POWTOON-BASED MATHEMATICS LEARNING MEDIA: VALIDATION STAGE OF THE PYTHAGOREAN THEOREM

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Abstract. Powtoon is a technology and information (IT)-based learning media, making it easier for students to accept material because of the various animation features and transition effects that make the material easier to understand. This study aims to produce learning media and determine the validity of the Powtoon learning media on the Pythagorean theorem material in class VIII SMP. This type of research is development research. This research goes through potential problems, data collection, product design, design validation, product improvement. The instruments used in this study were material expert assessment sheets and powtoon media. After the powtoon media is created, the powtoon is validated by experts. Validation was carried out by the validator with good scores. The data analysis technique used was validation analysis. From the results of the analysis that had been carried out on the material and media validation sheets, 79% were obtained, which were included in the valid category, namely good. This means that learning media using powtoon can be used.

Keywords: Software, Instructional Media, Powtoon, Animation Video

1.   INTRODUCTION

In the era of globalization of the 21st century, the development of science and information technology is happening so rapidly that it will directly or indirectly affect several aspects of human life. One aspect of human life affected by science and information technology development is the education aspect [1]. The learning process in the 2013 curriculum at all levels applies a scientific approach [2].

Referring to the 2013 curriculum function in the learning process, which is a tool for achieving educational goals, then as a tool, the curriculum has components that support each other. Which component is the learning process? In relation to the teacher has a role in the learning process. The presence of media in the world of education affects the learning process. Learning media is one of the tools in delivering teaching materials, increasing creativity, and focusing students' attention in the learning process [3]. The benefits of multimedia technology as a support for the teaching and learning process, helping to teach become more interesting, creative, innovative, and fun.

Currently, many media are developing more attractive and easy to operate online, such as *Prezi*, *Tiki-Toki*, and *PowToon* [1]. This type of online multimedia software is interactive and can be used to give interesting presentations in text, images, sounds, and animations to motivate students to receive material [4].

The reality in the field with mathematics teachers at SMP Muhammadiyah 2 Pekanbaru is that: (1) learning outcomes are not optimal, and class VIII students find it challenging to understand and analyze Pythagorean Theorem material, have difficulty understanding concepts and applying them. (2) This can also be seen from the average daily test score of class VIII semester one students in 2019/2020, which is only about 20% who reach the minimum completeness criteria (KKM), which is a score of 72. (3) Add to that when teacher learning rarely uses learning media, this is also due to time constraints, to prepare new learning media, especially in using traditional media which have difficulty in finding materials and tools and limited costs required, whereas if making learning media using more complex technology, the teacher does not have much time to make it and only relies on power points. (4) The teacher plays a major role in learning so that students are not independent. This is in contrast to the application of science, where the teacher's role is only as a facilitator to train students to be more active and build independent knowledge, not the other way around.

From the problems faced in schools, it is necessary to develop a new interactive learning media that is easy to do, requires little time, and is cheap. It also gets effective and efficient results, answering this problem through the powtoon application. Powtoon is an online application that easily creates animated cartoons or video presentations [5]. Powtoon is an online tool that features handwritten animations cartoon animations and provides transition effects for life and easy timing. So the author tries to introduce learning using powtoon media.

2. RESEARCH METHOD

This media development uses research and development (R&D) methods, research on the development of Powtoon-based mathematics learning media in the form of (1) learning media using Powtoon software for the Pythagorean theorem for class VIII SMP, (2) assessments carried out by a team of material and media experts, teacher. This development uses the Borg and Gall model with the stages: (1) Potential and Problems, (2) Data Collection, (3) Product Design, (4) Product Validation, (5) Product Revision, (6) Product Trial, and (7) Product Revision. The data collection instrument used is an expert validation sheet. The data analysis techniques used in this study are as follows.

