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Creating SAC-based interactive learning media will "improve" the mathematical understanding of MTs students.

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ABSTRACT The lack of maximum creativity in educational resources also results in the level of involvement and understanding of mathematical ideas needing to be maximized, which is a general consequence of using less interesting learning media. Additionally, many students need help applying what they learn in class to real-world situations. This study aims to find out how well Smart App Creator-based interactive learning multimedia helps students understand mathematical ideas in terms of design, validity, usefulness, and effectiveness. The R&D method was used for this research. Various tests, surveys, questionnaires, and documentation studies can be used to collect information. The result of his work is a product called Interactive Learning Multimedia, based on Smart App Creator. Seventh-grade content from a social mathematics textbook was used. Borg and Gall's theory of media evolution can be seen in practice. This research shows that this research product was produced as a multimedia product for interactive learning of class VII social arithmetic based on Smart Apps Creator, valid media, and practical media, as demonstrated by the use of Smart Apps Creator learning media in the classroom. Student responses show that interactive learning media based on Smart Apps Creator has been proven to increase students' understanding of mathematics topics for MTS class students.

1. INTRODUCTION

The development of science and technology has brought significant changes to various dimensions of human life in economic, social, cultural, and educational dimensions (Asnawir & Usman, 2022). Therefore, it is necessary to make adjustments so that education is not left behind in the development of science and technology. In addition, the development of science and technology has increasingly encouraged renewal efforts in utilizing technological results in the learning process (Arsyad, 2017).

In education, the development of information and communication technology has changed how people learn, obtain various types of information, and interpret information. The sophistication of technology in education provides a big challenge for educators to continue to play an important role in educating the nation's children in the era of globalization (Lestari, 2018). Information and communication technology development has encouraged the creation of innovations in all fields. One of the fields that has not escaped these developments is the field of education, which is characterized by the birth of the concept of electronic learning (e-learning) (Lestari, 2018). E-learning is a teaching and learning process that uses electronic circuits to deliver learning content, interaction, or guidance. However, some interpret e-learning as a distance education conducted through internet media (Hapsari, 2016).

Electronic learning (e-learning) is a new concept combined with rapidly growing information and communication technology. This learning concept makes it easier for students and teachers to obtain learning resources with easy and lightweight access. The concept of e-learning is starting to penetrate and develop into mobile learning by adapting e-learning, which is designed to be simpler and can address the shortcomings that occur in e-learning (Thohari et al, 2012).

Mobile learning (M-Learning) has characteristics that make it practical to carry anywhere and can be used wherever the user is because M-Learning is a medium contained in a handheld communication device (an Android smartphone). Android is an operating system for cellular phones based on Linux. Nowadays, Android can be called the king of smartphones. The Android operating system makes special learning media available in software or applications for students. This application is easy to use and can integrate and combine various things such as images, colors, videos, and animations in learning materials so that students are interested in reading and studying them and so that the process of receiving and obtaining information from various knowledge and learning resources is easily obtained by students (Thohari et al, 2012).

The reason for choosing Android as part of the learning medium is because, based on observations at MTs Al-Hidayah Ngancar, almost all students have smartphones; some even have more than one smartphone so that stu-

dents can learn anytime and anywhere. In line with research conducted by (Risma et al, 2021), the results show that the developed Android mobile learning application can improve student learning outcomes. In addition, research by (Chusni, 2018) found that mobile learning media can improve mathematical connection skills in as many as 85.4% of students (Iyatuna, 2017).

The difference between the learning media to be developed and other learning media is that the developer combines several media packaged in interactive multimedia and can be operated on Android smartphones online and offline. Applications with mathematical content packed with various colors and attractive designs and equipped with sound will be easily understood and absorbed by students because all the senses that students have can respond. So, the existence of this medium can be used to attract students' attention so that their activeness in learning can be active again. So that his learning motivation can increase. This increase in learning motivation is expected to impact increasing students' concept understanding.

Smart Apps Creator (SAC) is an app creation platform different from others. One of the main differences between SAC and other app creation platforms is that it does not require programming skills. One of the main advantages of SAC is that users do not need programming knowledge to create apps. SAC provides an intuitive and easy-to-understand user interface that allows users to create applications without writing code.

SAC is also a multi-platform, as it allows users to create apps for various platforms, such as iOS, Android, and Windows, as well as desktop and web apps. SAC provides more features and ready-made templates that allow users to create more complex and interactive apps. The cost of using SAC is relatively more affordable compared to other app-building platforms. Users only need to pay a monthly or annual subscription fee and do not need to pay developer or license fees. In addition, app creation is also faster, as in traditional app development, the time taken to create an app can be very long. With SAC, the development time can be accelerated as the platform provides various ready-made features and an easy-to-use interface. However, like any other app creation platform, SAC also has limitations in terms of functionality, and not all types of apps can be created using SAC.

