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DEVELOPMENT OF EXPLORATIVE MATHLET LEARNING MEDIA BASED ON ADOBE FLASH CS6 WITH ISLAMIC NUANCES ON LINEAR EQUATIONS SYSTEM WITH THREE VARIABLES MATERIAL

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Abstract:
This study aims to produce explorative mathlet learning media based on adobe flash CS6 with Islamic nuances on the linear equation system with three variables material and to determine the level of validity, practicality, and effectiveness of the media. The type of research used is research and development concerning the development model of Alessi and Trollip. The stages of multimedia development consist of: (1) the planning stage, (2) the design stage, and (3) the development stage. The test subjects in this study were students of class X MA Madani Alauddin Pao-Pao. The instruments in this study were expert validation sheets, observation sheets on the implementation of the device, student response questionnaires, student activity observation sheets, and learning achievement tests. The results showed that the explorative mathlet learning media based on adobe flash CS6 with Islamic nuances on the linear equation system with three variables material met the valid, practical, and effective criteria. Thus, the results of this study imply that learning media can be used as an alternative to improving students learning outcomes.

Keywords: Learning Media, Adobe Flash CS6, Linear Equation System with Three Variables

PENGEMBANGAN MEDIA PEMBELAJARAN MATHLET EKSPLORATIF BERBASIS ADOBE FLASH CS6 BERNUANSA ISLAMI PADA MATERI SISTEM PERSAMAAN LINEAR TIGA VARIABEL

Abstrak:
Penelitian ini bertujuan untuk menghasilkan media pembelajaran mathlet eksploratif berbasis adobe flash CS6 bernuansa islami pada materi sistem persamaan linear tiga variable serta untuk mengetahui tingkat validitas, kepraktisan, dan keefektifan media. Jenis penelitian yang digunakan adalah research and development dengan mengacu pada model pengembangan Alessi dan Trollip. Tahapan pengembangan multimedia terdiri atas: (1) tahap perencanaan, (2) tahap desain, dan (3) tahap pengembangan. Subjek uji coba dalam penelitian ini adalah siswa kelas X MA Madani Alauddin Pao-Pao. Instrumen dalam penelitian ini adalah lembar validasi ahli,

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lembar observasi keterlaksanaan perangkat, angket respons siswa, lembar observasi aktivitas siswa, dan tes hasil belajar. Hasil penelitian menunjukkan bahwa media pembelajaran mathlet eksploratif berbasis adobe flash CS6 bernuansa islami materi sistem persamaan linear tiga variable memenuhi kriteria valid, praktis, dan efektif. Dengan demikian, hasil penelitian ini mengisyaratkan bahwa media pembelajaran dapat dijadikan salah satu alternatif dalam meningkatkan hasil belajar siswa.

Kata Kunci: Media Pembelajaran, Adobe Flash CS6, Sistem Persamaan Linear Tiga Variabel

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INTRODUCTION

The rapid development of technology in the current era of globalization has provided many benefits in progress in various aspects of education. Technology is developing rapidly and captures the interest and attention of learners (Naidoo & Govender, 2014). This technological development must also be followed by developments in learning. Teachers can decide which educational equipment to use and how to use them by taking learning objectives, the learner's characteristics, and available facilities into consideration (Uslu, 2018), so that students more easily understand the material being studied (Lin & Wu, 2016). Learning technology is a field that is involved in human learning facilities through a process of systematic identification, development, organization, and utilization of various learning resources and such management (Yaumi, 2017). The teaching environment can thus be transformed by teachers if they integrate technology effectively in preparing lessons, designing learning activities, and conducting assessments (Umugiraneza, Bansilal, & North, 2018). There are so many sources for students' contact with computers, the internet, and relevant information that life becomes colorful. Some knowledge on the internet media is so broad that the attraction of learning environments and teaching materials for students' interests is a critical issue to achieving the teaching effect (Wu & Tai, 2016). Learning activities will be done well if all the factors in the learning process run properly, these factors are school conditions, the readiness of teachers and students, teaching materials, and learning media. If the learning media is

chosen properly and correctly then the continuity of the learning process can run optimally (Ampera, 2017).

