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THE DEVELOPMENT OF INTERACTIVE POWERPOINT LEARNING MEDIA TO INCREASE STUDENTS' CRITICAL THINKING ABILITY ON JUNIOR HIGH SCHOOL

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ABSTRACT

Mathematics learning can develop students' creativity to solve problems in various life situations. Learning mathematics helps train students to think critically and creatively to solve problems. Considering the reality on the ground and the importance of critical thinking skills. from an early age. One effort to develop critical thinking abilities is to use media directed at these abilities. The method used in this research is research and development, with a modified 4-D development model in three stages, namely determination, design and development. This research aims to determine the development of interactive teaching materials assisted by power points, on Statistics material. The subjects of this research were 3 mathematics teachers at SMP Mutiara 4 Bandung. The instrument for developing teaching materials uses interview instruments. The teaching materials validated by three validators have a total score on the interactive power point of 275 with a maximum ideal score of 300 and have a percentage of 92.31% in the valid category based on the teaching material criteria. The validator's assessment of the interaction strength score shows that the percentage score for each aspect and the total percentage score are both in the valid category. Based on the research and development process and results, the following conclusions were obtained. Developing learning media using interactive Powerpoint, critical thinking skills are within valid criteria. The results obtained can be tested on junior high school or MTs students in accordance with the considerations and assessments of validator experts.

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INTRODUCTION

Mathematics is an important subject, mathematics can help someone in solving mathematical problems or solving problems related to everyday life. According to Santoso et al., (2021), mathematics cannot be separated from the development of technology and information, therefore mathematics is known as the queen of science. According to Priyatna & Wiguna

(2021), stated that mathematics is one of the important subjects in the world of education and is a basic science, which is related to other sciences.

Through mathematics, students can train thinking styles to understand and solve social, economic and natural problems Kollosche (2018). Thus, learning mathematics can develop students' creativity to solve problems in various life situations. Learning mathematics helps train students to think critically and creatively to solve problems. Considering the contradictory reality in the field regarding the importance of critical thinking skills, efforts need to be made to develop students' critical thinking skills from an early age. One effort to develop critical thinking skills is to use media directed at these abilities.

There are several definitions of critical thinking. Sk & Halder (2020), argue that critical thinking is self-regulation in deciding something that leads to explanation, analysis, evaluation and inference, as well as the representation of evidence, concepts, methodology, criteria or contextual considerations for decision making. According to Choy and Cheah (Lailiyah & Wediyantoro 2021), critical thinking is defined as a complex process that requires high level cognition in processing information. In line with Ennis (Marnita et al., 2021), adding that critical thinking is the ability to think critically and rationally, focusing on what one believes or does. Critical thinking skills include basic clarification skills, making basic decisions, concluding, providing deeper explanations, estimating and integrating, as well as additional abilities.

According to Patonah (Pratama et al., 2022), a teacher must be able to create learning that can develop students' critical thinking abilities to independently search for learning information independently and actively create cognitive structures in students. Critical thinking ability is an ability that is very necessary for a person to solve various problems faced in social and personal life

Efforts to develop students' critical thinking skills require interactive learning, students are treated as thinkers rather than being taught, and teachers act as mediators, supports and motivations who help students learn, not teach. In learning, teachers must be able to design and develop learning media that can accommodate all student activities in the learning process (Sugiono, 2019). In line with the aim of this research is to analyze students' critical thinking abilities. It is important for teachers to design appropriate learning media and encourage students' critical thinking abilities.

The importance of media in facilitating learning, the presentation is adjusted to the set learning objectives. The presence of media in the learning process really helps students to better understand subject concepts. The use of learning media helps clarify the presentation of messages and information to facilitate and improve learning processes and outcomes (Hutagalung, 2022). Apart from that, learning media can increase and direct students' attention so that learning motivation is created, direct interaction between students and their environment, and students can learn independently based on their abilities and interests (Amsari et al., 2022). Considering the importance of using media in learning, teachers need to be able to develop information technology-based learning media such as Powerpoint. Powerpoint is a Microsoft Office application program that is useful as a presentation medium using several slides.