The importance of understanding students' mathematical concepts is found in the first objective of mathematics learning according to the Ministry of Education (Permendiknas no. 22 of 2006), namely understanding mathematical concepts, explaining the relationship between concepts, and applying concepts or algorithms flexibly, accurately, efficiently, and precisely in problem-solving. By the objectives of mathematics learning, students are expected to understand a mathematical concept to use their abilities in dealing with mathematical problems (Masitoh & Prabawanto, 2016). Mathematics is still considered the most difficult subject for students. One of the materials contained therein is algebraic material. According to students, the subject matter of algebra requires meticulous and critical thinking in solving problems related to algebraic forms; this material is part of grade VII junior high school material. Many students have not been able to understand and solve algebra-related math problems, so a teacher's task is to make students able to understand the material well (Lestari et al, 2019).

Based on interviews with mathematics teachers, MTs Al-Hidayah Ngancar, Nana Wijiana, and S.Pd. He said that the teaching materials used during teaching were books that he made himself and other books to add insight into learning materials, and he rarely used PowerPoint learning media due to the lack of projector facilities. According to him, it is necessary to have learning media to make it easier for students to access material without having to use projector facilities. In addition to conducting interviews with teachers, researchers conducted interviews with several students at MTs Al-Hidayah Ngancar. He also said that practice questions are given at the end of each subchapter, and not all students get scores that reach the minimum completeness criteria (KKM); some students have to carry out remedial because they have not reached the KKM. Based on the average math score data, it can be said that students are less able to understand the material the teacher has explained before being tested because when the teacher explains, students tend to pay less attention and not focus.

Therefore, considering the reasons previously explained, it is necessary to develop an interactive learning medium to make it easier for students to understand mathematical concepts that can be used anywhere and anytime. One of them is the use of smartphones, which students commonly use. Based on this background, the authors intend to conduct research and development titled "Development of Interactive Learning Multimedia Based on SAC (*Smart Apps Creator*) to Improve Understanding of Mathematical Concepts of Private MTs Students in Kediri District. In addition, the objectives of this study are: (1) Describe the development design of SAC-based interactive learning multimedia (*Smart Apps Creator*) to improve the understanding of mathematical concepts among private MTs students in Kediri Regency. (2) Testing the validity of SAC-based interactive learning multimedia (Smart App Creator) to improve the understanding of mathematical concepts among private MTs students in the Kediri district. (3) Testing the practicality of SAC-based interactive learning multimedia (Smart App Creator) to improve the understanding of mathematical concepts among private MTs students in Kediri district (4) Testing the effectiveness of SAC-based interactive learning multimedia (Smart App Creator) to improve the understanding of mathematical concepts among private MTs students in Kediri district.

2. METHOD

This research uses the Borg & Gall development model containing systematic guidelines for the steps researchers take so that the products they design meet feasibility standards. The steps of this development model have ten work steps, including: (1) potential and problems; (2) data collection; (3) product design; (4) design validation; (5) design revision; (6) product trial; (7) product revision; (8) usage trial; (9) product revision; and (10) mass production (Sugiyono, 2016).

The trial was conducted to determine the level of practicality and effectiveness of this learning media product. The product, in the form of SAC-based learning media, is tested for its practicality and effectiveness. The level of practicality and effectiveness of learning media is known through the results of product trial analysis conducted in two ways: (a) Small group test, namely conducting limited field tests with experiments. In this study, the trial was con-

ducted by one student randomly selected from each experimental and control class. The data collection technique was carried out by giving a post-test. (b) Field trials, namely conducting field tests with larger subjects, where the product is said to be almost perfect. At this stage, students from each experimental and control class were selected in addition to those who participated in the small group trial. The data collection technique was carried out by giving a post-test. The following is a chart of the trial design for the development product in Figure 1.

The test subjects are individuals or people who are part of the product trials produced in this final project's R&D. The individual plays a role in assessing the product's feasibility by filling out the questionnaire given with the product. In this study, the sampling technique used was the purposive sampling technique.

Data analysis is used in the research and development of interactive learning multimedia based on SAC (Smart App Creator) using qualitative and quantitative analysis. The following describes data analysis techniques carried out qualitatively and quantitatively. Qualitative data analysis describes the data obtained from the results of interviews and suggestions from lecturers who provide validation and documentation notes when the learning media is implemented at school. The data obtained were analyzed descriptively, with additional suggestions as material to improve the products that have been produced. While the notes that have been obtained from the documentation are used as a means to determine the extent of the benefits of the products that have been developed by researchers and used in the learning process, Quantitative data analysis is used to describe the quality of the products that have been produced, namely interactive learning multimedia based on SAC (*Smart Apps Creator*), based on the assessment of material expert lecturers, media, and mathematics teachers, and to describe the understanding of students' mathematical concepts after using multimedia products during learning.

