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Swishmax Software-Based Learning Media Solutions for Students in Understanding Mathematics

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ABSTRACT

Technology development in education has become a demand for students and teachers to be able to master it. The selection of appropriate learning media assists teachers in conveying the teaching and learning process in accordance with its objectives. One of those learning media used in this research is Swishmax-Based Learning Media. This media also caused the student more active and be motivated in following learning process. Therefore, the objective of this research is to find out the development of learning media based on swishmax software in order to facilitate students in understanding mathematics learning materials. This research used mix method by combining qualitative and quantitative data analysis obtained through questionnaires and student learning outcomes tests. The research results indicate that swishmax learning media is valid, practical and feasible to use in the learning process. The application of this learning media product development is effectively used by obtaining an increase in pre-test and post-test learning outcomes with a good N-Gain score.

Keywords: Learning Media, Mathematics, Swishmax Software

INTRODUCTION

The application of technology in education is constantly evolving, transforming traditional learning tools into contemporary learning tools that incorporate technology. Using the facilities provided by the system, teachers and students can describe and elaborate teaching and learning activities effectively and efficiently (Munna & Kalam, 2021). Mathematics is one of the subjects that is still a major concern for both teachers and students. Although there are still many assumptions that mathematics is very difficult to understand and boring because the learning process is still conventional, but teachers are expected to be selective and innovative in choosing learning media that are effective, practical, and easy for students to understand. Therefore, it is important to select and prepare interesting learning media in order to ensure that students better understand the material provided (Arriyani & Pratama, 2021; T. T. Wijaya et al., 2020). The utilization of good learning media can stimulate and increase student motivation and creativity, in addition to being a parameter of teacher effectiveness in the teaching and learning process (Komalasari & Rahmat, 2019; Rosdiana, 2016).

The conventional learning model applied has not indicated an increase in students' understanding of mathematics subject matter due to the lack of information obtained by teachers in developing learning media, especially technology-based media. Teachers' limited knowledge in using technology-based learning media is indicated by only depending on power point software as learning media. In addition, technology-based facilities and infrastructure provided by schools are quite limited, especially at SMPN 5 Satap Baebunta, Tarobok, South Sulawesi, Indonesia.

Mathematics learning materials require teaching aids that can facilitate the learning process, but sometimes the media / teaching aids prepared use tools that are less effective because the materials needed require a high cost. In addition, existing tools are easily damaged, which means that learning opportunities cannot be maximized (Magdalena et al., 2021). The limitations of teaching aids prepared by the school encourage researchers to develop learning media that are useful as virtual teaching aids with the advantage of being able to display mathematics material in detail, especially those related to the material of solid figures, then this swishmax software-based learning media becomes a solution in presenting technology-based learning media (Anwar et al., 2021). This learning media swishmax can reduce the static situation and can create an effective, interesting, interactive and fun learning process. Therefore, students can easily understand math materials.

However, based on the observations and needs analysis that has been conducted, there were facts that indicated the lack of student interest in understanding the material provided by the teacher because the learning media used were less interesting and the use of technology in conveying material had never

been used, therefore it is important to develop learning media based on the swishmax application (Mjege & Rwimo, 2022). This research is able to overcome these problems by offering technology-based learning media, especially for math lessons that can increase student motivation and creativity thus students can more easily understand the material.

The Research and Development (R&D) method is used to create mathematics learning products, and test the effectiveness of these learning products. The proposed mathematics learning innovation uses a 21st century learning model that utilizes swishmax software in the teaching and learning process to facilitate interaction between teachers and students in producing quality mathematics learning (Nurhayati & Sulistyowati, 2022). Swishmax software is an application that can generate flash animations with several advantages, including video-based products that can be played back or slowed down, or played repeatedly according to the needs of students in understanding learning materials (Sari & Putra, 2018). Swishmax software with all its advantages can be included in the interactive multimedia category because it is audio-visual based, as it is known that the use of multimedia-based learning aids can increase students' understanding of the material (Ahmad, 2020).

Understanding learning material is very important for students to improve learning outcomes, then this swishmax-based learning media can be a solution to achieve this goal (Kholifah, 2016). Teachers' perceptions in several other schools obtained from questionnaires distributed regarding the use of the SwishMax application stated that the SwishMax application is considered as one of the good applications for developing learning media because it is attractive to students, and is expected to improve student learning outcomes (Keeble & Wilkinson, 2018). Therefore, the objective of this research is to find out the development of learning media based on swishmax software in order to facilitate students in understanding mathematics learning materials.