Apart from that, creating learning media using Powerpoint also doesn't take a lot of time and money, so it will be easier for teachers to develop media according to students' needs. The use of Powerpoint media has also been proven to foster student interest and learning outcomes (Dewi & Izzati, 2020). Through the use of Powerpoint-based mathematics learning media, it can foster motivation and attract students' attention in learning mathematics. Apart from that, students can study independently using Powerpoint media to present material more

completely and concisely. Considering the importance of using Powerpoint media in learning, this is why Powerpoint-based learning media was developed which can foster students' critical thinking skills. In fact, there has been a lot of research conducted regarding the development of Powerpoint media in learning. The difference with this research is that the development of Powerpoint media is more interactive and provides menus that are easier to use. The thing that needs to be noted in this research is that currently there are still few Powerpoint media, especially in mathematics learning, that can interact directly with students in terms of feedback, especially in solving practical problems. Students can immediately find out the accuracy of their answers to the exercises given by selecting the buttons or menus available to determine their level of understanding of the material being studied. In other words, the Powerpoint media facility is not only used by teachers, but students can also use this media facility. The Powerpoint program is also a type of software that is specifically designed to display multimedia programs in an attractive way, is easy to create, easy to use and relatively cheap because it does not require raw materials other than tools for data storage (Kurniaty, 2020). Therefore, teachers do not need to install any other applications on their computers or laptops because the basic applications are already present on every computer. Therefore, we can assume that the use of this learning aid will not be an obstacle in operating learning media in the classroom.

Based on the description above, this research aims to ensure that mathematics learning media is needed that suits students' needs and characteristics to foster critical thinking skills. Mathematics is often considered difficult, complicated and boring, especially statistics material, which has an impact on students' low critical thinking abilities. One effort to overcome this problem is for teachers to prepare Powerpoint-based interactive learning media with interesting teaching methods so that critical thinking can grow in students.

METHOD

This study uses a research and development method, this study aims to determine the development of interactive teaching materials assisted by power point, on Statistics material. The subjects of this study were 3 math teachers at Mutiara 4 Junior high school Bandung. This research was conducted on December 7 2022, and the material used was statistical material. The instrument for developing this teaching material uses an interview instrument.

The module development stage is developed through a series of stages as follows.

a. Definition Step

This phase aims to identify and determine the necessary requirements for learning by analyzing the objectives and limitations of the material. Activities carried out at this stage include initial and final analysis, student analysis, material analysis, task analysis, and defining learning objectives.

b. Design Step

The design phase is the second step in the process of developing learning media teaching materials. The activity of this design stage is to make teaching materials for interactive PowerPoint-based learning media with activities including collecting reference materials, compiling texts, selecting materials, and designing designs.

c. Development Step

This development stage is the final stage in the development of teaching materials for this mathematics learning media. At this stage it is the stage that changes the interactive ppt design planned at the design stage into a teaching material product. The design of this module is in power point format. The next step is the interactive power point mathematics learning

material is validated by experts. At the validation stage, teaching materials were distributed to experts consisting of 3 teachers.

Teaching material validation is an evaluation process carried out on a product/document to find out whether the product/document is valid or not, so that the feasibility of the material can be known, whether the learning is used in the learning process. This validation is a means to evaluate and refine the results of the development of learning media teaching materials carried out by researchers. For validation, the researcher chose 3 teachers, namely: Rini Yulia Putri.,S.Pd, Nenden Herlina.,S,Pd, Harin Hidayat Tulloh.,S,PD. The validated aspects include material, language, location, and general form. In the following, the researcher presents the recapitulation of the validation assessment data from the experts in Table 1.

