# Development of Interactive Multimedia Using Adobe Animate Software on the Material of Sequences and Series For Class XI MAN Bintan

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**Abstract**

In the implementation of the teaching and learning process, the use of learning media is still not optimally applied, besides seeing the obstacles experienced by students in learning mathematics, especially the material for rows and Series. So, a solution is needed to deal with the problems that occur. Based on the results of interviews conducted with a mathematics subject teacher, it was found that the teaching materials required by students to support mathematics learning with the demands of the use of technology were in the form of teaching materials that could be run on a computer or smartphone. This study aims to describe the development of learning media in the form of interactive multimedia using Adobe Animate on the material of sequences and Series for class XI Islamic High School (MAN) Bintan, which is valid and practical. The type of research used is Research and Development (R&D) using the ADDIE research model, which stands for Analysis, Design, Development, Implementation, and Evaluation; in this current research, it was only until the implementation stage. The subjects of this study were 20 students of class XI MAN Bintan. The types of data in this study are quantitative and qualitative data. Research instruments are media and material validation sheets and questionnaires for teacher and student responses to be checked for practicality. The results showed: (1) the validity of interactive multimedia based on the assessment of media and material experts got an average percentage of 81,37% validity with very valid criteria. (2) the practicality of interactive multimedia based on the questionnaire responses of teachers and students after using interactive multimedia got an average percentage of 89,34% practicality with very practical criteria.

*Keywords:* development; interactive multimedia; adobe animate; sequence and series.

## I. Introduction

The development of an increasingly advanced era impacts major changes seen in the industrial era 4.0. According to Lase (2019), the world has entered the era of the industrial revolution generation 4.0, marked by increased connectivity, interaction, and development of digital systems, artificial intelligence, and virtual. The development of the times has an impact on change, one of which is in the field of education.

Education is an important element in improving the quality of human resources in personal formation because education is the right of all nations. As the 1945 Constitution Article 31 paragraph (1), every citizen has the right to education. In this case, the education in question is formal education held in schools. School is one of the facilities in the implementation of education. According to Law Number 20 of 2003 Article 18 (2003) concerning national education,

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schools are educational institutions that provide formal education consisting of basic education, secondary education, and higher education. Educational institutions are the key for every citizen to get the rights and obligations in obtaining knowledge.

In line with the development of an increasingly advanced era, the world of education is also experiencing developments that are now entering the 4.0 education era, a transition from 3.0 education. According to Surani (2019), education 4.0 is influenced by the industrial revolution 4.0 in describing various ways to integrate technology into learning. Now humans can take advantage of technology and communication to facilitate education. According to Mukminan (2014), advances in the IT field, especially learning technology, have encouraged the use of learning media and increasingly sophisticated equipment, where learning activities have moved towards reducing the conventional learning material delivery system that prioritizes the lecture method and replaced with a modern learning material delivery system that prioritizes the role of the learner and the use of learning technology.

The Regulation of the Minister of Education and Culture Number 68 of 2013 concerning the 2013 Curriculum instructs that teachers must give students the widest opportunity to learn from various available learning sources. This makes the teacher no longer the only source of learning for students, and the use of learning media is expected to change the learning atmosphere to be more creative and innovative so that it helps and makes it easier for students to understand the mathematical concepts being taught more quickly.

Learning media is a teaching material that is an important component in the ongoing learning process because it is a way that allows students to understand and understand lessons easily. According to Murtiyasa (2012), students in learning mathematics do not only depend on "what" is taught but also depends on "how" mathematics is taught or how students learn.

According to Setiawan & Rizki (2018), the development of teaching materials is one solution to attract students' interest in learning mathematics. Sari (2019) also revealed that to increase student interest and student activity in the learning process, a learning media is needed to present material realistically and be applied in everyday life to increase and attract student learning interest.

