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DEVELOPMENT OF LEARNING MEDIA USING ADOBE FLASH PROFESSIONAL CS6 SOFTWARE TO ENHANCE PROBLEM-SOLVING SKILLS IN MTS NURUL HIKMAH AEK GERGER SCHOOL

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Abstract: *Technologi is required in aspects, without the proper use of technologi will cause many problems that cannot be resolved well and perfectly. Adobe Flash Profesional CS6 is a software program that runs on certain systems and is useful in facilitating the learning process. This research was conducted to: 1) Determine the validation, practicality, and effectiveness of the Adobe Flash Profesional CS6 software media that has been developed to improve problem-solving skills in MTS Nurul Hikmah Aek Gerger School; 2) To find out how to improve the problem-solving skills of students in linear equation materials by using the developed learning media. This research is a development research. The objective of this research is the creation of an android-based student book for learning. This study is conducted at MTS Nurul Hikmah Aek Gerger School, class VIII during the second semester of the academic year 2022/2023. The technique used in this development is the Sadiman model. Based on the research results, it was found that the Adobe Flash Profesional CS6 software media is valid, practical, and effective in improving problem - solving skills. With the learning media on linear equation materials, it has been able to improve problem - solving skills on linear equation materials. The learning tool for linear equations is created using Adobe Flash CS6 as its application and is produced in the .apk file format which can be installed on Android devices.*

Keywords: *Learning Media Development, Adobe Flash Profesional CS6, Problem-solving Skills.*

Abstrak: Teknologi sangat diperlukan dalam berbagai aspek, tanpa pemanfaatan teknologi yang tepat akan menimbulkan banyak permasalahan yang tidak dapat terselesaikan dengan baik dan sempurna. Adobe Flash Profesional CS6 merupakan salah satu program software yang berjalan pada sistem tertentu dan berguna dalam mempermudah proses pembelajaran. Penelitian ini dilakukan untuk: 1) Mengetahui validasi, praktikalitas, dan efektivitas media software Adobe Flash Profesional CS6 yang dikembangkan untuk meningkatkan keterampilan pemecahan masalah di MTS Nurul Hikmah Aek Gerger School; 2) Untuk mengetahui bagaimana meningkatkan kemampuan pemecahan masalah siswa pada materi persamaan linear dengan menggunakan media pembelajaran yang dikembangkan. Penelitian ini merupakan penelitian pengembangan. Tujuan dari penelitian ini adalah terciptanya buku siswa untuk pembelajaran berbasis android. Penelitian ini dilaksanakan di Sekolah MTS Nurul Hikmah Aek Gerger kelas VIII pada semester genap tahun pelajaran 2022/2023. Teknik yang digunakan dalam pengembangan ini adalah model Sadiman. Berdasarkan hasil penelitian diperoleh bahwa media software Adobe Flash Profesional CS6 valid, praktis, dan efektif dalam meningkatkan keterampilan pemecahan masalah. Dengan adanya media pembelajaran pada materi persamaan linear telah mampu meningkatkan keterampilan pemecahan masalah pada materi persamaan linear. Alat pembelajaran persamaan linear ini dibuat dengan menggunakan Adobe Flash CS6 sebagai aplikasinya dan diproduksi dalam format file .apk yang dapat diinstal pada perangkat Android.

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Kata kunci: Pengembangan Media Pembelajaran, Adobe Flash Professional CS6, Soal-Keterampilan memecahkan.

INTRODUCTION

Education that is able to support future development is an education that is able to develop the potential of students. Education in Indonesia is faced with a classic problem, the challenge in preparing qualified human resource (HR) that are expected to be able to compete with the international world. The result of the 2018 PISA study (OECD..2019) released by the OCEAD showed that the ability of Indonesian students in reading, achieved an average score of 371, with an average score of OECD of 487. Then for the average math score, it reached 379 with an average score of OECD 487. Next, for science, the average score of Indonesian students reached 389 with an average score if OECD of 489. To improve HR, it is necessary to train students to learn for a lifetime and make the right decisions. Learning as a process of obtaining knowledge, skills, and routines, is more effective if new knowledge obtained from several learning experiences is facilitated by multimedia, (Divzak, B, 2011).