RESEARCH METHODOLOGY

The utilization of R&D (Research and Development) in this research is a research method that used to determine or verify the resulting product. This development research used ADDIE (Analyze, Design, Development, Implementation, Evaluation) model.

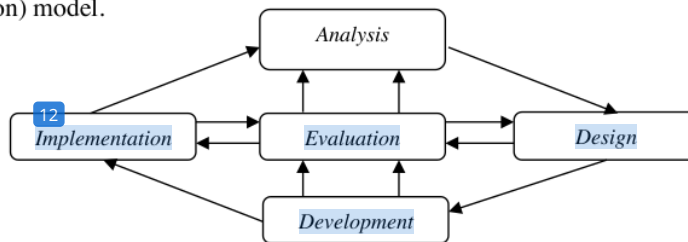


Figure 1. The Steps of ADDIE in Developing Swishmax-Based Learning Media

The first step is the analysis, which means that researchers analyze the learning media needed by the school according to the circumstances in the surrounding environment in order for the learning media to be used as intended.

The second step is the design. After finding problems at the analysis step, this step aims to determine the learning media that will be used in the teaching and learning process of mathematics. This step is used to combine the concepts that have been drafted previously. Development is conducted to produce learning media that will be validated by several experts.

The next step is the implementation. After being declared valid, a product can be used for educational purposes. Then, the last step is evaluation. Formative evaluation is conducted to collect data at each step for improvement and summative evaluation at the end of product development to determine its effect and quality. In this research, formative evaluation is in the form of improvements in accordance with each step of the ADDIE model (Gaigher et al., 2022).

This research was conducted at SMPN 5 Satap Baebunta, Tarobok, South Sulawesi, Indonesia. The researcher has obtained a research permit from the Government of North Luwu Regency, South Sulawesi, Indonesia and the Principal of SMPN 5 Satap Baebunta, North Luwu, South Sulawesi. Researchers also have the right to publish research results in public. In this research, the researcher conducted data collection techniques by following techniques:

1. Media Expert Validation Questionnaire

The validation sheet contains several aspects that will be assessed by media experts and material experts in their fields. The aspects that will be assessed by the validator are cover design, content design, completeness of material and content of learning media material. The validation results from the experts will be used as a reference in revising the media.

2. Questionnaire Responses of Educators and Students

Questionnaire is a data collection technique in the form of a list and distributed to respondents to respond. Questionnaires are used to determine the response of educators and students to the development of mathematics learning media and conclude the feasibility of the product as a basis for making revisions.

3. Learning Outcomes Test with Pre-test and Post-test Questions

Pre-test questions are given to students before using learning media, while post-test questions are given to students after using learning media.

The data obtained is classified into two, i.e. qualitative and quantitative data. Qualitative data contains criticism and suggestions from three experts to improve this learning media product, while quantitative data is obtained from the experts' validation questionnaire (a total of 3 people) which is used as a reference to revise the product that has been designed, with questionnaire results from respondents (1

teacher and 20 students) to determine whether the product is effective or not. In addition, quantitative data is also obtained from student learning outcomes through pre-test and post-test to see improvements by evaluating the N-Gain score (S. Wijaya et al., 2019).

Qualitative data was categorized based on expert corrections (media experts and material experts) to revise the product. The instruments used were validation sheets and practicality questionnaires. The validation sheet was provided to three competent validators to test the feasibility and validity of the developed media. The aspects assessed in determining the value of the product include media validation, such as media introduction, media display, basic principles of multimedia and media usage. Material validation includes introduction, content, evaluation, and closing. After the learning media is declared valid through an expert validity questionnaire, then the learning media using swishmax software is tested for practicality and effectiveness through trials. The trial was conducted by 1 teacher and 20 students. Questionnaires were distributed to teachers and students who conducted trials to assess several things related to the product, such as the convenience of media use, time efficiency, media usefulness, media presentation, ease of understanding, and interest in learning.