Based on the experience of researchers who carried out PLP (School Field Practice) at MAN Bintan, it was known that many materials were difficult for students to understand, one of which was sequences and Series. The MAN level studies sequences and series material in class XI. Researchers conducting PLP found that understanding of the material of sequences and Series seen from the results of student tests was still low. The low understanding experienced by students is in writing down what is known in the story questions, so students do not understand the material in everyday life that is visualized in the problem. In implementing the teaching and learning process, the use of instructional media is still not optimally applied in addition to seeing the obstacles experienced by students in learning mathematics. So, a solution is needed to deal with the problems that occur. Based on the results of interviews conducted with a teacher of mathematics subjects, it was found that the teaching materials needed by students in supporting mathematics learning with the demands of the use of technology were in the form of electronic teaching materials. Teaching materials that can be run on a computer or smartphone contain visualization of presentations and explanations of contextual problems in everyday life so that they can be useful and useful for students in learning mathematics. By looking at the problems and needs experienced by students in learning mathematics, interactive multimedia-based learning media is a way that can be used to solve the problems faced.

From previous research conducted by Masykur et al (2017), the problem studied was the lack of use of learning media in the mathematics learning process, so researchers developed

Macromedia flash-based learning media. The same thing was also done by Setiawan & Rizki (2018); the problem studied was the limited number of learning materials used in the learning process and not according to the needs of students. In addition, teaching materials used in the learning process are using PowerPoint. However, teaching materials that combine text, sound, images, videos, animations, and interactive quizzes have never been used in the learning process. As well as what was done by Septiawan and Abdurrahman (2020) from the results of interviews and observations, it was found that it was easier for students to learn with the media used, and the impact on student's motivation, interest, and enthusiasm for learning was greater than explaining with the lecture method alone, the limitations of the three researchers. These are limited products and can only be used on computer devices. From this, the researchers tried to develop interactive multimedia that was loaded on the smartphone device, which is a media that can assist teachers in transferring knowledge in the mathematics learning process, creating a sense of interest to focus on learning and can bring up student activity to find, construct their knowledge in solving mathematical problems experienced by students.

Technology-based learning media are computers or cell phones (Akhmadan, 2017). This device is easy to carry anywhere to communicate, especially on renewable devices, namely smartphones with the Android operating system and a cellphone equipped with technology resembling a computer (Abida & Kusuma, 2019). This can be seen from the data in 2015, which said that Android was the most popular mobile operating system in the world with a comparison of the operating system market share controlled by Android at 65% and the rest Ios, Windows Phone, and so on (Said et al, 2018). Apart from being a communication function, Android also has the potential to be developed into an interactive multimedia-based learning media that is useful for educators and students.

Interactive multimedia, according to Munir (2012) is media that presents a combination of various elements of information such as text, graphics, audio, video, animation, and sound, which aims to convey information equipped with controllers that can be operated by users, so that users can want what they want or when the multimedia element you want to display. Many applications support interactive multimedia criteria, such as Adobe Animate, a multimedia graphics, and animation program that can be used to create interesting interactive web applications and as a game maker program. With adobe animate, researchers can easily and freely create animations with free movement and interact with the media because it is interactive; therefore, adobe animate is software that is very suitable for creating interesting learning media.

The problem in this research is how to develop interactive multimedia using Adobe Animate software on valid and practical class XI MAN Bintan line and series material. The purpose of this study is to describe the development of learning media in the form of interactive multimedia using adobe animate on valid and practical sequences and series material for class XI MAN Bintan.

## II. Research Methods

The type of research used is R&D (Research and Development), a scientific way to research, design, produce, and test the products produced (Sugiyono, 2019). The product that will be developed and tested for practicality in this research is interactive multimedia using Adobe Animate software on sequence and series material.

The development model used in this study is ADDIE, developed by Dick and Carey (1996) which stands for Analysis, Design, Development, Implementation, and Evaluation. However, the researchers only applied part of the model, namely the Analysis, Design, Development, and Implementation (ADDI) stages. The limitation in this study is that the researcher did not carry out the product effectiveness stage because the material was used in the odd semester, where the

material had been missed, so it was not possible to carry out effectiveness because it was not in line when the trial was carried out.

The research instruments used in this study were expert validation and practicality questionnaire sheets which aimed to determine the validity and practicality of interactive multimedia.