1. Expert validation analysis is carried out by:
   a. Calculating the validity score from the expert validation results using the formula:

$$Va_1 = \frac{Tse}{TSh} \text{ x } 100\%$$

$$Va_2 = \frac{Tse}{TSh} \text{ x } 100\%$$

$$Va_3 = \frac{Tse}{TSh} \text{ x } 100\%$$

Description:
V_{a1} : Validity of the 1st expert
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V_{a3} : Validity of the 3rd expert

Ts_e : Total empirical score (validation result from validator)

TS_h : Maximum expected total score

$$V = \frac{va1 + va2 + va3}{3} = \text{........} \%$$

Description:

V : Combined Validity

$V\,a1$: 1st expert validation results

$V\,a2$: 2nd expert validation results

$V\,a3$: 3rd expert validation results

b. The results of the known validity are matched with the validity criteria as shown in the following table:

Table 1. Validity Scale

Eligibility scale	Criteria
85 - 100%	Very valid/no revision
70 – 85%	Sufficiently valid/needs to be revised
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01 – 50%	Not valid/unusable

Source: [6]

3. RESULTS AND DISCUSSION

Research Results

The research results on the development of Powtoon-based mathematics learning media are: (1) learning media using Powtoon software for the Pythagorean theorem material for class VIII SMP, (2) assessments carried out by a team of material and media experts teachers. This development uses the Borg and Gall model, but the research that I do is carried out in stages, namely: (1) Potential and Problems, (2) Data Collection, (3) Product Design, (4) Product Validation, (5) Product Revision. The stages are as follows:

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a. Need Analysis

Class VIII students find it difficult to understand the Pythagorean theorem material. Students have difficulty understanding abstract concepts and applying them to everyday life, and also teachers during learning, rarely use learning media during learning. This is also due to the lack of time in terms of making learning media, especially in traditional media, which must find materials. Because teaching aids require a lot of time and energy, there is potential for teachers to use technology learning media.

b. Field Survey

Field survey at SMP Muhammadiyah 2 Pekanbaru, obtained on the curriculum used at school, what learning methods and media are used.

a) Curriculum Analysis

Curriculum analysis is used to find out the curriculum used in schools, find out Core Competencies and Basic Competencies, and Indicators.

b) Method Analysis

Teachers only use conventional learning models and rarely use media

c) Media Analysis

At this stage, the computer is a learning medium. The use of computers at SMP Muhammadiyah 2 Pekanbaru is quite good.

c. Literature Review

Researchers collect information in the form of references from various sources of information that can enrich the material, such as books, the internet, learning media, and research journals.

2. Data Collection

a. Observation and Interview

After conducting observations and interviews at SMP Muhammadiyah 2 Pekanbaru, a characteristic analysis was obtained, namely about students' knowledge, grade, gender, and cultural background. The researchers used class $VIII_2$ SMP for this study, which amounted to 30-35 people.

3. Product Design

The product design is made in two stages of preparation as follows:

1) Product preparation specifications
   a. Learning media is made with Powtoon software in learning videos in mp4 format.
   b. The learning video developed has a neat sequence, namely: title, subject matter, learning objectives, supporting information, and practice questions.
   c. The videos developed have interesting variations of writing, animation, and colors
   d. The resulting video is a learning video with scientific stages, namely:
      1). Observe
      2). Ask
      3). Reasoning
      4). Try
      5). Communicating
   e. The resulting product is in the form of a file that can be stored on a computer device and can be uploaded on YouTube or other social media.
   f. The resulting product is a learning media for the Pythagorean theorem material for class VIII SMP
   g. This media is validated by a team of material and media experts
   h. This learning media can be run on all types of devices such as computers, laptops, notebooks, and cellphones, making it easy and practical to use.

