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Canva Application-Based Learning Media: Improving Mathematics Learning Outcomes in Fraction Materials for Elementary School Students

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Abstract: The purpose of this study was to produce a suitable and effective Canva application-based mathematics learning medium for improving student learning outcomes at Betania Private Elementary School in Medan. The type of research used is ASSURE research and development. The research instruments used were initial needs questionnaires, material expert validation questionnaires, media experts, design experts, and student response questionnaires. This study also uses quantitative data analysis techniques (data on the feasibility and effectiveness questionnaire assessment) and qualitative data (observation data and documentation). Product validation results show a score percentage of 89.16% for material expert validation, 83.47% for media expert validation, 95% for design expert validation, and 98.75% for student responses. The results of the normality and homogeneity tests show that the research data has been declared normal and homogeneous. The results of the hypothesis test show that the value of t count is 1.98 and the value of t table is 1.66, where t count > t table. The results of this study indicate that Canva-based mathematics learning media are effective in improving student learning outcomes at Betania Private Elementary School, Medan.

Keywords: instructional Media; canvas; mathematics; fraction number

1. INTRODUCTION

The development and progress of science and technology are increasingly developing in the field of learning. By utilizing technology, the educational component of both teachers and students can easily obtain a lot of information so that they can learn and absorb it well. The use of information and communication technology in education is through the development of appropriate and interesting learning media [1]. One lesson that requires learning media so students can learn abstract material is mathematics. Mathematics is knowledge that plays an important role in various disciplines [2]. Mathematics is one of the subjects that must be taught in school, but mathematics is still considered difficult by most students.

According to Teni [3] "Learning media is a tool that can support the teaching and learning process so that the meaning and messages conveyed can be clearer and learning objectives can be achieved effectively". The use of learning media can encourage students to be interested in learning new things in the teaching materials that will be delivered by the teacher so that they are easy to understand. Interesting learning media for students can be a stimulus for the learning process. Management of teaching aids or media can be very helpful in the world of education. Learning media can be used as an aid in teaching and learning activities. One of the teacher's tasks is to be able to choose appropriate learning media to achieve learning objectives as planned.

Canva can help teachers create learning media and make it easier for them to explain subject matter. With this application, students can learn the material taught by the teacher more easily because Canva can display writing, video, sound, animation, pictures, charts, and others as needed and is able to help increase student focus in learning activities because of its clear appearance. interesting [4]. The Canva application can help create designs without having to download the application and has various features that can combine various forms of artistic design [5]. The types of presentations that can be accessed on the Canva application are creative, educational, simple, business, marketing, sales, advertising, and technology presentations.

1.1 The Nature of Learning and Learning Outcomes of Mathematics

Suprijono [6] said that "Learning as a concept of gaining knowledge in practice is widely embraced. The teacher acts as a teacher who tries to provide as much knowledge as possible, and students actively collect or receive it. According to Kosasih [7] "Learning is a change in behavior that is marked by the existence of something new in a person, whether it is in the form of skills, attitudes, habits, knowledge, or skills". Learning is the result of an experience, namely in the form of interaction with environmental learning resources, books (readings) or people. Learning is an effort to acquire habits, knowledge, and attitudes.

According to Sanjaya [8], learning outcomes are learning behaviors, as learning outcomes are formulated in the form of abilities and competencies that can be measured or displayed through student performance. Learning outcomes cannot be separated from learning activities because learning activities are a process, while achievement is the result of the learning process.

According to Poerwanto [9], learning outcomes are processes within individuals that interact with the environment to obtain

changes in their behavior. Learning outcomes occur in individuals who want to learn, and there are changes in their skills, attitudes, and knowledge.

Furthermore, Slameto [10] suggests that learning outcomes are measured by the average results of the tests given, and the learning outcomes test itself is a group of questions or assignments that must be answered or completed by students with the aim of measuring student learning progress. Learning outcomes are "certain competencies or abilities, both cognitive, affective, and psychomotor, that are achieved or mastered by students after participating in the teaching and learning process" [11]. Learning outcomes are "changes that occur in students, both concerning cognitive, affective, and psychomotor aspects, as a result of learning activities" [12].

