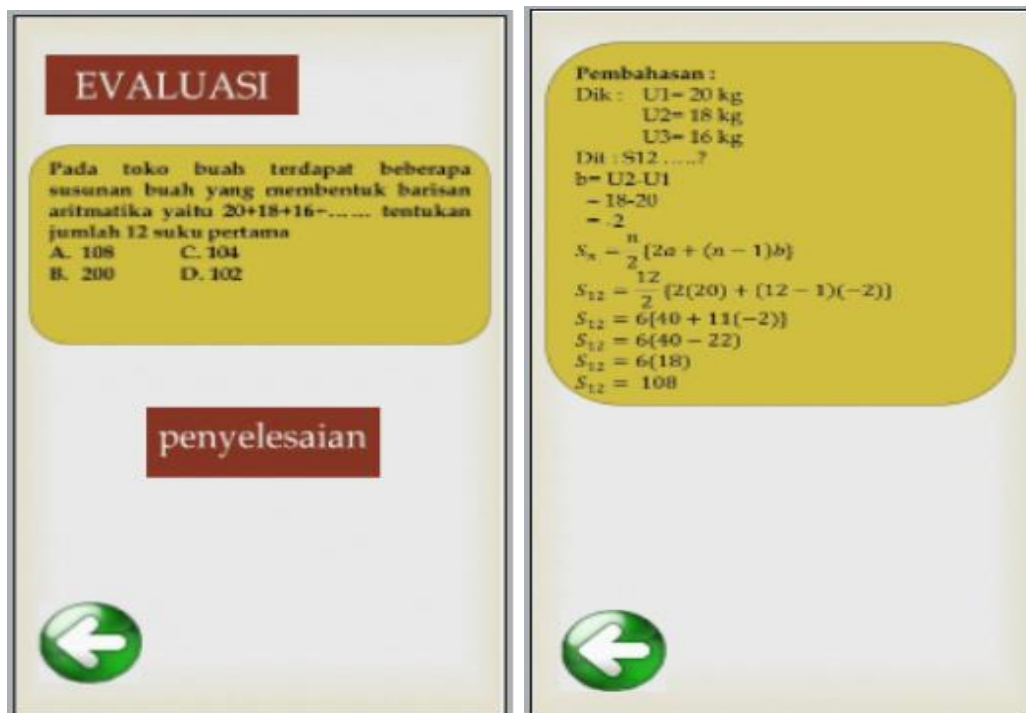
Figure 3 . Learning materials

Figure 4 . Evaluation Questions

5. **Implementation Stage**

The Implementation Stage is a stage carried out by distributing learning media based on Android smartphones to around 10 students in class VII SMP N 4 Padangsidimpuan. First, the researcher prepared a username and password for each student to be the key to enter the Construct 2 application. The application was installed on the student's Android smartphone via WhatsApp in the form of a .apk file. After the software is used by students, they will be asked to fill out a questionnaire in response to the use of learning media assisted by the Construct 2 software.

6. **Evaluation Level**

At this stage, what is carried out is an assessment by media users and a team of product development design experts to find out the strengths and weaknesses obtained when using the application. The assessment was carried out by distributing questionnaires to users and the product development design expert team. If deficiencies are found in the media, researchers will immediately repair the media. By paying attention to the assessment results from media users and the Android-based mathematics learning media design expert team, it meets the good category with the average product media user assessment getting a percentage score of 77.3% and from the product development design expert team 73% so it can be categorized as good and have met valid qualifications. Therefore, the media developed in this research is considered appropriate and good for use as a mathematics learning medium.

An Android-based application that is currently owned by almost all levels of society is utilized and developed into a learning medium. Therefore, the learning media that has been prepared can be used anytime and anywhere. So, this learning media is categorized as one of the learning media based on mobile learning. According to Abida and Kusuma (2019: 231), mobile learning is varied from the learning model It is possible that students can obtain study material and other knowledge anywhere You can also learn at any time just by utilizing the sophistication of mobile learning technology and internet network.