In distance learning activities like nowadays, some students cannot participate effectively. Moreover, there are not a few students who do not have supporting facilities for distance learning. Most of the existing research indicates that not many students will participate in learning effectively. Several things influence it, such as being caused by differences in the learning environment and the characteristics of the students themselves (Nakayama, Mutsuura, & Yamamoto, 2014). In addition, it was found that many students were bored and lazy to do distance learning. Based on the interview with one of the mathematics teacher in MA Madani Alauddin Pao-Pao, the teacher have difficulties in conveying material in this situation. He also explained the difficulties in conveying mathematical material such as linear equation systems with three variables material that was taught to students of class X MA. This affects low student learning outcomes. Situations like this make teachers required to provide innovation and creation in online learning models so that students remain enthusiastic about taking lessons (Anugrahana, 2020).

Learning media is one of the contributing factors to the success of the learning process in the school because it can facilitate the teachers to deliver information to the students. The use of creative and varied media is believed can increase learning efficiency so that the learning goals can be achieved (Gayatri, Soegiyanto, & Rintayati, 2018), and enhance the absorption and retention of students against learning material (Khuzaini & Santosa, 2016). This requires teachers to be able to innovate and adapt to the current situation. One way to tackle this online learning process is by utilizing information technology facilities as a learning medium. An example of using technology in the mathematics learning process is by using mathlet (mathematical applet). Mathlet is a program in a computer with a function as a learning medium. Mathlet has a light capacity for learning concepts where students explore mathematical concepts such as Geogebra, Excel, Adobe Flash, and others (Suweken, 2012).

Adobe flash is a graphic animation program that is used to produce works in the field of animation, presentations to learning media. The adobe flash program has the advantage of making 2-dimensional designs, making movies, games, animation buttons, and interactive menus. Adobe flash is also equipped with an action script menu, custom easing, and filters. The adobe flash program can integrate the components of color, images, sound, music,

and motion animation more smoothly (Tsani, Widowati, & Wahyuningsih, 2019). Adobe flash as an interactive learning media will help realize a good learning process because it becomes easier for students to receive the subject matter (Ampera, 2017). Therefore, it is necessary to study the integration of technology into learning (Uslu, 2018).

In addition, learning mathematics must experience changes in the context of improving the quality of education to improve optimal learning outcomes. Therefore, efforts continue to be made to realize innovative learning by the times and technology. In addition to harmonizing education with technological advances, education is also expected to build the values and character of each student through religious values (Maarif, 2015). Mathematics integration with religion needs to be done. Islamic integrated mathematics studies can take the form of Islamic nuanced mathematics, for example, mathematical problems in the context of the problem related to worship (Sugilar, Rachmawati, & Nuraida, 2019).

Research by Edwar, Ardie, and Nulhakim (2021) reveals that adobe flash CS6 learning media is very suitable for use in improving student learning outcomes in ICT learning. The development of android-based learning media using the adobe flash CS6 application can be used to assist teachers in the learning process (Kodri, 2020). Student responses to interactive learning media assisted by adobe flash CS6 were very good, so it can be concluded that students were very interested in using interactive learning media applications assisted by adobe flash CS6 as an alternative learning media (Yazid, Herma, Husni, & Sururuddin, 2021).

This shows the need to develop learning media that involve students actively when using media and integrate mathematics with the Islamic context. Based on the explanation, this study aims to develop explorative mathlet learning media based on adobe flash CS6 with Islamic nuances on linear equation system with three variables material.

METHODS

This research is research and development (R&D). This research is used to produce products and test the effectiveness of the products produced. In addition, this study uses the Alessi and Trollip development model. The stages of multimedia development consist of: (1) the planning stage, (2) the design stage, and (3) the development stage (Alessi & Trollip, 2001). The reason for choosing the Alessi and Trollip development model is because this

development model is very suitable for the product you want to develop by being programmed in a systematic order. In addition, the stages in the Alessi and Trollip development models also focus less on learning design but on the development of learning media. The research design in this trial will use a one-shot case study design, which is an approach using one-time data collection.

This research was carried out at MA Madani Alauddin Pao-Pao for the 2020/2021 academic year. The subjects of this study were students of class X IPA 1 MA Madani Alauddin Pao-Pao. Trials were conducted to see the product's validity, practicality and effectiveness to be developed. The product in this study is in the form of explorative mathlet learning media based on adobe flash CS6 with Islamic nuances on the material of a linear equation system with three variables. The instruments in this study were validation sheets, student response questionnaires, teacher response questionnaires, students' activity observation sheets, and learning achievement tests.