Daryanto and Raharjo [13] argue that mathematics can be learned to equip students at school with several competencies so that they have the ability to think creatively, critically, analytically, systematically, and logically. So there must be good interaction between teachers and students in learning so that the goal is achieved, namely that students are able to understand and master the material. Meanwhile, according to Amir [14], learning mathematics is a series of planned activities in providing learning experiences that aim to acquire students who have learned mathematical knowledge, are skilled and intelligent, and are able to understand teaching materials well.

Fractional numbers are one of the numbers that we often encounter in mathematics lessons. In English, fraction means fraction, which comes from the Latin word fractus," which means broken. The definition of a fraction is a part of the whole of a certain quantity. Ordinary Fractions are a form of fraction where the value of the denominator is greater than the numerator or a/b where a is the quantifier and then b is the denominator (denominator > quantifier).

Figure 1. Display of class II elementary school math fraction material using the Canva application

1.2 The Nature of Canva Learning Media

Gagne [15] explains that media are various types of components in the student environment that can provide stimulation for learning. According to Purnamawati and Eldarni [16], media is anything that can be used to channel messages from senders to recipients so that they can stimulate students' thoughts, feelings, concerns, and interests in such a way that a learning process occurs. In addition, Bovee [17] stated that "Media is a tool that has the function of conveying messages".

According to the Association of Education and Communication Technology (AECT), media are all forms and channels used to convey messages or information, while the definition of media according to Djamarah [18] is any tool that can be used as a channel for messages to achieve learning objectives.

Learning is a translation of the word instruction," which in Greek is called instructus or intruere," which means conveying thoughts; thus, the meaning of instructional is conveying thoughts or ideas that have been processed in a meaningful way through learning [19].

The word learning contains a meaning that is more pro-active in carrying out learning activities because, in it, it is not only educators or instructors who are active, but students are active subjects in learning [20].

The definition of learning put forward by Gagne and Brigs [21] is a system that aims to assist the student learning process and contains a series of events that are designed and structured in such a way as to influence and support the internal student learning process.

Learning media is anything that can convey and distribute messages from sources in a planned manner so as to create a conducive learning environment where recipients can carry out the learning process efficiently and effectively [22].

Learning media is a message-carrier technology that can be used for learning purposes. Learning media is a physical means for conveying subject matter. Learning media is a means of communication in print as well as sight and hearing, including hardware technology [23].

According to Latuheru in Hamdani [24], learning media are materials, tools, or techniques used in teaching and learning activities with the intention that the process of educational communication and interaction with teachers and students can take place in an effective and efficient manner.

1.3 Media Canva

Canva is a web-based application that allows users to modify images and create graphic creations. Apart from that, users can also download other designs, such as themes, fonts, and photos, to enhance their creations. You can also use Canva to make

posters, flyers, and brochures, including educational media. According to Wulandari and Mudinillah [25], Canva is one of the most popular applications among teachers for making learning media. There are various interesting template features that can be used to create learning media and can be developed to design learning media as creatively as possible so that learning media has a more communicative meaning and the visualization of learning media is more attractive to students.

According to Raaihani [26], the advantages of the Canva application can be used to create learning media, including the following: (1) Having attractive graphic design template variants such as writing, backgrounds, musical instruments, images, animations, and so on; (2) training the creativity of teachers in making learning media, As well as having many functions that have been provided in the Canva application with the drag and drop feature; (3) Making learning media can save time; (4) Students can study the material that has been distributed by the teacher again.

According to Pelangi [27], he explained the benefits of Canva for teachers and students, namely Canva as a technology-based application that provides a learning space for teachers who carry out learning by relying on the learning media that Canva has applied. There are quite a lot of templates provided in the Canva application, such as PowerPoint, infographics, learning videos, and so on.

Figure 2. Display of the Canva application for making math plans and stories

The research problem is formulated as follows: (1) Is the mathematics learning media based on the Canva application developed suitable for use in fraction material for class III students at SD Betania Medan? Is the mathematics learning media based on the Canva application that was developed effectively used to improve the learning outcomes of class III SD Betania Medan?