According to the results of research carried out by Putriani, et al. (2017) with the research title "Development of Android -Based Learning Media Using Construct 2 Software on Flat Side Building Materials for Class 8 Middle School Students" in this research the aim of this research is to develop student learning aids which use assisted android Construct 2 software with the topic of discussion is sequences and series that use the development of learning models with models ADDIE (analysis, design, development, implementation, and evaluation) to obtain namely the character of the students which is quite good but there are several a students who still have difficulty understanding the material that has been presented. The influencing factor is that there are differences in the abilities of each child from each other. The results obtained from the development of this learning media can be included in the good category where the average overall score was 3.98. Therefore, this learning media can be categorized as valid according to the evaluation that has been carried out the conclusion that can be drawn is that it is a learning aid to use assisted android Construct 2 software in grade VII junior high school sequence and series material which has quality, Good seen from its valid, effective and practical aspects. The researcher obtained the results that the research findings were deemed necessary for developing media in learning using the Construct 2 application on an Android cellphone.

There are various advantages of this learning aid tool compared to existing learning media or those that have been used by teachers at school, even though they usually only use PowerPoint. There are several advantages of this teaching material, such as the first material presented on the media using concise and concise material, so that students are more interested, displayed _ learning that can move, and materials with attractive colors. That way you make a child look focused, and more enthusiastic when I do it learning and make it easier to protege so that you can understand the content of the material presented more quickly. Interesting presentation by displaying mathematical information on the media proven to make things easier and provide new knowledge for students when learning takes place.

Apart from just being easy to operate, another advantage of this media is that it can provide messages in planting and developing good character in students. Every student who uses this media starts practicing questions, whether they want to study or students who want to solve the questions in the quiz, will feel challenged and interested because the media is presented in a simple display that is easy to understand. Therefore, students can focus, be disciplined, and commit themselves because when using this media, students are trained to focus and be disciplined in reading as well as studying the teaching material in the media so they can complete the exercises.

There is a third advantage to this media, namely that there is no time to work on practice questions with the aim that students have time to first calculate carefully and thoroughly so they can give the correct answer. Another reason why researchers do not make time is so that students can complete practice questions repeatedly without rushing and can complete them at any time without being set in time and space.

Apart from these advantages, there are also weaknesses when developing this learning media, namely that the material is limited to what has been prepared and developed by researchers, such as only rows and series material. Media can only be used on Android cellphones because converting media files into applications that can be applied on cellphones that use different online operating systems requires quite expensive funds. Then, some data can a So it cannot be adjusted to theory, because researchers found data directly from the field, either through interviews with teachers or several students. Limitations And specifications Technical device soft media is limited by technical Which is Not yet optimal. Because of That, There is a limitation to the media That researchers for. It means the researcher does not need to do tests in a way extensive in the field, Enough until on stage evaluation product. However, according to the researcher, A Little represents a problem in Which There is A possibility, and A Little Lot offers a solution alternative And contributes to changing education in a positive direction again.

CONCLUSION

Product development in this research is the development of learning aids mathematics for student school intermediate SMPN 4 Padangsidimpuan which will explore every process development media on lessons mathematics as media learning mathematics multimedia which is interactive for student class VII in Middle School. Matter This has a purpose in giving a description comprehensive there is a level intermediate, we serve line And series both in arithmetic sequences and series and geometric sequences and series. On development media learning mathematics student class VII JUNIOR HIGH SCHOOL Which made with use Construct 2, so done study development Which covers five-stage development with use steps process study model ADDIE For study And development. Composed from stage Analysis, stage Design, stage Development, stage Implementation, And stage Evaluation, so that produce product form application Android in the format APK. From the results study Which done seen clear that the media developed in the study is worthy And assessed as very Good For use in learning mathematics.

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