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Development of Canva-Based Interactive Learning Media to Enhance MTs Students' Understanding of Statistical Concepts

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ABSTRACT (10 PT)

This research aims to develop Canva-based interactive learning media to improve students' understanding of concepts in statistics materials at the MTs level. The research method used is Research and Development (R&D) by adapting the ADDIE (Analysis, Design, Development, Implementation, Evaluation) development model). The research subjects consisted of MTs grade IX students who participated in a small trial of 5 students and a large trial of 20 students. Data collection instruments include expert validation sheets, student response questionnaires, interviews, and pretest and posttest questions to measure understanding of concepts. The validation results showed media feasibility with a score of 84% (material experts) and 86% (media experts), so it was categorized as very good. The results of the small trial test with N-Gain obtained an average result of 0.90 in the high category and the results of the large trial test with N-Gain obtained an average result of 0.81 with the high category, The results of the response questionnaire in the small trial were 95.4% of the very good category. The results of a large trial test with an N-Gain of 0.81 in the high category, It can be concluded that Canva-based interactive learning media is effective and very feasible in improving students' understanding of concepts in statistical material.

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INTRODUCTION

Technology is an important aspect in modernizing the education system today. Technology is used to improve the quality of education (Nurdiana & Hasanuddin, 2023) Educators and students carry out the learning process at school using technology (Nurillahwaty, 2022). Therefore, technology has an important role in improving the quality of learning. Technology provides wide access to the use of technology in the world of education through learning media.

Technology-based learning media is an important part of learning activities in schools. Important learning media build a conducive learning atmosphere and make it easier for students to learn (Ummah,

2021). Students and teachers need to understand the medium for active and optimal learning (Harahap et al., 2022). Thus, technology learning media is necessary in the mathematics learning process. The use of technology-based learning media is also necessary to make it easier for students to learn.

The use of technology-based learning media has a positive impact on the learning process. Kemp and Dayton said that one of the benefits of this media is that learning is more interactive, clearer and more interesting (Firmadani, 2020). Silmi and Hamid added that this media is able to bridge the gap between concrete reality and abstract concepts so that it makes it easier for students to understand the material (Aji Silmi & Hamid, 2023). So, the benefit is to support efficient and effective learning in mastering abstract concepts, but there are problems that challenge students in understanding concepts.

Students' understanding of concepts in Indonesia is low because it relies more on memorization than material understanding (Septian et al., 2022). The most common thing in MTs is not being able to understand the basic concepts of statistical material (Juliana & Hidayat, 2021). Understanding concepts in one of the junior high schools, students do not know the efficient and effective learning method because they often experience obstacles in understanding and determining the form of the questions (Fajar et al., 2019). Thus, a minimal understanding of concepts in mathematics material, especially statistics, is obtained.

Based on interviews conducted with grade IX mathematics teachers at MTsN 2 Lhokseumawe City, students' understanding of concepts is still low. Students have difficulty in the indicators of classifying objects, students are weak in the indicators of applying concepts and providing examples and non-examples, students have difficulty giving non-examples and examples in daily life and indicators restating a concept. Problems also occur in the limited use of technological media in learning.

The concept understanding indicator is divided into seven parts. Anderson & Krathwohl say *Interpreting, Exemplifying*, *Classifying, Summarizing*, *Inferring, Comparing* and *Explaining*. However, from the students, four indicators of weak concept understanding were found, namely interpreting, exemplifying, classifying, inferring.

To achieve an increase in understanding of concepts, teaching media that combines a combination of video, images, animation and audio is needed. The combination of several media elements such as video, images, animations and audio in the media will clearly explain the content or meaning of the concepts conveyed (Dolo et al., 2022). Then effective learning media in the form of sounds, pictures and animations students will quickly understand the material provided (Maryani, 2014). The learning media is called interactive learning media.

Interactive learning media can improve understanding of mathematical concepts because it makes students active and clarifies a concept. Interactive learning media makes learning interactive, interesting, and effective in improving understanding of concepts (Safa'at et al., 2024). This media is suitable for use and effective for students to improve their ability to understand concepts (Setiani et al., 2024). Therefore, interactive learning media can increase students' understanding of concepts and provide effective solutions in learning. One of the interactive learning media is the Canva Application (Hafizah & Samosir, 2023). Canva is easy to use, flexible in design, and can add interactive elements (Oni Savitri, 2024).

Therefore, this study aims to develop and implement Canva-based interactive learning media to improve MTs students' understanding of concepts in statistics materials.

METHOD

This type of research uses Research & Development (R&D) research with the ADDIE model, the development process, namely, Analysis, Design, Development, Implementation and Evaluation. The subjects of the study are students of grade IX MTsN 2 Lhokseumawe City, a small trial of 20 people and a large trial of 20 students which will be carried out in the 2025 school year.