Based on the minister of National Education Regulation No. 22 of 2006 (Depdiknas, 2006) dated May 23, 2006 on the Content Standards for basic and Secondary Education, it states that mathematics lessons should be given to all students starting from primary school to equip students with the ability to think logically, systematically, critically, and creatively, as well as the ability to work together. This is also conveyed by Cockcroft (Cockcroft, 1982) that mathematics should be taught to students because (1) it is always used in everyday life; (2) all fields of study require appropriate skills; (3) it is a strong, concise, and clear means of communication; (4) it can be used to present information in various ways; (5) it increases logical thinking skills, precision, and spatial awareness; and (6) it gives satisfaction to challenging efforts. Based on that, it is clear that mathematics play an important role in preparing quality human resources. Mathematics is one of the subjects that play an important role in shaping human resources in human life. Mathematics is greatly needed by students, so it plays a role as one of the means of thinking to examine something logically and systematically (Siagian, 2016).

The MTS Nurul Hikmah Aek Gerger School located on the Desa Aek Gerger Protocol Street, Ujung Padang District, Simalungun Regency, Nort Sumatra Province, has been providing education for a long time. The school was established on September 27, 1999 in Aek Gerger village, Ujng Padang district. Based on observations conducted by the researcher, the mathematics learning in this school is still inadequate, on of which is students' difficuly in relating the mathematics knowledge they have learned to real-world situations and connecting previous mathematics knowledge with what they learn in school. Students only memorize formulas and solve practice problems without deep understanding and tend to want to finish with practical methods. This makes students less enthusiastic in following math classes, and creates the assumption that math is a difficult subject.

Some of the difficulties faced by students include difficulty in understanding mathematical concepts, solving mathematical problems (mathematical reasoning), mathematical connections (mathematical connections), and mathematical communication. According to Kantowski (Pehkonen et al., 2013), problem solving in mathematics is one of the learning outcomes that are desired and is very important. It is often said that problem solving is the heart of mathematics. Yet mathematics is a

universal science that underlies the development of modern technology, has an important role in life and advances human thinking. In addition, it is trained to develop logical, analytical, systematic and consistent thinking skill. To help in this thinking process, in addition to effective learning approaches, diagrams or animations can also be used. ICT (Information and Communication Technologies) can play a role here. Learning mathematics using technology-based media is very good if we support it with an interesting and creative display (Hafriani, 2021).

Information and communication technology has developed along with globalization. The development of this technology has caused interactions and information delivery to take place quickly. Sardar (Sardar, 1987) states that "Technology is a means of solving the fundamental problems of every human civilization". Therefore, technologi is needed in all aspects, without the use of technologi which causes many problems cannot be solved properly and perfectly.

The role of media is very important in the learning process to make the material delivered by the teacher reach quickly and easily accepted maximally by the students (Wicaksono, 2016). One application that can build learning media by linking ICT and mathematics is Adobe Flash Professional CS6. Adobe Flash Professional CS6 is a dynamic and versatile software for learning and teaching mathematics to high school students developed by Adobe Flash. Adobe Flash Professional CS6 is a software program that runs on a particular system that is useful for expediting the learning process. Adobe Flash Professional CS6 can be utilized as a media that can help students in understanding the learning that is being studied (Robi et al., 2017).

