



## Development of Macromedia Flash Based Teaching Materials on IT-Based Statistical Data Analysis

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**Abstract:** This study aims to produce macromedia flash-based teaching materials in IT-based statistical data analysis courses that are tested validity. The form of research carried out is research development under the term Research and Development (R&D). This research was conducted at the Faculty of Mathematics and Natural Sciences UIR Academic Year 2018/2019 in sixth semester students. The research subjects in this study were sixth semester students of UIP Mathematics FKIP. Based on the 4-D development model, the researcher made the design of this development procedure consisting of only 3 stages, namely defining, planning, and developing. The deployment stage (desseminate) was not carried out due to time and cost limitations. The data collection instrument in this study was a validation sheet of learning tools. Data analysis technique is an analysis technique used is descriptive analysis that describes the validity of macromedia flash-based teaching materials on IT-based statistical data analysis courses. From the research results obtained validity of Macromedia flash-based teaching materials meets the category of very valid with an average total of 87,955. Based on the research results it can be concluded that research has produced macromedia flash-based teaching materials in valid IT-based statistical data analysis courses.

**Keywords :** Teaching Material; Macromedia Flash; Statistical Data Analysis

### Introduction

At this time, a learning process in a university should ideally not only be a process of transferring knowledge from a lecturer to its students. Learning activities which are expected to be interpreted as active efforts of lecturers to help students in building their knowledge by using the experiences or knowledge that have been previously held by students. Lecturers are no longer positioned as authority holders who try to transfer their knowledge to students, but rather as facilitators who provide opportunities for students to build their knowledge through meaningful learning activities.

Good learning media must meet several requirements, namely learning media must increase learner motivation, the use of media has the aim of providing motivation to learners, and the media must also stimulate learners to remember what they have learned in addition to providing new learning stimuli. That way, an educator must be wiser in nature to determine the

media used in learning. The teachers who teach in class should have the willingness to make learning media that did not yet exist or develop existing learning media to overcome limitations in the delivery of information in the learning process (Erningsih, Armanto, & Yus, 2018).

According to (Meifiani & Prastyo, 2015; Widjayanti, Masfingat, & Setyansah, 2018) one alternative media that can help students to do a lot of exploration in limited time is to use computer assistance with various relevant programs. Therefore, researchers on this occasion used computer media to help develop their learning media. The computer program is ideal for use in learning concepts that require high accuracy, repetitive concepts or principles, completing graphics accurately, quickly and accurately. The latest computer-based learning media include text, graphics, audio, and video that are created, packaged, presented, and used interactively through computers.

Furthermore according to (Masykur, Nofrizal, & Syazali, 2017) states as the rapid development of science, technology and globalization flows are becoming more rapid at this time, a lot of computer applications launched such as Geogebra, Microsoft Powerpoint, Mathematica 7, Adobe Flash, Macromedia Flash, etc. which should have been used by educators in Indonesia to develop it as teaching material especially in learning mathematics.

Macromedia Flash is a program for creating animations and professional web applications. Not only that, Macromedia Flash is also widely used to create games, cartoon animations, and interactive multimedia applications such as product demos and interactive tutorials. Macromedia software output is a program for designing animated graphics that are very popular and widely used by graphic designers. In addition this application can also be used to load animated logos, movies, games, making navigation on websites, banners, button animations, interactive menus, interactive form fields, screen servers, and creating web sites or making other web applications (Andreas, 2003)

As an educational media, Macromedia Flash certainly has advantages and disadvantages. According to (Apriandi & Setyansah, 2017; Kusuma, 2018) Macromedia flash as a multimedia-based learning media has advantages over other multimedia presentations, there are (1) users can easily and freely create animations with free movements according to the desired animation scene; (2) can produce files with a small size, this is because flash uses animation with vectors; (3) produces file types (extensions), FLA which is flexible, because it can be converted into files of type swf, html, gif, jpg, png, exe, mov, this allows Macromedia flash program users to share the needs we want; (4) more able to understand the material being studied because each material presented simulations; and (5) can interact with the media because it is interactive.

Macromedia flash as an alternative learning media has the following limitations, there are (1) for a beginner it takes a long time to learn to learn Macromedia Flash as a graphic design software; (2) the menu is not user friendly; (3) Need a lot of tutorial references; (4) the programming language is rather difficult; (5) there is no template in it; and (6) large file size.