Data Collection Techniques

The following will explain about data collection techniques and instruments used are validation of material and media experts, pretest and posttest tests, student response questionnaires and interviews.

1. Test

Tests are a number of various questions to measure a skill, intelligence, knowledge, and ability that each individual or group has (Sugiyono, 2022). The test used is a description writing test which is assessed with an assessment rubric

Table 1. Concept Comprehension Test Grid

Material	Concept Understanding Indicators	Question Number
Statistical (Mean, Median and Mode)	Interpreting	1
	Exemplifying (Giving examples and non- examples of a concept)	2
	Classifying (Classifying objects according to certain properties according to their concept)	3
	Inferring (Applying a concept or finding patterns from a set of facts and using and utilizing and selecting a particular procedure or operation)	4

2. Validation of Material and Media Experts

Subject matter experts are professionals who are experts in a special subject or field of study (Copyright © 2015 Anis Chaeruman. This assessment will be validated by a statistical materialist, who has a high scientific rating in the field of statistics education and has been teaching for more than 5 years.

Table 2. Material Validation Grid

Yes	Aspect	Indicators	Yes Grain
1.	Material	a. Suitability of the material with basic competencies and learning objectives	1,2
		b. Easy-to-understand material	3,4
		c. Material attractiveness	5
		d. The material corresponds to real life	6
2.	Language	a. Appropriate and consistent use of language	7
		b. Use concise and clear language	8,9
3.	Evaluation	a. Suitability of questions with learning objectives	10

Table 3 . Media Validation Sheet Grid

Yes	Aspect	Indicators	Yes Grain
1.	Appearance/Design	a. Clarity of text when read	1

		b. Use of typefaces, proper writing spacing and font size	2
		c. Use of photos or images that support learning	3
		d. Composition and matching color combinations	4
		e. Use of proper animation effects	5
		f. Appropriate music support	6
		g. Use of appropriate narratives	7
2.	Language	a. Ease of use of media	8
		b. The media used can help the understanding of the material	9
		c. Can be controlled according to the student's speed of thinking.	10

3. Student Response Questionnaire

A questionnaire is a statement or question filled in by a person containing a specific topic to obtain data (Syahrum & Salim, 2014). The questionnaire was distributed after a small trial. The questionnaire was given to find out students' responses to interactive learning media.

Table 4. Grid of Small Group Student Response Questionnaire

Yes	Assessment Aspects	Indicators	Not to be confused with
1.	Learner response	Serving	7
		Material	3
		Language	3
		Ease of use	1

4. Interview

Interviews are conducted in a small trial stage to find out if students understand the ability to understand concepts and what needs to be improved by the media.

Table 5. Small Trial Stage Interview Grid

Yes	Question
1	Can interactive learning media help the student learning process?
2	Can interactive learning media improve students' understanding of concepts?
3	Do students like the interactive learning media?
4	Are the interactive learning media easy to learn and use?
5	Do students have problems in using these learning media?
6	Is the content of the learning media in accordance with students' expectations?
7	Does the learning media have good quality?

Data Analysis Techniques

1. Qualitative Descriptive Analysis

This technique was made to process data from various sources, namely media experts, material experts and students. Data analysis techniques include the incorporation of qualitative data such as inputs, responses, criticisms and suggestions from validation sheets and questionnaires as well as student interviews. The results of the analysis are then used to revise the development product.

2. Quantitative Descriptive Analysis

This technique is to manage the data that has been collected from validation sheets and questionnaires.

Table 6. Criteria used to assess scores

Criterion	Score
Bad	1
Not Good	2
Neutral	3
Good	4
Excellent	5

Based on the validation sheet that has been filled in, the validator can find the percentage with the formula:

$$P = \frac{\sum Total\ Score\ Obtained}{Total\ Score}\ x\ 100\% \quad (1)$$

Then the percentage of scores obtained will be changed to the media eligibility category

Table 7. Media Eligibility Category

Criterion	%
Bad	0-20
Not Good	21-40
Neutral	41-60
Good	61-80
Excellent	81-100

Analysis of Concept Comprehension Ability Test.
The N-Gain formula is as follows:

$$N - Gain(g) = \frac{Posttest\ Score - Pretest\ Score}{Maximum\ Score - Pretest\ Score} \quad (2)$$

With:
N-Gain : the magnitude of the gain factor
Posttest score: final test result score
Pretest score: the value of the initial test result
Maximum score : maximum test score

The N-Gain interpretation criteria are stated in the following table:

