

Analysis of Multimedia Learning Mathematics Storyboard Design

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ABSTRACT

This study aims to describe the characteristics of storyboard design and to find out the multimedia storyboard design of mathematics learning in the production of BTIKP (Center for Information and Communication Technology Education) of the Jambi Provincial Education Office according to the rules based on ADDIE framework learning design. The researcher uses the ADDIE framework learning design because this design is more effectively used as a reference for the creation and development of a learning media. From the results of the identification carried out by the researcher in three stages. For the characteristics of the multimedia storyboard design of mathematics learning produced by the BTIKP (Center for Educational Information and Communication Technology) of the Jambi Provincial Education Office, there is one storyboard that satisfies the assessment, namely in the third stage (evaluating and revising) for multimedia storyboards learning mathematics with Geometry Transformation material. Overall the design of the five multimedia storyboards of mathematics learning produced by the BTIKP (Center for Educational Information and Communication Technology) of the Jambi Provincial Education Office which has been investigated by researchers is still a design that is not in accordance with the design of ADDIE framework learning.

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1. INTRODUCTION

Education is part of an effort to help humans gain meaningful life. Education is also a major factor in the formation of the human person (Muhammad, 2017). Therefore education is a field that must be prioritized to develop various potentials in humans. Quality education is needed in an effort to support the creation of intelligent people who are able to compete in the current era of globalization.

The use of technology and multimedia is an effective and efficient way of conveying information (Kaharuddin, 2019). Computer is one of information technology that has great potential to improve the quality of learning, especially in mathematics learning (Herbst, 2014; Moradmand, 2014). The development of Information and Communication Technology which together with the development of multimedia technology, makes the products of Information and Communication Technology increasingly diverse.

A learning media is chosen through several considerations such as referring to the learning objectives to be achieved, targets (learners) to be given learning media, types of learning media to be used, problems in the use of learning media, costs of using instructional media, availability of tools supporters in the use of learning media, then concepts; the context and content that exists in the learning media and the quality of the learning media that will be used (Kurniawan, 2019). Being an educator (teacher) should be careful and observant in choosing to use a learning media (Primasatya, 2019). After determining and choosing the learning media to be used, in the end the teacher is required to be able to -

utilize the learning media well in the learning process. Along with developments in the world of education, various media for learning mathematics are created. One of them is multimedia in the form of learning videos.

In making multimedia the composition of the storyline or storyboard that gives an idea of what teaching material will be delivered. Storyboard visualization of ideas from the application to be built, so that it can provide an overview of the application that will be produced. The storyboard can also be said to be a visual script that will be used as an outline for a project, a shot by shot that is commonly referred to as the scene is displayed. One of the advantages of making a storyboard is that it can make users experience changes in the storyline to trigger reactions or deeper interests. Many multimedia learning can be utilized in the teaching and learning process in schools. Learners can immediately see and hear about the things they learn. For the manufacture of multimedia itself can be done by teachers and people who are experts in the field of technology. In making, sometimes the teacher and multimedia expert have not considered making according to the rules or rules that should be.

Researchers have not found information about the analysis of storyboarding in accordance with the rules or aspects of making a good storyboard. Therefore identification of multimedia learning storyboards is important to analyze in order to be used as a source of information and is expected to be useful. Based on this

background, the researchers felt the need to conduct research on "Analysis of the Storyboard Design of Mathematics Learning Products of Jambi Provincial Government Institutions".

2. RESEARCH METHOD

The type of research conducted is product research that uses a descriptive qualitative approach. Qualitative research is research that intends to understand phenomena that are experienced by research subjects such as behavior, perceptions, motivations, actions and others holistically and by means of descriptions in the form of words and languages, in a specific natural context and by utilizing various natural methods.

For the research method used in this study is a method of qualitative content analysis. Content analysis is a research technique for making inferences that can be replicated and validated by taking into account the context. The unit analyzed in this study is a multimedia storyboard of mathematics learning in the BTIKP Education Office of Jambi Province. Multimedia storyboard for mathematics learning is an object in this study. For the selection of storyboards that will be used in this study, namely by randomly selected.

Whereas the level of analysis is the implications for student learning viewed based on the design and development of ADDIE framework learning through the analysis phase; design, develop and implement; evaluate and revise. The types of data in this study include: Primary Data, in this study the multimedia storyboard of mathematics learning produced by the BTIKP Education Office of Jambi Province. Secondary data, in this study, is library research conducted by reading and citing written sources such as books, articles, journals, and others related to research.

Data collection techniques used in this study are by way of: Documentation, Observation and Library Studies. Qualitative content analysis is a continuous, repetitive and continuous effort, concerning data reduction, data presentation, and verification of data which are successive descriptions of success, as a series of interrelated analysis activities. In this study data analysis techniques used analytical techniques proposed by Miles and Huberman (1992).