The validity test was carried out to assess the validity of all the instruments and learning media using questionnaire data from validators using a scale of 5 (likert scale). Learning media is said to be practically based on the teacher's response to using learning media. The effectiveness of explorative mathlet learning media is supported by 3 components of effectiveness, namely: students' activity observation sheet, student responses, and student learning achievement test.

RESULTS AND DISCUSSION

The development of explorative mathematics mathlet learning products uses a development model adapted from the development model of Alessi and Trolip with product development stages namely planning, design, and development stages.

1. The planning stage, is divided into 3 parts, namely identification of problems, identification of needs, and collection of materials. In problem identification, it can be seen that what is needed by teachers and students is learning products that are appropriate to the characteristics of students, namely learning products that can facilitate understanding of the concepts of the material being taught. Identification of needs obtained during the initial observation is divided into 3 categories, namely product material assessment, product manufacturing tool assessment, and specification analysis. In the study of product material, it was decided to take trigonometry material because the material was difficult for students to

understand and in the study of product manufacturing tools based on theoretical studies and observations and seeing the ease of running the program, one application was used that could make explorative learning products, namely adobe flash CS6, whereas in the specification analysis, namely determining which devices can be used with the learning products that have been developed, based on the adobe flash CS6 application, this product can only be run on laptops or computers and also smartphones.

2. The design stage is divided into 2, namely making flowcharts and making storyboards. Making a flowchart helps design learning products by showing the flow of the program to be made and making it easier to see certain parts that have a relationship. Then for making storyboards it is very important to do a sketch that uses words, both how to use the display and the function of the navigation buttons.
3. Development Stage, the explorative mathlet being developed is media that has been prepared with specifications in the form of an application format that can be opened either using a laptop/computer or using a smartphone. This stage is divided into 2 parts, namely display making and writing program code. In addition, instrument development is also carried out in the form of student response questionnaires, teacher response questionnaires, student activity sheets, and learning achievement tests.

   The stage of making the display is to slowly build the parts of the application that the developer will make, from the intro display to the quiz display. For the stages of writing this program code, it takes place simultaneously with making the display, the programming language used is action script 3.0.

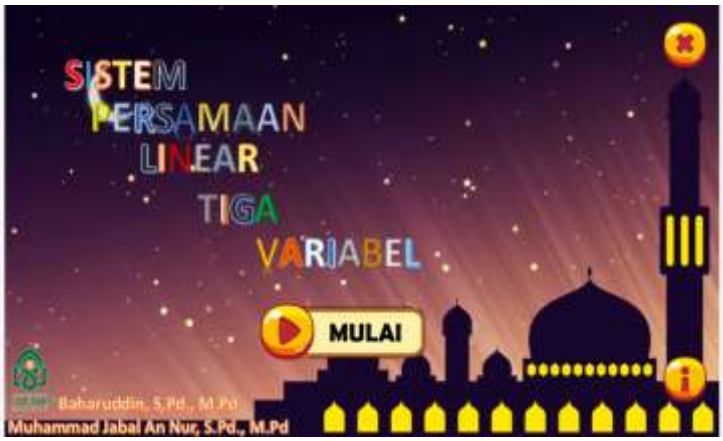

Figure 1. Intro View

In this view, the title of the material from the learning media that was developed with Islamic nuances will appear with several buttons such as for information and the function of each button, and then you will be directed to click the button to enter the main menu.

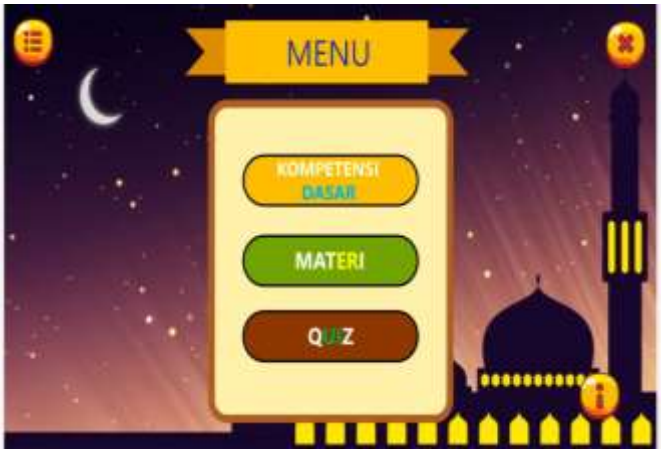

Figure 2. Main Menu Display

On the Main Menu Display, Basic Competency features, Materials and Quizzes will be presented. Students can immediately learn and understand the material through these features.