Product trial is the stage of testing the validity of the product that has been developed. Multimedia, which has been said to be valid by experts, is then tested to know the level of practicality and usability of the products that have been developed. The product trial subjects in this study were students of class XI IPA 1 MAN Bintan.

The types of data generated in this study are qualitative and quantitative data. Qualitative data were obtained from suggestions and comments from experts' validation results and questionnaire responses from educators and students. Quantitative data were obtained from expert validation sheets and teacher and student responses questionnaires.

To test the validity and practicality of multimedia, the researchers changed the data from a qualitative scale to a quantitative one; according to Dianti (2020), the Method of Summated Ratings (MSR) is a method for transforming qualitative scale data into quantitative scale data. Data transformation was carried out using the Method of Summated Ratings (MSR) using the help of the Microsoft Excel 2010 application. The expert validation and response questionnaires used a Likert scale with five answers. Scoring guidelines can be seen in Table 1 as follows (Setiawati, et al, 2013).

Table 1.
Scoring guidelines

| Score | Information |
|-------|-------------|
| 5 | SS (strongly agree) |
| 4 | S (agree) |
| 3 | C (enouhgnnnnnnnnnnn) |
| 2 | TS (don't agree) |
| 1 | STS (strongly not agree) |

## III. Results and Discussion

The results of this study are interactive multimedia developed using Adobe Animate software on the material for class XI MAN Bintan. The interactive multimedia developed in this study uses the ADDIE development research model developed by Dick and Carey (1996) with the stages of Analysis, Design, Development, Implementation, and Evaluation. In this study, researchers only applied four stages: the Analysis, Design, Development, and Implementation stages. This research has reached the implementation or trial stage to see the practicality of multimedia that is already valid based on the assessment of media and material experts. Based on the development research conducted, the following research results were obtained:

### 1. Analysis
In the analysis phase, the researchers reviewed the curriculum and the needs and characteristics of students.

#### a. Curriculum Analysis
The curriculum used at MAN Bintan is the 2013 revised edition of the 2017 curriculum. Curriculum analysis is carried out to determine competencies in the teaching materials developed because the Minister of Education and Culture Regulation No. 68 of 2013 concerning the 2013 Curriculum instructs that teachers must give students the widest opportunity to learn from various existing learning sources, including the use of technology in learning, so that classroom learning is more creative and innovative so that it helps and makes it easier for students to understand the mathematical concepts being taught more quickly. All competencies in the curriculum are available in the teaching materials. This research is focused on mathematics subjects at MAN Bintan class XI odd semester.

#### b. Analysis of Student Needs and Characteristics
Analysis of student needs and characteristics aims to see the gap between competence,

skills, and attitudes in identifying supporters and barriers to the learning process to select and determine appropriate and relevant media to achieve learning objectives and lead to increased learning carried out by students MAN Bintan by conducting interviews with subject teachers. The use of learning media applied to mathematics subjects at MAN Bintan is still limited. This condition still does not involve students actively in teaching and learning activities in class. The results of interviews with teachers show that teaching and learning activities in mathematics at school are still not optimal using technology-based learning media; teachers only apply teaching materials such as PowerPoint. However, student activity in learning is still lacking because powerpoints only make students see and listen while learning without being able to interact directly with the media. In line with the Introduction to the School Field (PLP) conducted by researchers in the odd semester of the 2020/2021 academic year at MAN Bintan, which applies distance or online learning, it is still oriented toward teachers who are fixated on providing material so that students become passive during the learning process. It is also known that many materials are difficult for students to understand, one of which is the material for sequences and Series in learning mathematics.

The characteristics of students at MAN Bintan today are inseparable from using smartphones, especially to access subjects. What is needed in the teaching and learning process is interesting learning media so that students can be actively involved in the learning process. Therefore, researchers developed interactive multimedia-based learning media that can be utilized for students' understanding of learning mathematics.