This data analysis consists of three activities, namely: Reduction is a form of analysis that sharpens, classifies, directs, removes unnecessary and organizes data in such a way that final conclusions can be drawn and verified, Display (Data Presentation) is a collection of formations arranged which gives the possibility of drawing conclusions and taking action. A good form of presentation is very important to produce a valid qualitative analysis, Verification (Attracting Conclusions) after the data is collected, classified then analyzed as the last step in this research. Taken a conclusion from the ingredients about the object of the problem. The conclusions drawn are essential conclusions in the research process.

For the validity of the data can be done by doing time triangulation. According to Moleong (2017) Triangulation is a technique for checking the validity of data that uses something else. While time triangulation is a technique to check the validity of data obtained by using the same method on the subject but at different times. Time triangulation was carried out aimed at finding conformity to the data sourced from two equal problems but carried out at different times. The researcher takes notes for each stage of the research and documents in full about the ideas that emerge and the actions that have been taken. By checking the results of the documentation, videos and transcripts of the results of interviews repeatedly so that accurate data is obtained.

3. RESULT AND DISCUSSION

The object in this study consists of multimedia multimedia learning boards. The researcher gives the code used to refer to each research object, namely:

- Smm1: Multimedia storyboard learning mathematics matrix material.
- Smm2: Multimedia storyboard learning mathematics material composition function.
- Smm3: Multimedia storyboard learning mathematics material transformation geometry.
- Smm4: Multimedia storyboard for learning mathematics derived material.
- Smm5: An integral mathematics learning multimedia storyboard.

While the analysis carried out by researchers to see the characteristics of each storyboard is seen from the aspect of appearance, the development team / compiler of storyboards, and the design of learning based on the ADDIE model consisting of the stages of analysis, designing, developing, implementing and evaluating.

Based on the results of identification that has been done and the data that has been presented by the researcher that the results of the identification of the multimedia history of mathematics learning for the production of BTIKP through the stages of designing and developing ADDIE framework learning can be seen in the following table:

Table 1. Results of the Analysis Phase Identification

No.	Assessment Indicator	Research Object				
		Sm m1	Sm m2	S m m 3	Sm m4	Sm m5
1	Independent Learning	√	√	√	√	√
2	Learning that is not easily forgotten	√	-	√	√	-
3	Variable learning experiences	√	√	√	√	-
4	Collaborative learning	-	-	√	-	-
5	Creative thinking skills	-	-	-	-	-
6	Technology skills	-	-	-	-	-

The table above is the result of observations and identification carried out by researchers towards five multimedia storyboards of mathematics learning in the production of BTIKP of the Jambi Province Education Office in the first stage, namely the analysis stage. According to Rusdi (2018: 121-123) that at this stage of the analysis the focus is on needs analysis, analysis of the characteristics of students, analysis of the ability of prerequisites and initial abilities and analysis of the learning environment.

Seen in the table there are still a number of assessment indicators that have not been fulfilled in the storyboard, two storyboards do not yet contain learning that is not easily forgotten by students, one storyboard does not contain varied learning, four storyboards do not yet contain collaborative learning, and the five storyboards do not yet contain learning with use critical thinking skills and skills in the field of technology. The analysis phase is done to determine the learning needs, what will be taught, and what competencies are expected to be mastered by students after learning (Gafur, 2012: 39).

Table 2. Results of the Identification Phase of Designing, Developing and Implementing

No.	Assessment Indicator	Research Object				
		Sm m1	Sm m2	Sm m3	Sm m4	Sm m5
1	Indicators of achievement of competencies according to learning objectives	-	√	-	-	-
2	Instrument for measuring indicators	-	√	√	√	√
3	Material presentation in sequence	√	√	√	√	√
4	Learning steps	√	√	√	√	√
5	Relationship between prerequisite knowledge	-	-	-	-	√
6	Teaching materials	√	√	√	-	-
7	Use of mathematical symbols	√	√	√	√	√
8	Visual and audio usage	√	√	√	-	-
9	Learning refers to students as learning centers	-	-	√	-	-

The table above is the result of observations and identification carried out by researchers towards five multimedia storyboards of mathematics learning in the production of BTKP in the Jambi Provincial Education Office in the second stage, namely the stage of designing, developing and implementing. According to Rusdi (2018: 124) that at the stage of designing, developing and implementing this needs to consider the following matters: determine the development team; determine the resources needed; compile a development schedule; choose and determine coverage; structure and sequence of material or learning messages; storyboard making; determine product specifications; make product prototypes; expert validation; and practitioners' validation.

Seen in the table there are still a number of assessment indicators that have not been fulfilled in storyboards, four storyboards do not contain indicators of competency achievement that are suitable with learning objectives, one storyboard does not have instruments to measure indicators, two storyboards do not have teaching materials, two storyboards do not use visual or audio, and four storyboards in learning are not centered on students. Whereas the advantages of the five storyboards in the second stage are for presenting the material in sequence, the learning steps are appropriate and the use of the correct mathematical symbols in terms of the use of mathematical symbols.