Table 1. Grids of Teaching Materials Validation Sheets

Observed Aspects	Assessment Indicators	Item Number	Number Of Items
Preliminary Aspects	Material completeness with basic competence.	1,2	2
	Confused presentation of the material	3,4	2
Content Aspect	Suitability with student abilities	5,	1
	Compatibility with the contextual approach	6,7	2
	Appropriate in the use of language and sentences	8,9,10	3
Evaluation Aspects	Selection of questions and learning resources	14,15,16,17,18, 19	6
	Teaching materials have goals, benerfits and identity	11,12,13	3
Closing Aspect	Clarity of summary as training material	20	1

For the Likert scale rating table to analyze the effectiveness of learning devices in general. The results of data validation from experts and practitioners in the field by converting qualitative data into quantitative data with the following conditions:

Table 2. Score Assessment Guidelines

Qualitative Data	Score
Very Good	5
Good	4
Pretty Good	3
Not Enough	2
Very Less	1

After the data is collected, then calculate the average score with the formula:

$$\bar{X} = \frac{\sum x}{n}$$

Information :

$\bar{X}$ = average score of each component

n = number of indicators assessed

$\sum x$ = total score for each aspect

Once it is known that the average score that has been calculated is converted into qualitative data with criteria according to Kartika (2014) as follows:

Table 3. Criteria for Material Expert Assessment and Field Practitioners

Mark	Score Intervals	Average Score	Category
A	$x > \bar{xi} + 1{,}8\ sbi$	$x > 4{,}2$	Very Valid
B	$\bar{xi} + 0{,}6\ sbi < x \leq \bar{xi} + 1{,}8\ sbi$	$3{,}4 < x \leq 4{,}2$	Valid
C	$\bar{xi} - 0{,}6\ sbi < x \leq \bar{xi} + 0{,}6\ sbi$	$2{,}6 < x \leq 3{,}4$	Quite Valid
D	$\bar{xi} - 1{,}8\ sbi < x \leq \bar{xi} + 0{,}6\ sbi$	$1{,}8 < x \leq 2{,}6$	Less Valid
E	$x \leq \bar{xi} - 1{,}8\ sbi$	$x \leq 1{,}8$	Very Invalid

Information :

$\bar{xi}$ = average ideal score = 1/2 (Maximum score+Minimum score)

sbi = Ideal standard deviation = 1/6 (Maximum score-Minimum score)

x = Actual score

RESULTS AND DISCUSSION

Results

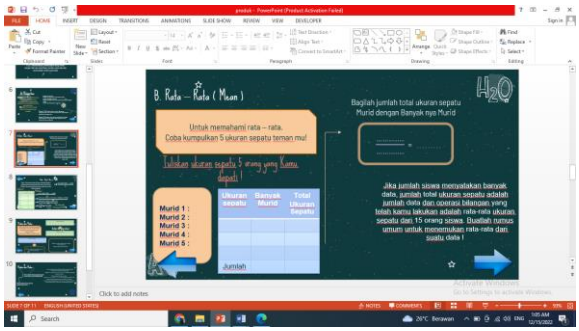
The results of this research aim to develop statistics learning media created using Powerpoint. Apart from creating interactive PowerPoint presentations, researchers also want to harmonize the learning media materials used during the learning process. The results of research and development with 4D models limited to stage 3 (Define, Design, Develop) are explained as follows, namely.

The definition stage aims to analyze the program, student needs and characteristics. The needs definition stage is carried out to determine students' needs during the learning process. Needs analysis was carried out by distributing questionnaires to 10 students at SMP Mutiara 4 Bandung. This analysis of student characteristics was carried out to determine students' personalities during the learning process using the learning materials developed. According to Karo-Karo & Rohani (2018), the use of educational media in the teaching and learning process can create new desires, excite, motivate, stimulate teaching and learning activities and even have a psychological impact on students. Based on the results of observations, students are more interested in learning using media containing pictures, videos and practice questions at SMP Mutiara 4 Bandung. The results of activities at the definition stage are analysis programs obtained by analyzing KI, KD and indicators contained in the text of the book, which can then be used as guidelines for developing development materials in learning media.