2. METHOD

The research that will be carried out is a type of research on the development of Canva-based mathematics learning media. This type of research uses the Research and Development (R&D) method. According to Mulyana [28], R&D research is a type of research whose goal is to create and develop new products using certain steps. According to Hanafi [29], R&D research in education is a process used to create or develop a product that will be tested for validation or effectiveness.

This research was conducted at Batania Medan Private Elementary School, which is located at Jalan Tangguk Bongkar III No. 57, Tegal Sari Mandala II, Medan Denai District, Medan City. This research was conducted in the even semester of the 2022–2023 school year. The research subjects were third grade students at SD Betania Medan. As for class III A as the experimental class and class III B as the control class, The object in this study is the material Fractions.

The learning system design development model is the model put forward by Sharon E. Smaldino, James D. Russell, Robert Heinich, and Michael Molenda, namely the ASSURE model. The ASSURE model can be described in Figure 3 below:

Figure 3. ASSURE Model Development

The procedure in this study adopts the learning multimedia development model developed by Sharon E. Smaldino, James D. Russell, Robert Heinich, and Michael Molenda, namely the ASSURE model. The steps or stages of the ASSURE development model [30] are as follows: (1) Analyze Learners; (2) state Objectives; (3) Select Methods; (4) Utilize Media and Materials; (5) require Learner Participation; and (6) Evaluate and Revise.

Data collection was carried out using a questionnaire by distributing questionnaires to the respondents, namely material experts, media experts, design experts, and students. The respondents gave an assessment of the quality of Canva-based mathematics learning media with the following research criteria:

Table 1. Scoring Rules

No	Category	Score
1	Very good	5
2	Good	4
3	Pretty good	3
4	Not good	2
5	Not good	1

(Source: Arikunto, [31])

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The research results of each respondent were used to calculate the average score obtained. The average score obtained is then converted into a qualitative value using the formula and basic guidelines to determine the level of validity as follows:

$$P = \frac{\sum x}{\sum x^1} \text{ x } 100\%$$

Keterangan:
P = Large Percentage
$\sum x$ = Number of Validator Answer Scores
$\sum x^1$ = Total Highest Answer Score

Table 2. Product Validation Criteria

Percentage %	Validity Level	Information
80 – 100	Very valid	Not Revised
60 – 79	Valid	Not Revised
40 – 59	Invalid	Partial Revision
20 – 39	Invalid	Revision
00 – 19	Very invalid	Revision

(Source: Arikunto, [32])

Canva Media Effectiveness Data Analysis
Normality test. To determine the average value, the formula is used, namely

$$\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$$

To calculate the standard deviation (s), the formula is used, namely:

$$s = \sqrt{\frac{n\sum x_i^2 - \left(\sum x_i\right)^2}{n(n-1)}}$$

By testing criteria:
If Lo < Lt then sample is normally distributed and if Lo > Lt then sample is not normally distributed

Homogeneity Test. The examination of the variance homogeneity test aims to determine whether the sample data has a homogeneous variance or not. Test the homogeneity of variance using the F test, with the following hypotheses:
$H_0 : \sigma_1^2 = \sigma_2^2$ the two populations have the same variance.
$H_a : \sigma_1^2 \neq \sigma_2^2$ the two populations have different variances.

To test the hypothesis above, the following formula is used:

$$F_{hit} = \frac{\text{varians terbesar}}{\text{varians terkecil}}$$

Test Criteria are:
$F_{hit} < F_{tab1/2\ \alpha(v1, v2)}$, H_0 accepted
$F_{hit} > F_{tab1/2\ \alpha(v1, v2)}$, H_0 is rejected

Testing the hypothesis in this study was carried out using the one-party t-test formula where the statistical hypothesis being tested can be formulated as follows:
Ha: There are differences in the learning outcomes of students who study using learning media based on the Canva application and students who study with conventional learning media.
Ho: There is no difference in the learning outcomes of students who study using the Canva application-based learning media and students who study with conventional learning media.
To find out the significant differences of student learning outcomes. The t test formula is as follows:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{s\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