Figure 3. Material Display

In the Material Display, students will be presented with material on a three-variable system of linear equations. For how to solve the problems contained in the 3-variable system of linear equations material will be made separately so that students can focus more.

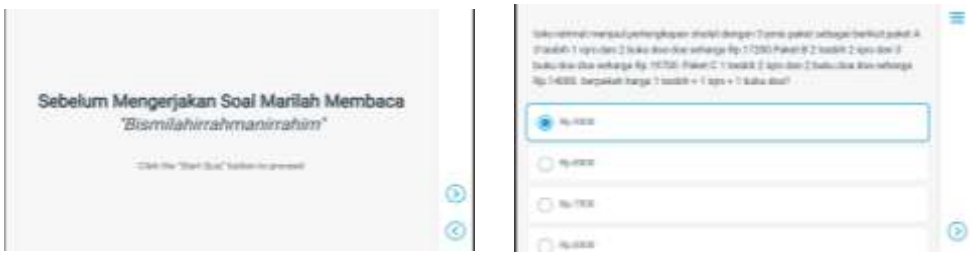

Figure 4. Quiz View

In the quiz display, students will be invited to pray together at the beginning and then will be directly directed to the quiz in the form of multiple-choice auto-correction. When students answer correctly, they will appear immediately.

a. Material Expert Validation

After the learning product has been made, material expert validation is carried out. Material expert validation is used to assess the material that has been compiled in explorative mathlet learning products. There are two aspects assessed, namely the learning aspect and the content aspect. The learning aspect is assessed to find out whether the material presented is by the basic competencies and content aspects to find out whether the content of the material is clear in its presentation. Material expert validation was carried out in 2 stages. The questionnaire uses a Likert scale with five alternative answers. The results and validation analysis from material experts can be seen in the following table.

1) Learning Aspects

Table 1. Data Validation of Learning Aspects by Material Experts

No	Aspects	Score	Category
1	Conformity of material with competency standards	4	Good
2	Systematic presentation of material	4	Good
3	Conformity of material with competency standards	4	Good
4	Clarity of material description	4	Good
5	Adequacy of evaluation	4	Good
6	Give students the to practice on their own	4	Good
7	Clarity of use of language	4	Good
Total			28
Mean score		4	Good

Source: Primary Data Processed, 2022

Based on table 1, there are 7 indicators obtained from the learning aspect. The total validation score on the learning aspect by material experts is 28 with 7 indicators, so the average assessment result from material experts is 4. Referring to the conversion table, the assessment results from material experts in the learning aspect are good.

2) Content Aspect

Table 2. Content Aspect Validation Data by Material Expert

No	Aspects	Score	Category
1	Clarity of presentation of the material	4	Good
2	Material truth	4	Good
3	Conformity of giving examples with the material	4	Good
4	Ease of material to understand	4	Good
5	The images presented support the material	4	Good
6	Formula questions according to basic competence	4	Good
Total			24
Mean Score		4	Good

Source: Primary Data Processed, 2022

The total validation score of material experts on content aspects is 24 out of 6 indicators so the average result of the material expert's assessment is 4 in a good category. Referring to the conversion table, the assessment of the content aspect is good.

b. Media Expert Validation

Validation carried out by media experts is used to assess interactive multimedia-based products. These aspects include display aspects and programming aspects. Display aspect to assess images, animation, music support, color selection, and screen display. This assessment intends to see whether or not the product is feasible to be implemented for students. Programming aspects assess navigation clarity, consistent use of buttons, clarity of instructions, ease of use, text efficiency, image efficiency, response to learners, and program speed. The media validator is a lecturer in the field of learning technology. The results of the analysis of media experts can be seen in the following table.

1) Display the Aspect

Table 3. Display Aspect Validation Data by Media Experts

No	Aspects	Score	Category
1	Clarity of navigation on the program	4	Good
2	Clarity of writing	4	Good
3	Accuracy of color selection and composition	4	Good
4	Consistency of button placement	5	Very good
5	Image display quality	4	Good
6	Animation show	4	Good
7	Music support	5	Very good
8	Accurate use of language	5	Very good
9	Background color with text	4	Good
Total			39
Mean Score		4.3	Good

Source: Primary Data Processed, 2022

Based on the results of table 3, there are 9 indicator items obtained from the display aspect. The total validation score on the display aspect by media experts is 39 with 9 indicators so the average assessment results from material experts are 4.3. Referring to the conversion table, the evaluation results from media experts in the display aspect are good.