3. RESULTS AND DISCUSSION

Research and development of SAC-based interactive learning media to improve students' understanding of mathematical concepts is carried out through several stages. The first stage is potential and problems, where at this stage is to identify problems that exist in class VII at MTs Al-Hidayah Ngancar and MTs Al-Asy'ari Wates. Identifying existing problems in the field was conducted by interviews with teachers teaching mathematics subjects, which were held on April 24, 2023. The first is Mrs. Nana Wijiana, S.Pd. and Mrs. Yunis Lailiyah, S.Pd. Based on the interview results, the data obtained showed that most students were still unable to solve the problems faced, especially in the ability to understand mathematical concepts. This is evidenced by the fact that students often cannot relate between mathematical concepts. In addition, students still cannot relate mathematical concepts to everyday life. With this SAC-based interactive learning media product, it is hoped that students can relate mathematical concepts with other subjects and everyday life.

Several factors cause students to not be able to develop the ability to understand mathematical concepts, including 1) Lack of practice problems given by the teacher, 2) Lack of varied problem models such as story problems and HOTS problems, 3) Lack of student accuracy in solving the problems given.

Student observation activities were carried out by researchers based on the results of student work in solving the problems faced. From the observation results, it can be concluded that students in the class to be studied generally have low concept understanding abilities and are often less thorough; most students prefer to answer directly without writing down what is known and asked. This is because students have never encountered learning media whose contents are structured and go through several phases in working on exercise questions, and the concepts given are related to culture, making it easier for students to understand the concepts given. Based on these problems, researchers will develop interactive learning media based on Smart App Creator to improve students' mathematical concept understanding skills. The material used in this study is social arithmetic material. This multimedia can be accessed and downloaded through the https://bit.ly/arsogen.

The initial page on this learning medium contains the title and start menu to start using interactive multimedia. The title of the learning media in this research and development is "Welcome to the World of Social Arithmetic". The following is a draft of the initial page on learning media in research and development in Figure 2.

The main menu display is a display on multimedia that displays menus and buttons. The menu includes basic competencies, learning objectives, materials, learning videos, a

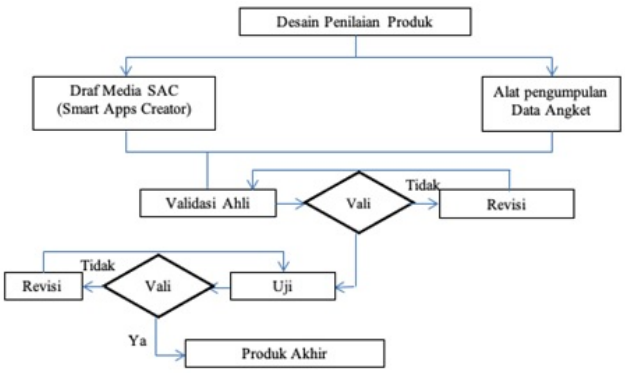

FIGURE 1. Product Development Trial Design

FIGURE 2. Learning Media Home Page

FIGURE 3. Main Menu Draft

quiz, and a developer profile. On this display, there is also an "X" button to exit the application. The main menu display in Figure in Figure 3:

On this menu there is a description of the Basic Competencies used in Social Arithmetic material. These Basic Competencies include: KD 3.9: Know and analyze various situations related to social arithmetic (sales, purchases, discounts, profits, losses, single interest, percentages, gross, net, tare). Then on KD 4.9: Solve problems related to social arithmetic (sales, purchases, deductions, profits, losses, single interest, percentage, gross, net, tare).

The next menu item in this learning medium is learning material. This menu contains materials and sample problems that will be studied by students during their learning. In the learning material menu, there is social arithmetic material including profit and loss, percentage of profit and loss, discounts, brutto nettto and tare, bank interest, and taxes. In addition, there are sample problems that will help students better understand social arithmetic material.

The next menu item is learning videos. In this menu, there are several learning videos related to social arithmetic material. So, when students have not understood the material in writing, they can see this learning video to better understand the material presented. Here are some drafts of learning videos in Figure 4.

Furthermore, the quiz menu is a menu where students are given practice questions related to social arithmetic material. The following is a draft of the quiz on this learning multimedia in Figure 5.