In a research conducted by Hadiyanto et al. (Hediyanto, 2020), it was found tht the result of the validation of macromedia flash with problem posing had a very valid criteria. The level of practicality of macromedia flash with problem posing had a very practical criteria, the level of effectiveness of macromedia flash with problem posing is considered very effective criteria. Therefore, it can be concluded that the macromedia flash with problem posing developed can be used because it meets the very valid validity criteria, very practicality, and effective effectiveness. In addition, Danang, Setyadi (Setyadi & Abdul, 2017) states that the procedure in this study consists of analyzing the product being developed, developing the initial product, and testing the product. The results show that the web-based learning media developed is valid. In Rubhan's research (Masykur, 2017) states that the results of the validation of the development of mathematics learning media using the macromedia flash application program obtained an average score; (1) the feasibility of the development of mathematic learning media using the macromedia flash application program obtained an average sscore of 3.73, in the linguistic aspect obtained an average score of 3,64, in the evaluation feasibility aspect obtained an average score of 3.66, in the media expert obtained an average score (efficiency media aspect obtained an average score of 3.87, button function aspect obtained an average score of 3.5 and graphics aspect obtained an average score of 3.4). The validation product is in a feasible criteria, (2) the attractiveness of the development of mathematics learning media using the macromedia flash application program, the response of students obtained an average score of 3.61 in the criteria of "very attractive" based on student's response.

The research conducted by Rangkuti (Rangkuti, 2016) related to the Adobe Flash Professional CS6 media states that the research results show that the students' answers process in solving problems that require metacognition and mathematical communication abilities in the experimental class 2 is better than the experimental class 1, and the students' mistakes in solving problems that require

metacognition and mathematical communication abilities in the experimental class 2 is fewer than the experimental class 1.

Based on several expert opinions, it can be understood that the principles of choosing learning media are: (1) The media chosen must be appropriate for the learning objectives and materials, teaching methods used, and the characteristics of the students (level of knowledge, language, and number of students). (2) To choose the right media, students need to know the characteristics of each type of learning media. (3) Choosing learning media should be oriented towards the students who are learning, meaning that the selection of media should be used to improve the effectiveness of learning for students. (4) Choosing media should consider the cost of procurement, availability of media materials, quality of media, and the physical environment of the learning space. This discussion shows that there needs to be a development of a good media so that students can understand the learning media well and can be more independent in learning.

METHOD

This research is included in a development research. In this research, what is developed is a student learning media. The development process is related to activities in each stage of development. This research was conducted at MTS Nurul Hikmah Aek Gerger School. The subjects in this study were class VIII-1 and VII-2 of MTS Nurul Hikmah Aek Gerger School for the academic year 2022/2023, which consisted of 34 and 35 students respectively, while the objective of this research is the creation of an android-based student book for learning.

This research is divided into two stages, the first stage is the development of teaching media which begins with validating the student book (BS). The second stage is the implementation of the already validated teaching media to see its practicality and effectiveness. The technique used in this development is the Sadiman model. Sadiman's research and development model is more systematic and easy to use in a research development design. The model offered by Sadiman (Sadiman, 2009) leads to research on computer-based learning media development. The following is a flowchart of the steps in developing learning media or multimedia-based learning media based on an adaptation of the Sadiman model used by the developer.

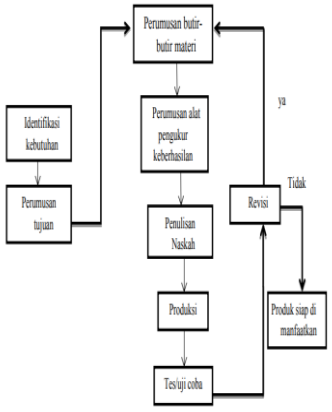

Diagram 1. Flowchart of Media Learning Development Procedure

Measuring the validity, practicality, and effectiveness of the developed teaching materials by designing and developing research instruments. The validity instrument used in this research is the student book (BS), Lesson Plan Implementation Plan (RPP), observation sheet of student activities, and mathematical problem-solving ability test. The practicality instrument of teaching media consists of a sheet of teaching implementation and a student response questionnaire on the components and materials used. The effectiveness instrument of teaching media consists of an observation sheet of student activities, a mathematical problem-solving ability test. The observation sheet of student activities in learning is a guide for observing students for the time limits set

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during the learning process. Observations are made periodically every 5 minutes. The mathematical problem-solving ability test is a tool used to collect data on students' mathematical problem-solving abilities on certain materials. The TKPMM is given on the final meeting (after learning using metacognitive-based teaching materials).