The use of macromedia flash in learning can help lecturers in explaining the subject matter is expected to make students easier to remember the material being taught, answering practice questions as strengthening the understanding of the material and providing new experiences to make students motivated. The selection of interesting fonts in the presentation of the material is expected to make students easier to remember the material being taught. Thus, learning media with macromedia flash provides opportunities for students to be more creative in gaining experience in learning. Students feel that the learning process is not limited by space and time (Amir, Hasanah, & Musthofa, 2018). Also, media can make learning more fun, not boring, and increase student interest (Reffiane & Bayutama, 2019), so that the use of learning media can influence student learning outcomes (Putri & Mukminan, 2019).

The development of learning media using macromedia flash has been carried out on several materials, including geometry (Nelwati, Sepriyanti, Susanto, Melinda, & Afriadi, 2019), SPLDV (Kusuma, 2018) and some on science material. On statistical material this interactive media has also been developed (Meifiani & Prastyo, 2015; Widjayanti et al., 2018).

Based on the experience of researchers who study IT-based statistical data analysis courses, students in the learning process are already using computer aids. But students only use computers as a tool for solving problems with the help of SSS. Students have not fully utilized the applications that exist on the computer. Therefore, researchers are interested in developing macromedia flash-based teaching materials in IT-based statistical data analysis courses. The purpose of this study was to produce macromedia flash-based teaching materials in IT-based statistical data analysis courses whose validity was tested.

## Method

The form of research carried out is development research with the term Research and Development (R&D). "To be able to produce certain products used research that is needs analysis and to test the effectiveness of these products in order to function in the wider community, research is needed to test the effectiveness of these products" (Sugiyono, 2015). This research was conducted in the even semester of 2018/2019 at FKIP Mathematics Education, Riau Islamic University. The subjects in this study were sixth semester mathematics education students. Based on the 4-D development model, the researcher makes the design of this development procedure consisting of only 3 stages, namely defining, planning, and developing. The deployment stage (desseminate) was not carried out due to time and cost limitations. The device development model as suggested by Thiaragarajan, Semmel, and Semmel (in Trianto, 2012) which can be seen in Diagram 1. below:

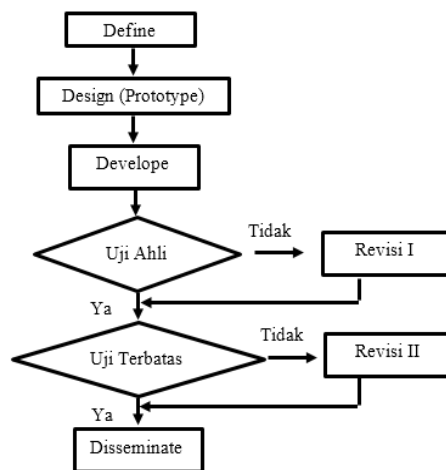


Diagram 1. Development Flow

The steps taken in the development procedure with the 4-D model are as follows:

#### 1. Define Phase

a. Beginning-to-end analysis

This analysis was conducted to determine the basic problems in developing teaching materials for IT-based statistical data analysis courses that use macromedia flash-based media.

b. Analysis of Student Characteristics

Analysis of the characteristics is done by examining the characteristics of students. The characteristics of these students include abilities, background knowledge, and cognitive development of students.

c. Concept Analysis

The course that will be taught to students is an IT-based statistical data analysis course.

d. Task Analysis

This analysis is carried out to get details about the assignments that will be given to students in learning.

#### 2. Design Phase

a. Constructing the Reference Criteria Test

The tests are arranged based on the reference criteria that have been translated into achievement indicators.

b. Media selection

The choice of media is related to determining the right media to present learning material that is based on material analysis, task analysis, and facilities and student characteristics.

c. Format selection

This step includes the selection of formats for designing content, choosing strategies, approaches, and learning methods, as well as developed learning resources.

d. Initial Design

The initial design was carried out to design macromedia flash-based teaching modules in IT-based statistical data analysis courses from the results of the analysis that had been carried out at the defining stage and based on criteria determined by the appropriate media and format. The results of this initial draft are draft 1.

#### 3. Development Phase (Develop)

The purpose of this stage is to produce macromedia flash-based teaching materials in valid IT-based statistical data analysis courses. At this stage an expert test is conducted, this activity is carried out to obtain an assessment or test the validity of the initial design of macromedia flash-based teaching materials in IT-based statistical data analysis courses and assessment instruments (draft1) from experts on the developed products. Macromedia Flash-based teaching materials in IT-based statistical data analysis courses and revised instruments based on input and suggestions for improvement from these experts are then called draft 2.