2) Programming Aspect

Table 4. Programming Aspect Validation Data by Media Experts

No	Aspects	Score	Category
1	Navigation clarity	4	Good
2	Consistency of button usage	5	Very good
3	Ease of use	4	Good
4	Image efficiency	4	Good
5	Program speed	5	Very good
Total			22
Mean Score		4.4	Good

Sumber: Data Primer Diolah, 2022

The total validation score of the media expert on the programming aspect is 22 out of 5 indicators so the average result of the media expert's assessment is 4.4 in the good category. Referring to the conversion table, the assessment of the programming aspect is good.

The explorative mathlet learning media based on adobe flash CS6 with Islamic nuances was developed through the validation stage which was carried out by two validators. The validator provides an assessment score and suggestions for improvement through a validation sheet that has been prepared to solicit theoretical and practical considerations to improve the contents of the explorative mathlet. Explorative mathlet validation results and research instruments with an average value of 4.5 in the range of values X > 4.2. This shows that the explorative mathlet being developed is in the very good category, in the sense that the explorative mathlet can be tried out.

After the validation stage was carried out and declared feasible to be tested. Next is the application to students to measure the level of practicality and effectiveness. After the trial was carried out on class X IPA 1 MA Madani Alauddin Pao-Pao students, the level of practicality was obtained from the teacher's response questionnaire. The results of the analysis from the teacher's response questionnaire also gave a 100% positive response to learning products that were at $\leq RS \leq 100$ in the sense that the teacher's response questionnaire was stated to be very positive, indicating that the explorative mathlet learning media used met the practicality criteria. This is in line with the research on the development of interactive learning media assisted by adobe flash CS6 in class IV MI NW Sukamulia that the student response to interactive learning media assisted by adobe flash CS6 is very good so that it can be concluded that students are very interested in using interactive learning media applications assisted by adobe flash CS6 as an alternative learning media (Yazid, Herma, Husni, & Sururuddin, 2021). Kuswanto and Radiansah (2018) also stated that android-based learning media is feasible to be implemented in schools.

The level of effectiveness is seen from the results of the analysis of observations of students' activities, analysis of the results of student response questionnaires, and the results of the analysis of learning outcomes tests. The results of the analysis from observing the activities of 83% of students who are at the percentage interval of $80 \leq X \leq 100$. This means that the activity of students in the learning process is very good. The results of the analysis from the student response questionnaire obtained a percentage of 83% which was at $80 \leq RS \leq 100$ in the sense that the student's response was positive, and the results of the analysis of the learning achievement test were in the high category with a percentage of 81% which was in the range of 75% - 90% or a score of 75-90 (standard category set by the Ministry of National Education).

This is also in line with research conducted by Jubaerudin regarding the development of android-based interactive media assisted by articulate storyline 3 in mathematics learning during a pandemic, the results of an analysis of effectiveness were very good (Jubaeruddin, Supratman, & Santika, 2021). The learning outcomes of students in biology subjects are effective by using Android-based learning media (Muyaroah & Fajartia, 2017). Adobe flash CS6 learning media is very suitable for use in improving student learning outcomes in ICT learning (Edwar, Ardie, & Nulhakim, 2021). The development of Android-based learning media using the adobe flash CS6 application can be used to assist teachers in the learning process (Kodri, 2020; Muhammad, Yolanda, Andrian, & Rezeki, 2022).

The development of information technology affects various aspects of human life (Varisa & Fikri, 2022). Fitrah and Kusnadi (2022) revealed that teachers must develop and interpret their skills to integrate Islamic values which are closely related to mathematics so that the output can lead students to become advanced and characterized human beings.

CONCLUSION

Based on the results and discussion of this study, the product development process refers to the Alessi and Trollip development model starting from the planning stage, the design stage, and the development stage. Explorative mathlet learning media based on adobe flash CS6 with Islamic nuances is feasible to use based on the results of expert validation. Practical criteria were obtained based on the analysis of teacher response data to learning media which stated that the teacher gave a positive response. Effective criteria were obtained based on students' activity during the learning process in the very good category, students give a positive response to learning products, and learning outcomes tests were in the high category.

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