

DEVELOPMENT OF CANVA-BASED INTERACTIVE MATHEMATICS LEARNING MEDIA TO IMPROVE LEARNING OUTCOMES OF SMP STUDENTS

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ABSTRACT

The results of observations at UPT SMP Negeri 2 Tuban show that mathematics learning is still dominated by teachers and the application of digital media in mathematics learning has not been fully implemented. This has an impact on students' relatively low mathematics learning achievement. Thus, there is a need for learning innovation by utilizing technology as an interesting and interactive learning medium. This study aims to create an interactive mathematics learning media product by integrating Canva that is valid, practical, and effective. This research is a Research and Development study using the four-D model (Define, Design, Development, Disseminate). The validity of the learning media was rated "very valid" by subject matter experts, "valid" by media experts, and "very valid" by test questions. The practicality of the media was rated "very practical" by observers, and "very practical" by student questionnaire responses. The effectiveness achieved an N-gain score of 0.76, categorizing as "high effectiveness." This indicates that the developed learning media meets the criteria of validity, practicality, and effectiveness in improving student mathematics learning outcomes and demonstrates Canva's potential in creating engaging and interactive learning media.

Keywords: canva, interactive learning media, learning outcomes, mathematics

ABSTRAK

Hasil observasi di UPT SMP Negeri 2 Tuban terlihat bahwa pembelajaran matematika masih didominasi oleh guru serta penerapan media digital belum sepenuhnya diterapkan. Hal ini berdampak pada pencapaian belajar siswa matematika relatif rendah. Dengan demikian, perlu adanya inovasi pembelajaran dengan pemanfaatan teknologi sebagai media pembelajaran menarik serta interaktif. Penelitian ini bertujuan untuk menciptakan produk media pembelajaran matematika interaktif dengan mengintegrasikan canva yang valid, praktis, dan. Jenis penelitian ini adalah Research and Development dengan model four-D (Define, Design, Development, Disseminate). Kevalidan media pembelajaran oleh ahli materi "sangat valid", oleh ahli media "valid" sedangkan soal tes "sangat valid". Kepraktisan media dari observer "sangat praktis" dan angket respon siswa "sangat praktis". Keefektifan mendapatkan skor N-gain 0,76 kriteria "keefektifan tinggi". Hal ini menunjukkan bahwa media pembelajaran yang dikembangkan mempunyai kriteria valid, praktis, dan efektif dalam peningkatan hasil belajar matematika siswa serta menunjukkan potensi canva dalam menciptakan media pembelajaran yang menarik dan interaktif.

Kata kunci: canva, hasil belajar, matematika, media pembelajaran interaktif.



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Introducion

Mathematics is a subject that can be found at all levels of education. Mathematics is a subject that can improve the quality and standard of education and shape students' mindsets, such as logical, systematic, analytical, critical and careful thinking (Ratnaningtyas et al., 2023; Sari & Putri, 2024). This is because mathematics plays an important role in various aspects of life. The abstract nature of mathematics poses a particular difficulty for students in learning it (Apriadi, 2021). Moreover, when the delivery of material is monotonous in the mathematics learning process, many still use a pattern of explaining the material, then taking notes, and giving students practice questions (Susanta & Koto, 2021). This learning process often makes students feel bored, uninterested, and tired of learning mathematics. Therefore, teachers must be able to create an interactive learning situation, namely interaction between teachers and students, students with fellow students, and students with learning resources to support the achievement of learning objectives (Putri et al., 2022; Zain, A. A., & Pratiwi, 2021).

Based on initial observations at UPT SMP Negeri 2 Tuban, it was found that the teaching and learning process in mathematics is still teacher-centred. As a result, students tend to be passive, uninterested and find it difficult to understand the material. Although students like digital learning media, its use in mathematics learning has not been maximised. This has an impact on students' relatively low learning outcomes in mathematics. Therefore, innovative solutions are needed to create an interactive and engaging learning process.

As technology develops, teachers can easily utilise technology in the learning process. Utilising technology as a learning medium can make the learning process flexible and effective, increase student interaction and activity, and support improvements in the quality of education and learning (Banarsari et al., 2023; Said, 2023; Ubaidi, 2023). Not only that, digital-based learning media are attractive and do not bore students (Dewi et al., 2022). The use of interactive media can be one solution in creating interactive and engaging learning.