The test criteria are that Ha is accepted if tcount < ttable and Ho is rejected if tcount > ttable, which is obtained from the t distribution list with dk = (n - 1) and level α = 5%. To see the value of the effectiveness of the Canva application-based mathematics learning media that was experimented with, the effectiveness calculation formula was used as follow:

$$X = \frac{\text{number of students who completed}}{\text{total number of students}} \text{ x } 100\%$$

3. RESULTS AND DISCUSSION

3.1 RESULTS

The results of the assessment by media experts, material experts, individual trials, small group trials, and limited field trials for all aspects of the assessment are determined by the average score. The results of the assessment were then analyzed and determined whether or not it was appropriate to develop mathematics learning media based on the Canva application. The average percentage of the results of the assessment of media experts, material experts, individual trials, small group trials, and field trials is shown in Table 3 below:

Table 3. Feasibility of Canva application-based mathematics learning media

No	Categorization	Percentage of average score %	Criteria
1.	Material Expert Validation	89,16	very feasible
2.	Media Expert Validation	83,47	very feasible
3.	Learning Design Validation	95,00	very feasible
4.	Individual Trial	92,66	very feasible
5.	Small Group Trial	95,80	very feasible
6.	Field Test	98,75	very feasible
The average		92,47	very feasible

ased on Table 3 above, it can be concluded that the Canva application-based mathematics learning media is very feasible; thus, it is known that the average rating (μo) from experts and trials on students is 92.74%, while the eligibility threshold value criteria (μ) is 70%, so μo > μ. So it can be concluded that the Canva application-based mathematics learning media in this study is said to be very feasible to use and can meet the needs of implementing mathematics learning.

Based on the learning outcomes of students who were taught using the Canva application-based learning media at Betania Medan Private Elementary School, the lowest score was 70 and the highest score was 96. The average score was 83,875, mode 80, median 83.5, and standard deviation 6.871. A complete description of learning outcomes using the Canva application-based mathematics learning medium is shown in Table 4.

Table 4. Frequency Distribution of Experimental Class Student Learning Outcomes

Class	Class Intervals	Absolute Frequency	Relative Frequency
1	70 – 74	3	9,375%
2	75 – 79	6	18,75%
3	80 – 84	9	28,125%
4	85 – 89	5	15,625%
5	90 – 94	6	18,75%
6	95 – 99	3	9,375%
Total		32	100%

Based on the learning outcomes of students who were taught using conventional learning at Betania Medan Private Elementary School, the lowest score was 70 and the highest score was 95. The mean score was 80.531, mode 80, median 80.05, and standard deviation 6.619. A complete description of learning outcomes using conventional learning media is shown in Table 5.

Table 5. Frequency Distribution of Control Class Student Learning Outcomes

Class	Class Intervals	Absolute Frequency	Relative Frequency
1	70 – 74	3	9,375%
1	70 – 74	4	12,5%
2	75 – 79	7	21,875%
3	80 – 84	9	28,125%
4	85 – 89	6	18,75%
5	90 – 94	4	12,5%
Total		95 – 99	2

The data normality test uses the Liliefors test with the null hypothesis (Ho) which states that the sample comes from a normally distributed population. Acceptance and rejection (Ho) are based on a comparison of the price of Lcount with the price of Ltable at a significant level α = 0.05. If Lcount < Ltable then the data is normally distributed. Summary of data normality test results in the experimental class and control class can be seen in table 6.

Table 6. Summary of the Data Normality Test with the Liliefors Test

No	Data	Class	L_{count}	L_{table}	Conclusion
1	Pretest	Experiment	0,086	0,157	Normal
2	Pretest	Control	0,079	0,157	Normal
3	Posttest	Experiment	0,132	0,157	Normal
4	Posttest	Control	0,094	0,157	Normal

Based on table 6 it can be seen that the results of the pretest data normality test in the experimental class obtained Lcount < Ltable (0.086 < 0.157) and in the control class also obtained Lcount < Ltable (0.079 < 0.157). The same thing also happened to the posttest data normality test results for the experimental class with Lcount < Ltable (0.132 < 0.157) and in the control class obtained Lcount < Ltable (0.094 < 0.157). Thus, it can be concluded that the pretest and posttest data in the experimental and control classes were normally distributed at the significance level.