The data obtained from the observations and assessments need to be processed to draw conclusions about the research. To ensure that the data obtained is not questionable, the data needs to be tested for its validity. The validation of the content is based on the results obtained from the students after the evaluation, such as giving tests or scales of assessment. Based on the students' answers, the level of validation of each statement or scale of research will be determined, which is analyzed using the Product Moment Correlation. The formula used is the Product Moment Correlation formula as follows (Asrul, 2014:130):

$$r_{xy} = \frac{N\sum XY - (\sum X)\sum(Y)}{\sqrt{\{N\sum X^2 - (\sum X)^2\}\{N\sum Y^2 - (\sum Y)^2\}}}$$

The data analysis technique used to analyze the mathematical problem-solving ability of students is descriptive qualitative. The analysis used to analyze the data obtained refers to the Ministry of Education and Culture Regulation No. 53 of 2015. Based on this, the researcher adjusts the category of mathematical problem-solving ability levels with the range of values in the 2013 curriculum which can be seen in Table 1 as follows:

Table 1. Range of Mathematical Problem Solving Abilities Scores No Range of Scores Grade Category

No	Value range	Predicate	Category
1.	86 < test score ≤ 100	A	Excellent
2.	71 < test score ≤ 85	B	Good
3.	56 < test score ≤ 70	C	Fair
4.	Test score < 55	D	Poor

(Depdiknas, 2013)

Based on the data in Table 1 above, the level of students' mathematical problem-solving abilities is categorized as very good if 86 < test score ≤ 100, categorized as good if 71 < test score ≤ 85, categorized as sufficient if 56 < test score ≤ 70, and categorized as lacking if the test score is less than or equal to 55. Where the student's score individually is the total score obtained by the student divided by the maximum score and multiplied by 100, or:

$$\text{Nilai tes} = \frac{jumlah skor\ yang\ diperoleh}{skor\ maksimum} \text{ x } 100$$

The percentage of students' problem-solving ability in mathematics for each indicator is calculated according to the formula:

$$\%\ \text{KKM tiap indikator} = \frac{jumlah skor\ siswa\ tiap indikator}{skor\ maksimum tiap indikator banyak siswa} \text{ x } 100\ \%$$

In this study, to determine the increase in students' mathematical problem-solving skills from the test results, the N-Gain value is determined. With the following formula:

$$\text{N-Gain} = \frac{postest - pretest}{skor\ ideal - pretest}$$ (Hake, 1999)

RESULTS AND DISCUSSION

Description of the Development Stage of Learning Media

Design (Designing)

The first stage is the design or planning stage of android-based learning media. This stage is the media design based on the results of the review in the analysis stage. The design stage includes creating flowcharts and storyboards. A flowchart is a diagram consisting of symbols that indicate the steps of a procedure or program.

In the design phase, the researcher creates an overview or design of the media to be designed based on the needs of the media learning users, namely

teachers and students, in accordance with the guidelines of the RPP (Learning Implementation Plan) in accordance with what has been created by the researcher of linear equation learning media, and preparing materials needed such as material, images, audio, video, clipart and animation required to design this learning media. Some materials are obtained or downloaded from the internet to make the learning media more interesting and visually appealing. In the image below, you can see an overview of the design of linear equation-based android learning media.

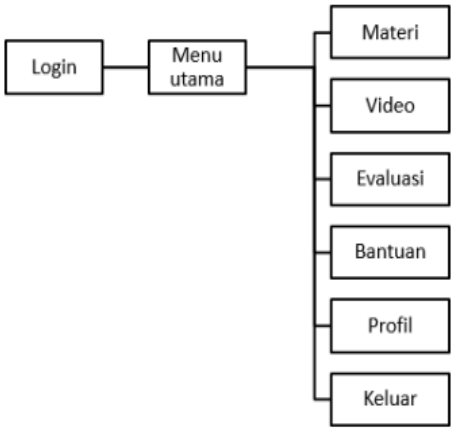

Figure 2. General Overview of the Learning Media

This learning media consists of 8 main buttons that can be accessed using an android, within this learning media there is a login button to enter the main menu, in the main menu there are 7 buttons, namely the material button to view the material, the video button to display video tutorial guides for linear equation learning, the evaluation button to display the evaluation menu for linear equation learning and to work on the problems in the evaluation menu, the help button to display how to run the linear equation application and the functions of each button in the learning media, the profile button to display the personal data of the creator of the learning media, the exit button to exit the learning media and the sound button to turn off and turn on the sound in the linear equation learning media application.