Several studies have shown that interactive learning media play an important role in helping students understand mathematical concepts and reducing student boredom (Aliya et al., 2024; Maharani & Hidayah Putri, 2023). Not only does it enhance students' learning experience through interactive and dynamic visuals, but interactive media also helps students understand mathematical concepts and assists teachers in delivering material easily and making the learning process more effective and enjoyable (Indartiwi et al., 2020; Siregar et al., 2024). According to research (Djuma & Mus, 2024) the use of interactive learning media can improve learning outcomes, interest, and enthusiasm for learning mathematics. Based on research conducted (Najibah et al., 2024), interactive learning media shows a high level of effectiveness in improving students' mathematics learning outcomes.

Canva is one of the platforms that can be used to create interactive learning media. Canva has interactive elements such as links between pages or external sites, and the animations provided by Canva can make learning media more interesting (Pramita & Supriyo, 2024). The various features provided by Canva make it easy for users to use, such as teachers being able to easily create interactive and engaging learning media using the various features provided and increasing student (Kurniawan et al., 2024; Santoso & Istiqomah, 2023). In mathematics, Canva can be used as a learning medium, such as infographics, presentations, or videos by adding

interactive elements such as hyperlinks to make them more interactive (Lestari et al., 2024). Not only that, the use of Canva interactive learning media has been proven to improve students' mathematics learning outcomes (Andreansyah et al., 2023). Oktaviana and Vahlia (2017) explored the use of a 3D shape snake and ladder game as part of the Creative Problem Solving (CPS) learning model. This media was used to enhance students' creativity in learning. Syamil, Vahlia, and Sudarman (2024) developed a learning media based on the Powtoon application, which also incorporates Islamic values. This media was used to teach the concepts of quadrilaterals and triangles. Indriyani, ES, and Vahlia (2021) developed a mathematics learning media based on an Android application, utilizing the Realistic Mathematics Education (RME) approach. This aimed to facilitate students' understanding of mathematical concepts through more interactive tools. These studies suggest that the use of media can help students better understand mathematics learning in schools.

Although several researchers have conducted studies related to the use of Canva-based interactive media in mathematics learning. For example, Andreansyah et al. (2023) found that Canva-based interactive media is effective in improving learning outcomes, but the study did not focus on the subject of flat triangles in Grade VII junior high school. Research by Kurniawan et al. (2024) also stated that Canva can be used to easily create interactive media, but not for mathematics learning.

From the explanation above, research entitled 'Development of Canva-Based Interactive Mathematics Learning Media to Improve Junior High School Students' Learning Outcomes' is needed for the subject of flat triangle shapes in Grade VII junior high school. This media will be designed to make students more active and motivated in learning by utilising the interactive features provided by Canva. This research and development aims to test the validity, practicality, and effectiveness of the developed learning media. Thus, this research is expected to make a real contribution to efforts to improve students' mathematics learning outcomes.

Research Methods

This study utilises the research and development (R&D) method. According to Sugiyono in (Azmi, 2024), this type of research and development method is used to create a product and test its validity and effectiveness. The researcher applied the 4D development model from Thiagarajan et al, (1974) in (Waruwu, 2024), which includes define, design, develop, and disseminate. The 4D model has quick steps but still has a systematic and complete development description. It can be used to develop media, and the development product results have been tested because the product has been assessed by experts, namely subject matter experts and media experts, before being disseminated. However, the researcher only reached the develop stage to test its effectiveness through a trial phase due to time constraints.

The trial was conducted using a 'One Group Pre-Test and Post-Test' design (Istikomah & Wicaksono, 2023). This research design involved one experimental group that was given a pre-test before the treatment and a post-test after the treatment using the developed media to measure the improvement in student learning outcomes (Khotimah & Astawan, 2024). Although this design has limitations due to the absence of a control class, it is still effective for measuring the

improvement in learning outcomes in one group of research subjects. The research subjects were 31 students in class VII-C at UPT SMP Negeri 2 Tuban.

The instruments used were expert material validation sheets, media expert validation sheets, pre-test and post-test question validation sheets, product implementation observation sheets, student response questionnaires, and student learning outcome tests. Media validation was carried out by two validators according to their fields of expertise, namely a lecturer from the mathematics education department at PGRI Ronggolawe University in Tuban and a teacher who taught mathematics to Year 7 students. The quantitative data included the learning media assessment sheets by the validators, assessments from observers, student response questionnaires, and student learning outcome data, namely pre-test and post-test data, while the qualitative data consisted of comments and input from the validators, which were used to improve the developed media products.

Quantitative data on the validity and practicality of the media were analysed using the Usfiyana Likert scale (Mendrofa et al., 2024) shown in Table 1.