2) Product Manufacture
   There are three stages of making learning media products using Powtoon software, namely:
   a. The researcher displays images, texts, and animations using a Powtoon that is adapted to the material and curriculum that has been analyzed and is also in accordance with the scientific approach.

b. The second stage is making a sound recording which will be combined and adapted to the text, images, and animations that have been created. The making of this voice recording uses a recording device that has been provided in the powtoon software. The voice recording used is the researcher's voice with the text script and supporting sentences as learning instructions.

c. The last stage in making this media is the publish or export stage. At this stage, the media that has been created with text, images, animation, music, and sound recordings that are converted into videos is ready for use.

4. Product Validity

a. Validity of Learning Media

At this stage, validation of learning media is carried out through expert considerations. This validation uses a validation sheet. The validations carried out in this study were material validation and media design validation. The validators in this study were a lecturer in Mathematics Education at the Islamic University of Riau, Putri Wahyuni S.Pd M.Pd on June 18, 2020, as validator I and Mrs. Rahma Qudsi S.Pd.,M.Mat May 11, 2020, as validator II and two teachers. SMP Muhammadiyah 2 Pekanbaru Mr. Ade Sultian S.Pd June 10, 2020 as a class VIII mathematics teacher as validator III and Mrs. Chitra Valentika S.Pd., M.Si June 22, 2020 grade VII mathematics teacher at SMP Muhammadiyah 2 Pekanbaru as validator IV.

b. Validation Analysis

After the validator provides suggestions and input, then the validator fills out the validation sheet. The results obtained from the four validators can be seen in the following table:

Table 1. Results of Learning Media Validation Analysis

Validator	Empirical Score	Maximum Score	Percentage	Category
Validator 1	46,3	64	72,3 %	Valid
Validator 2	48	64	75 %	Valid
Validator 3	55	64	86 %	Very Valid
Validator 4	52	64	81,25%	Valid
Combined Validator	201,3	256	79 %	Valid

Of the four validators, the results obtained on the Powtoon-based learning media for the Pythagorean theorem include valid criteria with an average percentage of 79%, it can be said that this learning media can be used.

5. Product Revision

After the design validation is complete, it can be seen that there are deficiencies in the learning media using Powtoon on the Pythagorean theorem material, which will then be revised according to suggestions and comments from the validator. Researchers submitted a validator questionnaire consisting of 16 statement items to see experts' opinions on learning media. After being analyzed, two validators from FKIP Mathematics

Education lecturers, Putri Wahyuni S.Pd., M.Pd as validation I, the first validator, assessed three learning media with three questionnaire sheets. If analyzed in the first meeting media, the number with an empirical score is 46, while in the second meeting media, the number of empirical scores is 48. The media at the third meeting is 45 empirical scores, so to get the average number of of the three assessments is 46.3 with an average score of 72.3%, which means it is in the valid category. Further by the second validator, namely Mrs. Rahma Qudsi S.Pd., M.Mat, the results of the analysis obtained from the second validator are that the total empirical score is 48 with an average score of 75%, which means this learning media is valid. And continued with the third validator, namely Mr. Ade Sultian S.Pd as a mathematics teacher for class VIII, with the analysis results that he got a total empirical score of 55 with an average of 86%, which was included in the very valid category. Followed by the last validator, namely by class VII teacher Mrs. Chitra Valentika S.Pd., M.Si obtained a total of 52 and obtained a score of 81.25%, which means it is included in the valid category. Then obtained from the four validators, this learning media is considered valid with an average of 79%.

Discussion

The results of the four validators stated that the learning media used was included in the valid category with different suggestions for each validator. Suggestions from the validator tend to the duration of time used to suit the heterogeneous abilities of students. And the content of the material displayed is improved more clearly so that students understand the material well.

4. CONCLUSION

This research has produced learning media products using Powtoon software in the Pythagorean Theorem subject for class VIII SMP. Based on the results of the research that has been done, it can be concluded that the learning media developed in this study included the category of the best media quality with the validity of the media and material validation results obtained with an average percentage of 79% which included the category $71 < x < 85$, then the learning media included in the "good" category so that this learning media is good and interesting to use.

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