**2. Design**

At this stage, the researchers designed interactive multimedia using Adobe Animate based on the results of previous analyzes, which aimed to get the initial conceptual framework of the product. The interactive multimedia was developed specifically for the material for class XI MAN Bintan. Several things are done at the design stage: the preparation of criteria tests, selection of media to create and publish interactive multimedia, selection of media presentation forms, and initial product design. The explanation of the design stage is as follows:

a. **Preparation of Criteria Tests**

The preparation of the criteria test includes the preparation of a questionnaire to measure the validity and practicality of the developed interactive multimedia. Expert validation sheets to measure the validity of interactive multimedia expert validation sheets include media expert and material expert assessments carried out by one mathematics education lecturer and one mathematics teacher. Aspects of the media validation sheet are aspects of appearance, letters, menus, and applications, as well as aspects of the material validation sheet, namely aspects of content, presentation, and language. Questionnaire sheet responses of educators and students to measure the practicality of interactive multimedia; in the questionnaire, aspects such as appearance, ease of use, presentation of material, and benefits are assessed.

b. **Format Selection**

The selection of the resulting format is the media that will be carried out to support the interactive multimedia development process which is making interactive multimedia using adobe animate software that produces products that can be run on smartphones.

c. **Selection of media presentation**

The selection of media presentations aimed at designing interactive multimedia menus adapted to the curriculum and learning materials in full and produced at an early stage to ensure the product meets all standards imposed on it so it can be tested.

d. **Initial product design**

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The product is carried out in the initial design process before the development stage. In the initial design, researchers made interactive multimedia with the colors chosen in making interactive multimedia blue and gray. Color selection is important because the first thing the user sees is the colors of the background used. The right color combination will make an interesting impression on the whole. The following is a display of interactive multimedia.

1) Home

The home screen contains text including the main title and school level and has a menu button to direct the user to the desired page.



Figure 1. Home page display

2) Basic Competence

This page explains Basic Competence (KD), Competency Achievement Indicators (IPK), and Learning Objectives.



Figure 2. Basic competency page display

3) Material

The material in this interactive multimedia discusses the pattern of number sequences and Series, the concept of arithmetic and geometric sequences and series, and an infinite geometric series. All display materials are supported by pictures and animations that increase students' understanding and can interact directly with the media.



Figure 3. Material page view

4) Simulation

The display in the simulation contains the input of known data to find a solution to the problem of sequences and Series. The simulation menu has a clear completion flow until the answer is found.



Figure 4. Simulation page view

5) Exercise

On the exercise page, discussing questions from the line and series material, there is also a help button that is useful for users in carrying out the initial stages of working on the given exercise so that they know the initial steps from working to completion.



Figure 5. Exercise page view

6) Test

The test, page contains multiple-choice questions, totaling 15 questions with 5 answer choices. The purpose of this test is that students can hone their mathematical understanding and solve mathematical problems related to everyday life.


Figure 6. Test page display

7) Instructionsions

The instructions page contains text that explains the use of the buttons in interactive multimedia. This page is intended as a guide for interactive multimedia users to be able to use it well.


Figure 7. Hint page view

8) Profile

The profile page display of this interactive multimedia contains the developer's identity.


Figure 8. Profile page view

9) Music

The Music menu is a supporting aspect or background containing simple instrument songs that the user can play on and off.


Figure 9. Music page view

10) Exit Menu

On the exit menu, a warning will appear to the user to confirm whether they want to exit interactive multimedia.


Figure 10. Exit page view

## 3. Development

In this development stage, the next step is for researchers to consult with supervisors to get suggestions for improvement and improvement of learning media so that further assessment can be carried out by media experts (Alfiansyah, 2019) and material experts (Rihandoko, 2018) and can be tested on educators and students through validation sheets and response questionnaires.

**a. Validation assessment by media expert and product revision**

The media expert validation assessment on the interactive multimedia developed was conducted by two validators: one UMRAH mathematics education lecturer and one mathematics teacher.

Based on the results of data analysis using MSR from the assessment of the two media experts above, an average result of 81.90% was obtained by meeting the very valid criteria. The average percentage and data criteria for media expert validation based on the aspects assessed on the media can be seen in Table 2 below.