The analysis technique used is descriptive analysis which describes the validity of macromedia flash-based teaching materials on IT-based statistical data analysis courses as follows:

### 1. Techniques of validity analysis of teaching materials based on Macromedia Flash

The validation of the valuation instrument is determined by the average score given by the validator. According to (Akbar, 2013), the formula for analyzing the level of validity descriptively is as follows:

$$Va_n = \frac{TSe}{TSh} \times 100\%$$

After the value of each validation test results are known, researchers can calculate the combined validity of the analysis results into the formula as follows:

$$V = \frac{Va_n}{n} = \dots \%$$

Information:

$V$  = Combined validity

$Va_n$  = Expert validity

TSh = Total expected maximum score

TSe = Total empirical score (validation results from validator)

The results of the validity of each validator and the results of the analysis of the combined validity once known, the percentage level can be matched or confirmed with the validity criteria as follows:

**Tabel 1.** Criteria Validity

No	Validity Criteria	Validity Level
1	85,01 % - 100,00%	Very valid, or can be used without revision
2	70,01 % - 85,00 %	Quite valid, or can be used but needs minor revisions
3	50,01 % - 70,00%	Less valid, it is recommended not to use because it needs a major revision
4	01,00 % - 50,00%	Invalid, or may not be used..

Source: Akbar (2013:157)

The instrument assessment instrument is considered valid if the average validation rating is categorized as sufficiently valid or very valid.

## Result and Discussion

### Validation Results

The validators of this learning kit are two lecturers from the Mathematics Education Study Program FKIP Riau Islamic University. The validators assess for each device that has been prepared by researchers. The tool prepared by the researcher was for 11 meetings. From the results of the study by the validator in the validation seen in the following table.

**Table 2.** Percentage of Validation Results by Validator

Meeting	Validation Percentage (%)		Average (%)	Category
	V1	V2		
P-1	90	88,33	89,165	Very Valid
P-2	86,67	96,67	91,67	Very Valid
P-3	86,67	86,67	86,67	Very Valid
P-4	91,67	86,67	89,17	Very Valid
P-5	85	88,33	86,665	Very Valid
P-6	85	86,67	85,835	Very Valid
P-7	88,33	91,67	90	Very Valid
P-8	83,33	88,33	85,83	Very Valid
P-9	86,67	90	88,335	Very Valid
P-10	85	91,67	88,335	Very Valid
P-11	88,33	83,33	85,83	Very Valid
Validation Average (%)			87,955	Sangat Valid

Based on Table 2., it can be seen that from 11 meetings, all instruments fulfilled very valid criteria. Then if seen from the average by two validators also included the very valid criteria with an average total of 87,955. Thus it can be said that teaching materials developed using macromedia flash can be used without revision.

This research was conducted at the Faculty of Mathematics and Natural Sciences UIR Academic Year 2018/2019 in sixth semester students. The process of developing learning materials based on macromedia flash is a development study using 4D (define, design, develop, and disseminate) that has been modified using the define, design, and develop stages. The Disseminate stage was not carried out because of limited funds and time in implementing it. Researchers only reached the stage to find out the validity and practicality of the developed mathematics learning device.

The material validated by the validators are subject matter of IT-based statistical data analysis developed by researchers using SPSS, Frequency Analysis and Descriptive Analysis, Crosstabs Analysis and Explore Analysis, Kolmogorov-Smirnov Test, Mahalanobis Distance, Linearity Test, Box's Homogeneity Test M, Instrument Validity, Construction Validity Using SPSS 21 Software, Instrument Reliability, Reliability Using SPSS 21 Software.

Before conducting the trial, the researcher validated 2 validators consisting of 2 FKIP Mathematics Lecturers. Validation is very useful for researchers because from the validation results, researchers can find out the errors contained in the product being developed and get suggestions so that the resulting product is tested eligibility. The results of the validation of teaching materials based on macromedia flash have been revised showing that the teaching materials developed are in the very valid category that is 87.955%.

This is supported by Setyawan's research (Sanusi, Suprpto, & Apriandi, 2015; Setyawan & Wahyuni, 2019; Widjayanti et al., 2018) which states that developing teaching materials with the

help of computers in lectures that are validated can make students more attractive in learning. From this explanation it can be concluded that the development of macromedia flash-based teaching materials in IT-based statistical data analysis courses is valid and practical. Valid because it has been validated by a validator and practical because it has been tested for eligibility.

## Conclusion

Based on the results of the analysis of this study it can be concluded that there has been produced teaching materials based on macromedia flash based on valid IT-based statistical data analysis courses.

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