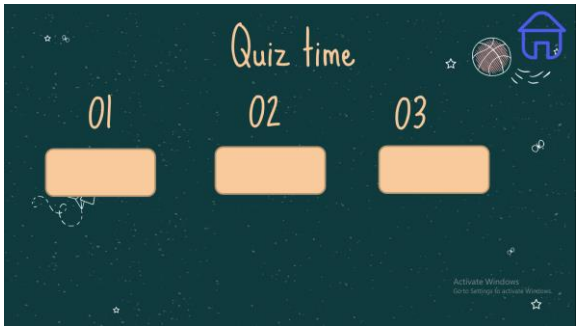
The design stage, the media product preparation stage, begins with preparing the application used to develop the product, especially the Powerpoint application. Next, prepare the elements that will be displayed in the media, such as: writing a documentary script, producing videos, researching images, recording voice actors in the media and preparing accompanying music to be used in the media. The final step is to organize the media according to the initial project/design created at the ideation stage. Interactive media supported by Powerpoint include:

1. Opening

2. Table Content



3. Closing



After completing the creation of learning materials using PowerPoint and before the learning materials are implemented on a small scale, media experts, material experts and secondary school mathematics teachers will evaluate or validate the suitability of the learning materials as a reference for making and improving them. This process is useful before the product is presented to students at the field test stage. The evaluation was carried out with media experts to determine the feasibility of PowerPoint-based learning media. The aspects assessed include form, content and benefits.

In this study the accuracy of teaching materials is interactive power point. This teaching material is validated beforehand whether it is appropriate as a reference. The assessment was carried out by 3 experts including teachers who had pedagodic experience and a background in mathematics education, with the aim of gathering information, criticism and suggestions for appropriate and quality teaching materials both in terms of material and writing techniques. The validation sheet in this study consisted of 20 items, with a maximum score of 5 points and a minimum score of 1 point for each question item. For each evaluation, it can be seen from the teaching materials that have been prepared that each validator will receive a validation sheet in the form of a form that can be filled in as needed. The following is the average result of the validator's assessment of Interactive Powerpoint Learning Media on Statistics material:

Table 4. Interactive Power Point Validation Results

Aspect	Items	Validator			Total Score	SMI	Percentage Sxore	Criteria
		1	2	3				
Prelliminary Aspect	1	5	4	4	56	60	93,33	Valid
	2	5	4	5				
	3	5	4	4				
	4	5	5	4				
Content Aspect	5	5	4	4	83	90	92,22	Valid
	6	5	5	4				
	7	5	5	4				
	8	5	5	5				
	9	5	4	4				
	10	5	5	4				
Evaluation Aspect	11	5	5	4	122	135	90,37	Valid
	12	5	5	4				
	13	5	5	4				
	14	5	5	4				
	15	5	5	4				
	16	4	5	4				
	17	4	5	4				
	18	4	4	4				
	19	5	5	4				
Closing Aspect	20	5	5	4	14	15	93,33	Valid
Total					**275**	**300**	**92,31**	**Valid**

Based on Table 4, teaching materials validated by three validators have a total score on interactive power point of 275 with a maximum ideal score of 300 and has a percentage of 92.31% with a valid category based on teaching material criteria. The interaction strength score validator's assessment shows that the percentage scores for each aspect and the total percentage scores are both in the valid category. This validation will determine the extent to which the designed instructional materials can be used accurately according to existing program standards and will include steps that are consistent with the methodology used. So interactive powerpoints are worth experimenting with.

Discussions

The teaching materials produced are in accordance with predetermined curriculum standards. Keeping students in the learning corridor, combined with interesting teaching materials, stimulates students' interest, so that students can think critically with an attitude of solidarity, and discuss and solve problems that arise with friends. The recommendations from the team of experts and field practitioners resulted in a number of evaluation components of teaching materials which were compiled based on interactive power points.