Develop

This stage is the realization of the design stage. In this stage, the media is developed according to the design that has been created.

Production Stage

This learning media is published in the form of a .APK file that can be run on each student's android. The presentation of this learning media uses animation, sound, and attractive images to grab the attention of the students.

Design Struktur Navigasi

The menu structure in this learning media uses a hierarchical navigation design, because the menus are related to each other, so it allows the user to interact and more navigation is needed.

The Main Menu Navigation Structure

The main menu navigation structure shows the location of the menus within the system and the relationship between each menu, such as the material menu, video menu, evaluation menu, help menu, profile menu, exit button for the learning media application, and on or off button for the sound of the learning media. This can be seen in Figure 3.

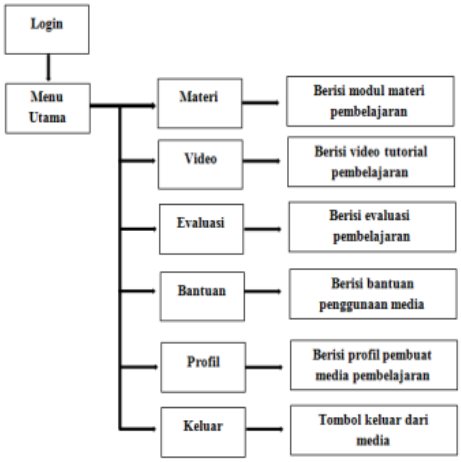

Figure 3. Main Menu Structure

In this chart, there is a login page to access the main menu, in the main menu there are 7 buttons, such as the learning material menu to view the learning materials, the video menu containing links to videos related to linear equation

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subject, the evaluation menu containing exercises about the linear equation subject, the profile menu containing the author's bio, the help menu containing guidance on using the learning media, the exit menu to exit the learning media and the sound menu for commands to turn on and turn off the sound.

Material Navigation Structure

In Figure 4, there is a material button to access the materials, and then on the material page, there are 14 sub-menu buttons containing materials about the basic concepts of linear equation learning, android programming anatomy, familiarizing with the App Inventor interface, creating an initial App Inventor project, steps for using App Inventor, creating a simple game application, creating a simple game application part 2, creating a project code block, creating a project code block part 2, creating the initial screen, creating screen 1, creating screen 2, creating screen 3, and creating screen 4.

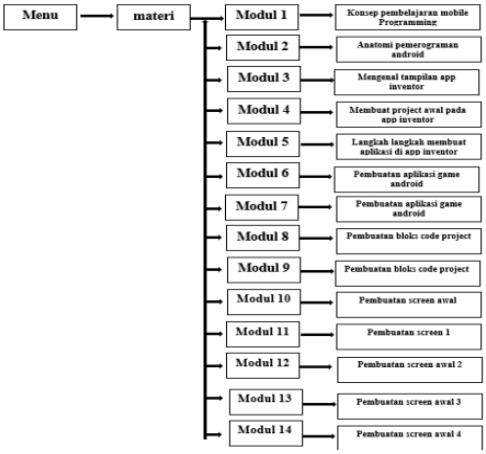

Figure 4. Material Navigation Structure

Storyboard Design

A representation of the scenes that will be designed, the visual form of the design, audio, duration, description, and sound created in the storyboard design. The result of this storyboard design will be a guide in creating the media display. The storyboard for the initial scene of the media is the login page to access the main menu scene/initial page, the storyboard design is briefly for the scenes that will be created as shown in Table 2 below:

Table . Summary Storyboard Scenes

Scene	**Keterangan**
Scene 1	Login / masuk
Scene 2	Menu utama
Scene 3	Materi
Scene 4	Isi materi
Scene 5	Video
Scene 6	Menu video
Scene 7	Evaluasi
Scene 8	Menu evaluasi
Scene 9	Bantuan
Scene 10	Profil
Scene 11	Keluar dari media
Scene 12	Sound media

Interface Design

This learning media is designed for teachers and students in grade X RPL at Tamansiswa Sukadamai school, so the design uses animation and images to make it interesting for teachers and students to use as a linear equation learning media.