Table 8. N-Gain Interpretation Criteria

N-Gain Score	Criterion
g < 0,7	Tall
	Keep
G < 0,3	Low

RESULTS AND DISCUSSION

Analysis

This analysis is carried out to obtain all the information or conditions used for reference in development research. This stage is to identify problems through the analysis of student needs, curriculum, and learning tools in schools. First, interviews were conducted with mathematics teachers, it was obtained that the curriculum implemented was the 2013 curriculum for class IX, while grades VII and VIII used an independent curriculum. In addition, based on the results of the interviews, it has been found that students tend to have difficulties in several important indicators, namely indicators of *classifying objects***,** indicators of applying concepts or finding patterns (*Inferring***),** indicators of giving examples and non-examples (*Exemplifying*), indicators of restating concepts (*Interpreting*). Not only that, based on interviews with teachers, it is known that there are limitations to the use of technological media in learning activities. Teachers rarely use technology media in learning because teachers still feel unfamiliar and not proficient in applying it.

The teacher said that the learning method used so far is less interesting and the limited use of visual media can support students' understanding, especially in statistical materials and result in the learning also becoming less interactive and not enough to facilitate students to understand concepts in a fun way. Therefore, teachers need learning media that can facilitate the learning process in helping the learning process to be effective and optimal (Aisyah Fadilah et al., 2023). It was found that students have a desire to learn through technology-based teaching media. Teachers also said that the use of interactive learning media such as media using Canva can increase students' interest in learning statistics materials and make it easier for them to understand difficult concepts.

Design

The design stage is the writing of ideas into a formula that describes the learning medium in detail. The form of the formulation of learning media is very varied and depends on the type of learning media that is to be developed. The formulation of interactive learning media designs was developed in the form of flow *charts* and *storyboards* (Batubara, 2018). The formulation of learning media design aims to direct media developers to create and develop learning media. Therefore, writing a learning media design formulation can facilitate media developers to create an interactive learning media.

Development Stage

At the development stage, the media design that has been made will then be validated by the media expert validation team. Media validation is carried out for initial refinement. There is an assessment aspect that is carried out at the media and material validation stage. The results of media validation by the expert team are listed in the following table.

Table 9. Material Validation Score

Yes	Aspects observed	Score Per Aspect	Score Maximum	%	Information

1	Material	27	30	90	Excellent
2	Language	10	15	67	Good
3	Evaluation	5	5	100	Excellent
	Sum	45	50	84	Excellent

Based on the table, it states that in the material aspect "very good", the Language aspect "Good", the evaluation aspect "very good". This is in accordance with the feasibility category (Sugiyono, 2022).

Table 10. Media Validation Score

Yes	Aspects observed	Score Per Aspect	Score Maximum	%	Information
1	Display/ Design	31	35	89	Excellent
2	Operation	12	15	80	Good
	Sum	43	50	86	Excellent

Based on the table, it states that in the aspect, the appearance/design aspect is "excellent", the operating aspect is "Good". So with this the media category is very good.

The results of the revised design are as follows:

Figure 1. Main start page

This page is an initial look at Canva-based interactive learning media. The design is made attractive and themed in the school environment to foster students' interest in learning. There is a "start" button that directs users to the main material.

Figure 2. Menu page

Present the main navigation in interactive learning media. There are several buttons, namely Media Instructions, Learning Videos, Materials, and Questions that make it easier for students to choose the part they want to learn. The display is made simple to make students more focused and interested. which shows that interactive learning media is a medium that can help students interact directly because the learning process is interesting (Muhammad et al., 2022).

Figure 3. Media Hint Page

On this page, there are select buttons that direct users to the User Guide, Learning Objectives, Developer Profile, and References. This page is designed to provide supporting information that clarifies the use of the media and the background of the material presented.

Figure 4. Learning Video Page

This page features learning videos, Videos are designed to help students understand concepts visually and more engagingly.

Figure 5. Material Page

This page presents the material in a concise and engaging form. The material is equipped with sample questions to help students understand concepts gradually.

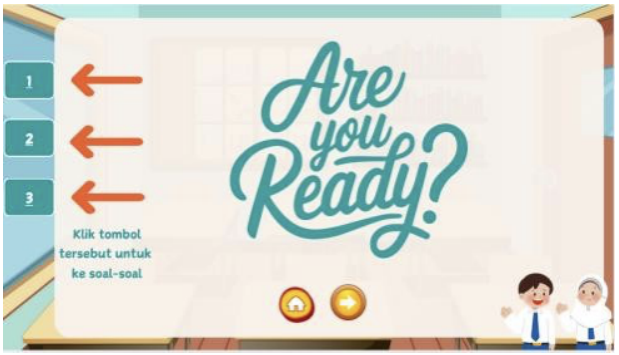

Figure 6. Questions Page

This page contains practice questions designed to test students' understanding of the material. Questions are presented in an essay format.

Figure 7. Closing page

The closing page contains a thank you to the users who have used this learning medium.