Table 2.
Media expert calculation results

| No. | Aspect | Average (%) | Criteria |
|---|---|---|---|
| 1 | Appearance | 80,68 | Very Valid |
| 2 | Letter | 70,12 | Valid |
| 3 | Menu | 86,94 | Very Valid |
| 4 | Application | 89,87 | Very Valid |
| Overall media validation results | | 81,90 | Very Valid |

**b. Validation assessment by material expert and product revision**

The assessment of material expert validation in the interactive multimedia developed was carried out by two validators: one UMRAH mathematics education lecturer and one mathematics teacher.

Based on the results of data analysis using MSR from the assessment of two material experts, an average result of 80.85% was obtained by meeting the very valid criteria. The average percentage and data criteria for material expert validation based on the aspects assessed in the material can be seen in Table 3 below.

Table 3.
Material expert calculation results

| No. | Aspect | Average (%) | Criteria |
|---|---|---|---|
| 1 | Contents | 76,92 | Valid |
| 2 | Presentation | 89,27 | Very Valid |
| 3 | Language | 76,38 | Valid |
| Overall material validation results | | 80,85 | Very Valid |

The validation assessment by media experts obtained an average percentage of 81.90%, and the validation assessment by material experts obtained an average percentage of 80.85%; this shows the criteria are very valid, with an average percentage of validity of 81.37%.

**4. Implementation**

At this stage, all interactive multimedia designs that have been developed are applied to educators and students after validation and revision.

The researcher conducted a trial using class XI IPA 1 MAN Bintan subjects; the test was intended to see the level of practicality in interactive multimedia (Arriza, 2020). This test consists of 1 subject teacher and 20 students. The assessment includes several aspects, namely aspects of appearance, ease of use, presentation of material, and benefits.

The results of data analysis using MSR from the assessment of the educator's response questionnaire obtained an average result of 87.86% by meeting very practical criteria. The results of the practicality data of the educator response questionnaire can be seen in Table 4 below.

Table 4.
Calculation results of educator response questionnaire

| No. | Aspect | Average (%) | Criteria |
|---|---|---|---|
| 1 | Appearance | 100 | Very Practical |
| 2 | Ease of use | 100 | Very Practical |
| 3 | Material presentation | 72,01 | Practical |
| 4 | Benefit | 79,42 | Practical |
| Overall educator practicality results | | 87,86 | Very Practical |

Meanwhile, the results of data analysis using the MSR from the assessment of student response questionnaires obtained an average result of 90.82% by meeting very practical criteria. The results of the practicality of student response questionnaire data can be seen in Table 5.

Table 5.
Results of calculation of student response questionnaires

| No. | Aspect | Average (%) | Criteria |
|-----|--------|-------------|----------|
| 1 | Appearance | 93,17 | Very Practical |
| 2 | Ease of use | 91,32 | Very Practical |
| 3 | Material presentation | 90,20 | Very Practical |
| 4 | Benefit | 88,60 | Very Practical |
| Practical results of students as a whole | | 90,82 | Very Practical |

The results of trials for educators as a whole obtained an average percentage of 87.86% with very practical criteria. The results of the practicality test of students as a whole obtained an average percentage of 90.82% with very practical criteria; thus, the average percentage of practicality was 89.34%, which means interactive multimedia meets the criteria for being very practical and can be used in learning.

The development of other Mathematics Learning Media on Sequences and Series Materials got the same results. The result s of the analysis of the average validation of instructional media is 92.15% which falls into the very valid category, while the results of the analysis of the average practicality of the learning media are 92.66% which falls into the very practical category (Septiawan, 2019). But this research uses Adobe Flash CS6 Professional.

Based on the test results, validators and practitioners stated that this learning media was suitable for use in learning. The use of adobe flash in learning can also increase students' learning motivation. By research results Oktafiani et al., (2020) state that the development of interactive multimedia-based learning media using Adobe Flash can have implications for increasing learning motivation, making it easier for students to understand material during the COVID-19 pandemic and making it easier for teachers to deliver learning materials. The results of the study

also state that learning using interactive multimedia is more effective than conventional learning (Hidayati, 2017).

## IV. Conclusion

From the results of research and development carried out with the ADDIE model development stage, it can be concluded that the interactive multimedia developed using adobe animate software on the material for class XI MAN Bintan has met the criteria and is practical.

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