Material Collection

In the process of creating the media, materials such as images, audio, background, and other supporting materials are collected.

Assembly Stage

Assembly is the stage of creating the linear equation learning media application based on the design that has been done previously.

Creating Objects and Background

The background and objects in this learning media are designed manually using Corel Draw X7 and also using Adobe Flash Professional CS6 by utilizing the available tools. In creating this media, it also uses clip art images to create menu buttons, exit button, and other buttons, which are designed using Corel Draw X7.

Creating Navigation Button Stage

The buttons in this learning media are created using Adobe Flash

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Professional CS6 and then converted into buttons. Then, the result is imported to the Adobe Flash Professional CS6 library, and the button is converted into a symbol with a button type that will be applied to the learning media that will be created.

Programming and Actionscript Stage

The Actionscript that is used to run actions on the frame, scene, or button is Actionscript 3.0 because the creation of android-based applications in Adobe Flash Professional CS6 must use Actionscript 3.0.

Test Movie and Publish Stage

After all the stages of creating this media are completed, the next step is to perform a test movie to see if the learning media runs well or not. If there are problems or errors, it must be fixed so that it can run well. The result of the test movie produces a file with the .swf file type.

Result Display

Login or Enter display

In the login display, there is one button that connects to the main menu of the learning media application, and in this login display, there is also an animation in the form of a spinning loading that surrounds the enter button to the main menu, so the login display looks very attractive.

Figure 5. Login Display

Learning Material Display

On the learning material display, it contains the learning materials that will be taught in the linear equation subject, these materials must also be in line with the RPP of the linear equation subject. The display of the learning materials can be seen as follows:

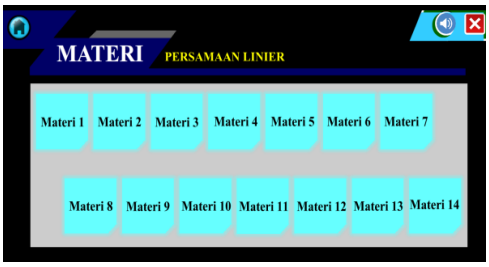

Figure 6. Material Menu Display

***Evaluation* Question Display**

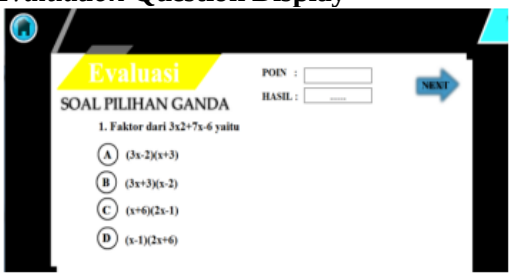

Figure 7. Evaluation Question Display

Testing

Testing or trial is the testing stage of the learning media that has been created. If there are errors in the learning media, it must be fixed first, and if it runs well, the process will proceed to the next stage, which is distribution. This stage is done after the completion of the creation stage and all the data is entered. At the testing stage, the media is tested using black-box testing.

Testing Using Blackbox Method

Testing using the blackbox method is testing that is done on the software interface, this testing aims to show that the software created works well in the sense that input is accepted correctly and the output produced is truly accurate, the integration of external data can run well.