Implementation

After validation by experts and has been revised, a trial will be carried out. At the implementation stage.

Small-Scale Testing

A small group trial involving several students selected from different classes with the main trial within the scope of MTs class IX. The trial was carried out by 5 students. Students are given pretest and posttest questions.

Table 11. Small Trial Test Score Results

Pretest Score	Postest Score	N-Gain	Category
38	76	0,90	Tall

The results of the small trial test on 5 students show that the learning media has been made with a maximum score of 16 and the results of the calculation of the average n-gain of pretest scores of 38 and postest 76 with the average n-gain of students of 0.90 with a high category, it can be concluded that there is an increase in the understanding of the concept of high students. This results in the fact that interactive learning media has been able to have a positive effect on improving students' understanding of concepts from the material that has been taught.

Then students fill out a questionnaire to find out the students' response to the use of interactive learning media. The following is a table of the results of students' responses to interactive learning media.

Table 12. Student Response Results in Small Trials

Total Score	Maximum Score	Present(%)	Criterion
66.8	70	95,4%	Excellent

Based on student responses to the small group trial in a table involving 5 respondents, it was found that interactive learning media products were very feasible or very good with a percentage of 95.4% so that there were no significant changes.

Full-Scale Testing

Products that have been tested in small groups are then carried out large trials to improve students' understanding of concepts on interactive learning media. This trial involved 1 class IX-3. Large trials obtained the results of concept comprehension tests as shown in the following table:

Table 13. Large Trial Student Test Results

Pretest Score	Postest Score	N-Gain	Category
132	286	0,81	Tall

The results of the large trial test on 20 students showed that the learning media that had been created with a maximum score of 16 and the total pretest score was 132 and the total posttest score was 286. From the calculation results, the average N-Gain is 0.81 with a high category,

Based on the Hake classification, N-Gain is carried out to measure learning effectiveness, with a high category if the N-Gain ≥ 0.7. As many as 15 out of 20 students (75%) obtained a high N-Gain, and 5 students (25%) were in the medium category. This knows that most students experience a significant improvement in concept understanding after learning using the developed media.

Evaluation

The last stage of media development is the evaluation stage, where the media has been successfully developed and in accordance with the research objectives (Purnamasari, 2019., Rahmi, et al., 2023). The results of the evaluation are described in summative and formative evaluations. Formative evaluation is carried out in the development and summative evaluation stage, namely the evaluation of the assessment of pretest and posttest test results (Dalilah et al., 2023; Pitriyani et al., n.d.; Zulfikar & Hilliyani, 2025).

Formative evaluation is carried out during the media development process, namely from the validation of material experts and media experts. Validation aims to determine that the content, language, display and interactive features of the media are in accordance with the eligibility standards. In the first stage of validation from subject matter experts with a percentage of 78% in the "Good" category. After the improvements were made according to the validator's suggestion, the second stage of validation showed an increase in getting a score with a percentage of 84% of the "Excellent" category. This has shown from the material contained in the media that the material is in accordance with the material standards. Meanwhile, validation from media experts obtained "excellent" results with a percentage of 86%. This has shown from the media that the media has an attractive display quality and is easy for students to use.

Summative evaluation was carried out after the media was implemented for students including small trials (5 students) and large trials (20 students). The purpose of this evaluation is to determine the improvement of students' understanding of concepts and see their response to the developed media.

Small Trials

During the small group trial, all students found an increase in concept understanding from the pretest and posttest. The Average N-Gain score was 0.90 with a high category and an increase occurred in the four indicators of concept understanding (*Interpreting, Exemplifying, Classifying*, and *Inferring*) with an N-Gain of 0.90. The results of the student response questionnaire also obtained very good category results. The average response percentage from students was 95.4% with the category "Very Good". Students state that the media is easy to understand, very attractive, the display is not boring and helps in capturing statistical material.

Large Trials

During the big trial, pretest and posttest were carried out for 20 students in grade IX MTsN 2 Lhokseumawe City obtained an average N-Gain of 0.81 with a high category, then there were 15 students (75%) who got the high N-Gain category, 5 students (25%) with the medium N-Gain category and no students got the low N-Gain category.

Referring to the results of formative and summative evaluations, it can be concluded that Canva-based interactive learning media is suitable for statistical learning. Validation by experts results that the media has met the feasibility criteria in terms of content and technicality. On the other hand, the results of the students' tests and the students' responses showed that the media was able to significantly improve the understanding of concepts. Therefore, interactive learning media can be recommended to be applied in mathematics learning at the MTs level in statistics material.

CONCLUSION

Based on the results and discussions that have been presented, it can be concluded that students' ability to understand concepts in statistical materials using canva-based interactive learning media in MTs has improved effectively and is suitable for the use of these media.

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