RESULT AND DISCUSSION

The research results indicated that the design of learning media development based on swishmax software includes three steps, i.e. needs analysis, design, development and implementation, and evaluation by validation. The results of the validation of media experts and material experts can be seen in Table 1 and Table 2, while the practicality table can be seen in Table 3 as follows:

Table 1. Media Expert Validation Results

No.	Aspects	Σ Score per Aspect	Max Score	%	Category
1	Media Introduction	10	16	62.5	Valid
2	Media Display	37	48	77.1	Valid
3	Basic Principles of Multimedia	11	16	68.75	Valid
4	Final Part	4	8	50	Quite Valid
Total		62	88	70.45	Valid

Source: Primary Data Processed

Based on table 1, the results of the media expert explained that of the 4 aspects measured, 3 aspects met the valid category by obtaining valid qualification results (70.45%).

Table 2. Material Expert Validation Results

No.	Aspects	Σ Score per Aspect			Max Score	%	Category
		I	II	Sum			
1	Introduction	4	3	7	8	87.5	Very Valid
2	Contents	27	28	55	72	76.39	Valid
3	Evaluation	12	12	24	32	75	Valid
4	Closing	4	3	7	8	87.5	Very Valid
Total		47	46	93	120	77.5	Valid

Source: Primary Data Processed

The results of the material expert review obtained in Table 2 explained that 2 aspects were categorized as very valid with a total score of 77.5%. Both experts concluded that this learning media is valid. In addition, the effect of this media on the results of student trials is presented in Table 3 as follows:

Table 3. The Calculation Result of Pre-test and Post-test

	N	Ideal Score	Minimum Score	Maximal Score	\bar{x}
Pre-test	20	100	5	25	19.5
Post-test	20	100	45	85	51.5

Source: Primary Data Processed

Based on the data in Table 3, it is indicated that there is a significant increase in student scores from the Pre-test to the Post-test with a considerable increase in the average score. It is proved that the development of swishmax-based learning media has an effect on student test scores.

Table 4. The Recapitulation of N-Gain Score

	N	Ideal Score	Minimum Score	Maximal Score	\bar{x}
III-H	20	100	0.11	0.83	0.38

Source: Primary Data Processed

According to Table 4, the N-Gain research results conducted on the subject of solid figures of flat-sided spaces using swishmax software-based learning media obtained 0.38, getting a moderate assessment predicate between 0.30 - 0.70. Thus, it can be concluded that the swishmax software-based learning media on the subject of solid figures of flat-sided spaces is effective because the N-Gain score is > 0.3 . Based on the validity test and effectiveness test of swishmax-based learning media development, it is obtained that the learning media developed is effective in increasing student understanding and is suitable for use in the learning process.

The difference between this research and several previous researches that apply swishmax software is in the discussion of different materials, physics and mathematics on Algebraic structure material by applying a different development

model, namely 4D (Define, Design, Development, and Disseminate) which has an effect size test with the results of 0.70 with moderate criteria (Riska et al., 2019).

This research with swishmax-based media called eyecatcher uses the assure development method which consists of six steps, i.e. analyzing students, stating objectives, selecting research methods, media, and materials, using media and materials, requiring student participation, and evaluation. It can be concluded that the development of a swishmax-assisted eyecatcher as an alternative learning media for the millennial generation has been successful after all the steps have been completed (Adedapo & Opoola, 2021; Samsiya & Siskawati, 2020).

Swishmax has a good ability to create learning media because it can provide a display with a variety of colors equipped with scripts that can be adjusted according to student needs. In addition, it can also use animation in conveying material during the teaching and learning process (Kholifah, 2016). Swishmax is quite easy to use because it comes with a variety of interesting animations. In addition, swishmax can stimulate motion, sound and color effects. The most important thing is that it can design learning content to be more creative and innovative (Komrudin et al., 2021).

Basically, the development of learning media based on swishmax software supports teachers to innovate in developing technology-based learning media because of the many attractive features in it. The data obtained that the media based on the swishmax application is able to change the paradigm of students who stated that learning math is difficult to be able to understand math easily. The limitations of this research include the need for electronic devices that support product development with supporting software. In addition, special skills are needed to use this application to make it easier in its operation.

CONCLUSION

The development of mathematics learning media with the help of Swishmax Software-Based Learning which refers to the research and development design modified from the ADDIE development model. The results of expert validation of the learning media developed obtained the category "valid" or feasible to use in the learning process. Meanwhile, the results of the media effectiveness test can be seen that the average value of N-Gain is > 0.3 . Based on the validity test and effectiveness test of swishmax-based learning media development, it is obtained that the learning media developed is effective in increasing student understanding and is suitable for use in the learning process.

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