The first aspect of the interactive powerpoint assessment, which consists of 3 assessments with the final percentage indicating good or effective criteria. This is evident in the clarity of the study guide, the clarity of the preparation steps for learning, and the clarity of learning outcomes. Problems presented in the form of problems that are familiar with everyday life, but students can still see to be able to solve the problem.

Furthermore, the second aspect assessed is the content aspect. There are 10 points in this aspect, the assessment aspect with the final result in percent is a good or valid criterion. This

can be seen from the consistency of the description of the content or description of the material, the scope of the material, the factualization of the material, the actualization of the material, the clarity of the examples included to clarify the content, the clarity and relevance of the language used, the attractiveness of the content of the material to motivate users, the suitability of the material for the purpose, the suitability of the content material with normative concepts, and the suitability of the material for the characters. The advantage of teaching materials in the student learning process is that it can increase student learning motivation, because teaching will attract their attention more. This is supported by (Lestari, 2013). The ability of a teacher to design, compile teaching materials or materials is one of the things that plays a very important role in determining the success of the learning process.

The third aspect assessed is the evaluation aspect. This aspect consists of 6 items, the assessment aspect with the final percentage showing sufficient or valid. This can be seen from the clarity of the instructions for the test questions, the order in which the questions are presented, the level of difficulty of the questions, the relevance of the exercise to learning outcomes, the balance of the difficulty of the questions, and the accuracy of the questions providing feedback on the user's answers feedback. According to Eggen & Kauchak (Muthoharoh, 2019), there are several things that teachers must do regarding the availability of teaching materials/materials, namely (1) providing various examples and representations of lesson material to students, (2) encouraging a high level of interaction. high in the learning process, (3) connecting lesson material with the real world. The material that has been developed can be organized into teaching materials to make it easier for students to learn it.

The last aspect assessed is the closing aspect. This aspect consists of 1 item, an aspect of assessment with a final percentage that shows good enough or valid. This can be seen from the clarity of the summary as training material. Gazali (2016), there are several things that need to be done by the teacher related to the availability of teaching materials, namely (1) providing examples and presentation of various topics to students, (2) encouraging high-level interaction in the learning process, (3) connecting the content of the subject matter with the real world. The material that has been developed can be arranged into teaching materials to facilitate student learning.

The results of the validator's assessment of this interactive power point show that the percentage score on each aspect and the total percentage score have a good or valid understanding of interpretation. This shows that this interactive power point is worth testing.

The following is a comparison of my research with other research entitled "DEVELOPMENT OF INTERACTIVE LEARNING MEDIA BASED ON PROBLEM BASED LEARNING MODELS TO IMPROVE STUDENTS' CREATIVE THINKING ABILITIES" by Yuliana, Muhammad Zuhdi. First, the same learning media used is interactive learning. Based on research Zulhelmi et al., (2017), results the influence of interactive learning media can improve students' critical thinking skills. Second, the difference between the media of this journal and my journal is the use of media, my journal uses interactive PowerPoint media while this journal only uses video media for learning. The results of the study revealed that elementary school students taught with Powerpoint presentations performed better. The third one both uses good mathematical language sentences and does not give rise to multiple interpretations or misunderstandings. The fourth student worksheet states the lesson material is practically illustrated based on test results. Lastly, this research also produces teaching materials in the form of videos, while my research produces teaching materials in the form of worksheets on interactive Powerpoint.

CONCLUSION

Based on the research and development process and results, the following conclusions were drawn. Through the process of research and development of devices according to the development model with stages including definition, design, development and limited implementation. The media assessment was assessed by 3 expert teachers in the field of mathematics. The development of learning media using interactive Powerpoint, critical thinking skills were within the valid criteria. The results obtained can be tested on junior high school or MTs students in accordance with the considerations and assessments of validator experts.

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