The results of media expert validation show an average validation percentage of 91.87%, this proves that multimedia is said to be very valid.

Analysis of questionnaire data through analysis of data from observation questionnaires of the implementation of interactive learning multimedia based on *Smart Apps Creator* and student response questionnaires regarding interactive learning multimedia based on *Smart Apps Creator* conducted at the end of the meeting by mathematics subject teachers and students of class VII Experimental MTs Al-Hidayah and students of class VII Experimental MTs Al-Asy'ari. The results of observations of the implementation of interactive learning multimedia development based on SAC (*Smart Apps Creator*) are positive, with an average positive response of 85.48%.

The results of the student response questionnaire regarding SAC Learning Media get a positive response with an average of 84.61% and 88.07%, so it can be concluded that the development of interactive learning multimedia based on *Smart Apps Creator* to improve students' understanding of mathematical concepts is practical and can be used as learning media for students in grade VII SMP or MTs equivalent.

Product discussion is a discussion of the final results of research related to the stages of research and development that have been carried out in accordance with the research objectives. The following are the final results of research and development conducted by researchers.

Smart Apps Creator is software that can be used to create learning media. The *Smart Apps Creator* application was created by the Computer Technology Training and Development Center (BMPTK) in Semarang, Central Java. This application can be used in various sciences at elementary to advanced levels. (Kusumaningsih & Fatoni, 2019). *Smart Apps Creator* is a desktop application that can be used to create Android and iOS mobile applications. *Smart Apps Creator* has features such as digital content output, real-time, highly interactive, HTML 5 support, template and animation support, and waterfall-friendly (Budyastomo, 2020).

The making of SAC products begins with finding problems in schools and carrying out research and development through interviews with mathematics teachers and asking questions related to the ability to understand mathematical concepts. Next, the SAC product design includes the home page, learning objectives, learning materials, learning videos, quizzes, and author profiles, which will later be validated by media experts, materials, and post-test questions. In the validation of media, materials, and post-test questions, each stated that the average percentage of test results showed 78%. This is in accordance with the validation criteria, which state that the media or development product is declared valid and can be used. The observation questionnaire for the implementation of learning media states that the average percentage of test results shows 95.83%. This is in accordance with the observation questionnaire criteria that there is a positive response to the existence of learning media. The student response questionnaire states that the average percentage of test results is 82%. This is in accordance with the criteria of the student response questionnaire that there is a positive response to the existence of learning media and that the learning media are practical to use.

The effectiveness test was carried out in two stages, namely, small group trials and large group trials. At MTs Al-Hidayah Ngancar, the results of the small group trial showed that students who used the development media scored higher than students who did not use the developed media. The results of the large group trial on the Independent Sample Test showed the significance level of the research results was $0.000/2 < 0.05$. In accordance with the hypothesis acceptance criteria, it shows that the research hypothesis (Ha) is accepted. So based on the results of research and development based on the Independent Sample Test, it can be stated that the use of SAC learning media is effective for improving the ability to understand mathematical concepts of social arithmetic material in class VII-G students.

FIGURE 4. Draft Learning Video

FIGURE 5. Draft Learning Media Quiz

This statement shows that the development product is declared valid and practical, and its use is effective. This is supported by multimedia learning theory, which shows that the use of multimedia in learning mathematics can improve students' understanding of mathematical concepts. This theory emphasizes the use of the right combination of text, images, sound, and animation to help understand information. By utilizing visual and verbal elements together, multimedia helps students process information better and enriches the learning experience (Mayer, 2014). In addition, by applying multimedia design principles, learning mathematics becomes more interesting, practical, and effective for students (Surjono, 2017).

4. CONCLUSION

From the description of the discussion and research results, it can be concluded that the SAC learning media developed are valid to be applied in class VII at the junior high school/MTs level or equivalent. This is evidenced by the average obtained from media experts (77%), material experts (79%), and validation of post-test questions (82%). So, based on the criteria set, it can be concluded that the SAC learning medium is valid. The use of SAC learning media at each meeting received a positive response from students. Based on the results of teacher observations, an average score of 95.83% was obtained; the results of the student response questionnaire at MTs Al-Hidayah obtained an average score of 88.32%; and the average score of the student response questionnaire at MTs Al-Asy'ari obtained an average of 89.36% and fell into the positive response category. Therefore, the SAC learning media is practical and can be used as learning media for grade VII students at the junior high school/MTs level or equivalent. The effectiveness of SAC learning media is seen from the post-test results. The learning results of the control class and the experimental class using SAC learning media show a significant difference with a value of 0.000 <0.05. It can be concluded that the mathematical concept-understanding ability of experimental class students is higher than that of the control class.

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