Product Testing

In this stage, the validity, practicality, and effectiveness tests are carried out with the following results

Validity Test

Validity test is a standard measure of the accuracy and authenticity of a product. The goal of this validity test is to determine the level of accuracy of a product produced. The product is considered valid if the product result is in

line with the specified criteria. For the validity test, the researcher takes 3 media experts who are asked to validate the product that the researcher designed, which is Mr. Dr. Edy Surya, M.Si, Mr. Dr. W. Rajagukguk, M.Pd, and Mr. Dr. H. Banjarnahor, M.Pd. The validation was conducted on May 18, 2022. Based on the analysis, the product that the researcher designed is in the category "valid" because the V value is 0.84 in the range of Aiken's V values from 0.60-1.00. The conclusion of this data is that the android-based linear equation learning media is considered very valid in terms of media aspect, content aspect, and valid for the appearance aspect. So the android-based linear equation learning media has been declared eligible to be applied in the learning process.

Practice Test

After the product is validated and the results are valid, the next step is the practicality test, which is a measure of the practicality of the product. For the practicality test, the researcher targeted Dr. Edy Surya, M.Si and Dr. W. Rajagukguk, M.Pd. So based on the analysis above, it can be said that the product that the researcher designed is Very High due to the percentage obtained of 0.90 falls within the percentage range of 0.81-1.00.

Effectiveness Test

The effectiveness of a product can be seen from the effects of the attitude and motivation of students, how a student is interested in using the product as a learning medium. For effectiveness testing, the researcher targets 20 students of the Software Engineering Department. Here is the table of testing the Effectiveness of the product from 20 students.

Table . Results of Product Effectiveness Test

No	Nama	Sebelum media	Setelah media	Nilai Efektivitas
1.	Abel	60	96	0,90
2.	Allya	60	96	0,90
3.	Bima	80	96	0,80
4.	David	84	92	0,50
5.	Evy	80	100	1,00
6.	Irli	84	92	0,50
7.	Jilani	80	100	1,00
8.	Lili	80	84	0,20
9.	M. Albar	88	100	1,00
10.	Mhd. Gilang	76	100	1,00
11.	Nadi	95	100	1,00
12.	Nazja	64	84	0,55
13.	Nazwa	52	96	0,88
14.	Rafli	56	96	0,90
15.	Rehan	80	96	0,90
16.	Salwa	60	92	0,80
17.	Suci	56	92	0,81
18.	Tiara	60	80	0,50
19.	Wisnu	56	92	0,81
20.	Yanti	72	96	0,85
Jumlah				**15,7**
Rata-rata				**0,78**

It can be concluded that the design of the linear equation-based android learning media that the author made is already very effective because it is in the range of 0.70-1.00 value, which means that the value of the product effectiveness test that the author made is already said to be Very Effective. This is in line with the research conducted by Lham Muhammad and Fitriana Yolanda (Muhammad & Yolanda, 2022) which shows a positive response from students regarding the use of Adobe Flash CS6 in the learning process. Thus, the use of Adobe flash learning media can facilitate online learning and increase interest in students. In addition, research conducted by Silvi Siburian, et al. (Siburian et al., 2020) stated that the feasibility test results

according to media and material design experts obtained an average feasibility percentage of 98.95% with the criteria "Very Good" in developing Adobe Flash CS 6 learning media on Linear Equation material.

Test Conclusion

After conducting several tests on the product, the output generated from this linear equation learning media has met the expectations of the researcher.

Product is Ready for Use

In this process, the learning media has been completed, this learning media produces a file with the .APK extension, with the aim that the learning media can run on android without having to install Adobe Flash Professional CS6 on each computer first. To run this linear equation learning media application, hardware that has been installed on each android device is required, namely Adobe Air.

CONCLUSION

Based on the results of the analysis and discussion of this research, the Adobe Flash Professional CS6-based android learning media in MTS Nurul Hikmah Aek Gerger School that has been developed has met the criteria of validity, practicality, and effectiveness. This learning media can help students to enjoy the subject of linear equations, making the learning process interesting and enjoyable for students, and also increasing students' motivation towards understanding the material of linear equation subject. This learning media has improved students' problem-solving skills in linear equation material. This linear equation learning tool is designed using Adobe Flash CS6 as the main software and supported by other software.

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