Table 1. Likert Scale

Description	Score
Very Not Good	1
Not Good	2
Quite Good	3
Good	4
Very Good	5

Table 1 is used to measure the validity and practicality of the media on a scale of 1 to 5. Quantitative data on practicality from observations of product implementation were analysed using a Guttman scale according to Ridwan (Aziz, 2019), as shown in Table 2.

Table 2. Guttman Scale

Answer	Score
Yes	1
No	0

Table 2 is used to measure the practicality level of the media from the observer through observation of the feasibility of the developed media products.

Furthermore, the value of each criterion is recapitulated using the Arikunto formula (Khairunnisa et al., 2023), namely:

$$\text{Percentage} = \frac{\text{Total assessment score}}{\text{Maximum assessment score}} \times 100\% \quad (1)$$

The data was then summarised and assessed according to predetermined criteria. Table 3 shows the validity criteria for the developed media.

Table 3. Validity Criteria

Criteria	Percentage (%)
Invalid	0-20
Less Valid	21-40
Quite Valid	41-60
Valid	61-80
Very Valid	81-100

Based on Table 3, it can be seen that the developed media is considered valid if > 60%.

Table 4 shows the criteria for the practicality of the developed media.

Table4. Practically Criteria

Criteria	Percentage (%)
Not Practical	0-20
Less Practical	21-40
Quite Practical	41-60
Practical	61-80
Verry Practical	81-100

Based on Table 4, it can be seen that the developed media is considered practical if > 60%.

To measure the effectiveness of the media in improving learning outcomes, an N-gain analysis was conducted using the following formula:

$$N - Gain = \frac{\text{Skor Post test} - \text{Skor Pre test}}{\text{Skor Ideal} - \text{Skor Pre test}} \quad (2)$$

The effectiveness categories of N-Gain are shown in Table 5.

Table 5. Score N-Gain Categories

N-Gain	Criteria
$0,7 < g$	High
$0,3 \leq g \leq 0,7$	Medium
$0,3 > g$	Low

Source: Hake from (Kumawati, 2023)

This N-Gain analysis serves to measure the extent of improvement in student learning outcomes after using the developed media. The media is considered effective if the N-Gain score is in the moderate or high category, indicating that the developed media is capable of providing a significant improvement in students' understanding of the material.

Results and Discussion

The define stage includes preliminary analysis. UPT SMP Negeri 2 Tuban implements an independent curriculum. Mathematics learning has a time allocation of 4 JP for 2 meetings with a minimum passing grade of 73. Based on the data, the average test score of students in one class was only 40.3, with many students failing to achieve the minimum passing grade. The main problems based on the observation results are that students find it difficult to understand the material, are less active, and have relatively low mathematics learning outcomes. Therefore, this study focuses on the development of interactive mathematics learning media on the subject of triangular shapes taught in the even semester of grade VII. This media is designed to include quizzes and exercises that can support the achievement of learning objectives.

This is a website that uses Canva as the main platform for creating learning media. It is also supported by Google Forms for quizzes and LiveWorksheets for exercises. These platforms are used to enrich interactivity and utilise Canva's hyperlink feature. In addition, this media is also equipped with images and videos to support the material. The content of this media includes 1) the home page, 2) the menu page, 3) usage instructions, 4) learning objectives, 5) the material menu page, 6) the quiz menu, 7) practice questions, and 8) the developer's profile.

Below are some screenshots of the developed learning media. Figure 1 shows the cover or front page, while Figure 2 shows the instructions page.



Figure 1. Cover



Figure 2. Instruction

The development stage includes testing the validity, practicality and effectiveness of the developed media. Through limited trials, the practicality and effectiveness of the developed learning media were obtained.

The expert validation data for the developed learning media is shown in Table 6. Table 6. Data From Media Validation by Material Experts

Aspect	Assessment		Total
	Validator I	Validator II	
Material Suitability Aspects	28	28	56
Writing Suitability Aspects	4	4	8
Linguistic Aspects	9	8	17
		Total	81
		Percentage of Validity Criteria	81%
			Very Valid

Table 6 shows that the percentage obtained from two expert validators was 81% with a criterion of highly valid. This proves that the triangle material presented is relevant and valid for use.

The learning media validation data by media experts is shown in Table 7. Table 7. Data From Media Validation by Media Experts

Aspect	Assessment		Total
	Validator I	Validator II	
Learning Media Aspects	11	11	22
Writing Aspects	18	16	34
Display Aspects	12	12	24
		Total	80
		Percentage of Validity Criteria	80%
			Valid

Table 7 shows that the percentage obtained from two media expert validators is 80% with valid criteria. This proves that the learning media presented is valid and suitable for use and testing.