Table 3. Results of the Evaluation Phase Identification

No.	Assessment Indicator	Research Object				
		Sm m1	Sm m2	S m3	Sm m4	Sm m5
1	Understand the presentation of material on the storyboard	√	√	√	√	√
2	Applying knowledge, skills and attitudes	-	-	√	√	-
3	Information that is easily accepted	√	√	√	√	√
4	Information that is easy to understand	√	√	√	√	√
5	Direct learning	√	√	√	√	√

6	Overview of positive feedback and reinforcement	-	-	√	-	-
7	Learning resources that meet learning needs	-	-	√	-	-
8	Formative Test	-	-	√	-	-
9	Sumative Test	-	-	√	√	√

The table above is the result of observations and identification carried out by researchers towards five multimedia storyboards of mathematics learning in the production of BTKP in the Jambi Province Education Office in the first stage, namely the evaluation stage. According to Rusdi (2018: 132) that at the evaluation stage is the focus, namely regarding the formative and summative assessment both. Whereas according to Gafur (2012: 40) that evaluation is carried out includes internal evaluation and external evaluation. Internal evaluation (another term formative evaluation) is conducted to determine the effectiveness and quality of learning. The internal evaluation results are used as feedback to make improvements. Whereas external evaluation (another instance of summative evaluation) is intended to determine the level of student mastery of the competencies that have been taught.

Seen in the table there are still a number of assessment indicators that have not been fulfilled on the storyboard, there is a storyboard that contains a formative assessment and three storyboards that contain summative assessment. And four storyboards among them have not included a formative assessment and the other two storyboards have not included summative research.

The appearance of a storyboard design should provide information or clarity to its users. According to Kemp (in Gafur, 2012: 160), at least eleven professional abilities are needed to form a learning system design development team. The eleven professions include: educators, learning design experts, curriculum and study experts, learning and learning theorists, evaluation and assessment experts, administrators, information technology experts and media, library experts, technicians, teaching assistants, students and students.

The learning design development team for example consists of main developers, expert validators, practitioner validators, programmers, technicians and users (Rusdi, 2018: 124). Each member of the development team explains their respective experience, knowledge and competency requirements, their duties and functions in the development. The composition of the development team greatly determines the quality of the products produced. A description of the development team can be used as material to discuss the product specifications and profiles produced.

A study by Purwasasmita entitled "Practitioner Steps to Design ICT-Based Storyboard for Learning Materials" states that based on the GENERAL in composing storboards ICT-based teaching materials needed the involvement of a team of various expertise including material substance experts, instructional experts, computer graphics experts, and programming experts computer.

From the results of observations and identification on each storyboard, information was obtained about the development team/compiler consisting of script writers, media experts, and material experts. The researcher found differences in storyboards and multimedia for the development team as explained in the results of identification and observation of each storyboard.

However, it is possible for someone to have more than one skill /ability. Someone who is declared an expert in a field can be viewed

from the aspect of the educational background pursued, the background of the field of work an expertise or background experience of an expertise.

The basic pattern of designing and developing the most popular products for the flow of analytical critical thinking or scientific thinking is to use the framework of Analysis, Design, Development, Implementation, and Evaluation (ADDIE). ADDIE is a continuous and systematic framework in organizing a series of design and development research activities (Rusdi, 2018: 116).

Therefore, in this study the researcher refers to the design of ADDIE framework learning. The advantages of the ADDIE model are simple and easy to learn and systematic structure so that this design will be easily learned by educators and the ADDIE framework can also be fragmented according to the stages desired by the researcher.

Based on the discussion above, there are things that need to be considered in designing/creating a storyboard design because there are still a number of points on the multimedia learning mathematics storyboard produced by BTIKP not in accordance with the rules, concepts and procedures for making a learning design. attention in the manufacturing procedure.

The concepts and procedures of learning design are designed and produced by paying attention to the mastery of learning design for multimedia developers learning is very important, so that the multimedia developed takes into account the principles of learning.

Multimedia created by considering the principles of learning will be able to teach well. Conversely, multimedia that only considers technological aspects and collections of content information without considering the principles of learning, the media will not be able to teach users and cannot be referred to as learning media but only as an information medium (Rusdi, 2018: 40).

By using the design reference and development of ADDIE framework learning, it is expected that future storyboarding will be even better. Especially in terms of appearance, effectiveness, the development team/storyboard maker and the storyboard design design that is in line with learning design in order to achieve the learning objectives expected to the maximum.

4. CONCLUSION

Judging from the results of the research conducted by researchers, it was stated that the design of the multimedia learning storyboard in mathematics still contained several important aspects that had not been included. It is expected that in the future the making of multimedia learning storyboards should pay more attention to the quality that is more directed towards learning goals, namely the needs of students in learning. By using design references and developing ADDIE framework learning, storyboarding is expected to be better. The existence of this research is expected to be a picture for further research relating to the assessment of multimedia storyboards of mathematics learning.

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