The pre-test and post-test validation data to measure the improvement in student learning outcomes are shown in Table 8.

Table 8. Data From Validation Pre-Test and Post-Test Questions

Aspect	Assessment		Total
	Validator I	Validator II	
Question Material	12	12	24
Construction	19	18	37
Language	14	12	26
	Total		87
	Percentage of Validity Criteria		87%
			Very Valid

Table 8 shows that the percentage of validation of pre-test and post-test questions from two validators is 87% with a very valid criterion. This proves that the pre-test and post-test questions are valid and can be tested.

The data from the observation sheets on the implementation of learning activities obtained from observers over two days are shown in Table 9.

Table 9. Learning Activity Implementation Observation Sheet Data

No	Aspect	Assessment		Total
		Observer Hari Ke- 1	Observer Hari Ke- 2	
1	Preliminary Activities	5	6	11
2	Core Activities	8	8	16
3	Closing Activities	3	5	8
	Total			35
	Percentage of Practicality Criteria			92,11%
				Very Practical

Table 9 shows that the percentage of observation results was 92.11% with very practical criteria. This proves that the developed media is practical for use in the learning process.

The data from the student response questionnaire obtained from 31 students is shown in Table 10.

Table 10. Student Response Questionnaire Data

No	Assessment Aspects	Total
1	Ease of Use	138
2	Accessibility	792
3	Attractiveness	274
4	Language	144
	Total	1348
	Percentage of Practicality Criteria	86,96%
		Very Practical

Table 10 shows that the percentage of student response questionnaire results was 86.96% with a criterion of very practical. This proves that the developed media is practical for use in the learning process.

The pre-test and post-test assessment data for 31 students and the N-Gain scores are shown in Table 11.

Table 11. Pre-test and Post-test Assessment Data

Test Type	Score	Total Score
Pre-Test	1178,5	3100
Post-Test	2645,5	3100
N-Gain		0,76
Criteria		High

Table 11 shows that the N-Gain score obtained from the pre-test and post-test is 0.76 with a High criterion. This proves that the developed media is highly effective and there is an increase in student learning outcomes after using the developed interactive learning media.

The revisions obtained from the subject matter expert validator were that the definition of a triangle listed was made easier for students to understand, while the input from the media expert validator was the addition of dialogue bubbles to the text display, tidying up the text layout, and adding the developer's name to the video created. Figure 3 shows the appearance of the learning media before revision.



Figure 3. View Before Revision

Figure 4 shows the revised learning media display.



Figure 4. View After Revision

This research and development yielded results consistent with previous studies and Mayer's multimedia learning theory, which states that learning is more effective when information is presented in text, image, and video formats. Not only that, multimedia learning also involves student activity and facilitates students in understanding abstract mathematical concepts (Noordin et al., 2024). By utilising Canva's interactive features such as hyperlinks, animations, and videos, it helps to visualise the concept of triangles. That way, students can more easily understand the material presented.

This is also in line with research conducted by Najibah et al. (2024), which shows that the interactive learning media developed is valid and practical. This media is able to improve student learning outcomes with an N-Gain of 0.8, indicating high effectiveness, making it suitable for application in learning. Furthermore, research by Andreansyah et al. (2023) shows an increase in students' mathematics learning outcomes using interactive learning media. However, this study contributes more by specifically discussing triangular material, combining it with Google Forms and LiveWorksheets, which were not present in previous studies, and proving that this Canva-based interactive media can be an effective solution to overcome difficulties and improve student learning outcomes.

The disadvantage of this research and development is that the media developed has not integrated learning models into the media, so it is still flexible in its use. However, this research and development has the advantage that the media is easy to access and has been proven to be highly effective in improving student learning outcomes.

Overall, this interactive mathematics learning medium based on Canva has not only proven to be valid and practical in terms of ease of use, but also effective in improving student learning outcomes.

CONCLUSION AND SUGGESTION

From the results of this research and development, the validity test by subject matter experts was 81% 'highly valid', media experts 80% "valid", test item validation 87% 'highly valid'. The practicality test by observers was 92.11% 'highly practical', student response questionnaires 86.96% 'highly practical'. The N-gain effectiveness test was 0.76, which is 'high'. Therefore, the developed learning media is valid, practical, and effective for improving mathematics learning outcomes on the subject of triangles.

The recommendation from this research is that future research should develop learning media to the dissemination stage and improve the visual design, as well as combine it with other platforms to make it more attractive.

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