Homogeneity test was carried out to find out whether the data is homogeneous or not. To carry out the homogeneity test, Fisher's test is used, the sample has a homogeneous variance if Fcount < Ftable at a significant level α = 0.05. The summary of the results of the data homogeneity test in the experimental class and control class can be seen in Table 7.

Table 7. Summary of Data Homogeneity Test with Fisher's Test

No	Data	Class	F_{count}	F_{table}	Kesimpulan
1	Pretest	Experiment	0,97	1,83	Homogeneous
2	Pretest	Control			
3	Posttest	Experiment	1,07	1,83	Homogeneous
4	Posttest	Control			

Based on table 7 it can be seen that the results of the calculation of the pretest data homogeneity test in the experimental class and control class at a significant level α = 0.05 obtained Fcount <Ftable (0.97 <1.83), it can be concluded that the pretest data in the two classes have the same or homogeneous variance. Then in the posttest data homogeneity test in the experimental class and control class at a significant level α = 0.05 obtained Fcount <Ftable (1.07 <1.83), it can be concluded that the posttest data in the two classes have the same or homogeneous variance .

Hypothesis testing in this study was carried out using the t test formula. The t-test was conducted to find out whether there were significant differences between learning outcomes in classes taught using the Canva application-based learning media (experimental class) and learning outcomes taught using conventional learning media (control class). The calculation results obtained tcount = 1.98 and ttable = 1.66 so that tcount > ttable at a significant level α = 0.05. Based on these results, that H0 is rejected and Ha is accepted or in other words there is a significant difference between student learning outcomes in the experimental and control classes at the significance level α = 0.05.

To test the effectiveness of the developed Canva application-based learning media, the following calculations are carried out:

$$X = \frac{number\ of\ students\ who\ complete}{total\ number\ of\ students}\ x\ 100\%$$
$$= \frac{27}{32}\ x\ 100\%$$
$$= 84{,}37\%$$

The value of the effectiveness of conventional learning media can be seen as follows:

$$X = \frac{number\ of\ students\ who\ complete}{total\ number\ of\ students}\ x\ 100\%$$
$$= \frac{21}{32}\ x\ 100\%$$
$$= 65{,}62\%$$

Based on the calculation of the effectiveness test on both, the results were obtained that the learning outcomes of students who were taught with the Canva application-based learning media were higher than the learning outcomes of students with conventional learning media (84.37% > 65.62%). Thus it can be concluded that the learning media based on the Canva application is more effectively used in learning mathematics at Betania Medan Private Elementary School compared to using conventional learning media.

3.2 DISCUSSION

Based on the results of the validation that has been carried out, the Canva application-based learning media product is declared feasible to continue in field trials. The learning media based on the Canva application that has been developed meets standards based on the design of the development of learning materials, learning media, and learning designs. And individual trials, small group trials, and field trials showed that the learning media based on the Canva application for learning mathematics were declared very suitable for use as learning media for Betania Medan Private Elementary School students.

Testing the effectiveness of the product on the developed Canva application-based mathematics learning media has been carried out by comparing the average value of student learning outcomes taught using the Canva application-based learning media with those using conventional learning media. There are differences in learning outcomes between students taught using learning media based on the Canva application and students taught using conventional learning media (84.37% > 65.62%).

This is in line with Santyasa [33], which states that the learning process should contain five communication components, namely the teacher (communicator), learning materials, learning media, students (communicants), and learning objectives. Learning media are all physical devices that can present messages and stimulate students to learn in the form of books, films, tapes, and so on [34].

Furthermore, Suryani [35] states that learning media are all forms and means of conveying information that are created or used in accordance with learning theory and can be used for learning purposes and convey messages, stimulate thoughts, feelings, attention, and willingness of students so as to encourage a learning process that is intentional, purposeful, and controlled.

Media Canva is a web-based application that allows users to modify images and create graphic creations. Apart from that, users can also download other designs, such as themes, fonts, and photos, to enhance their creations. You can also use Canva to make posters, flyers, and brochures, including educational media. According to Wulandari and Mudinillah [36], Canva is one of the most popular applications among teachers for making learning media. There are various interesting template features that can be used to create learning media and can be developed to design creative learning media so that learning media has a more communicative meaning and the visualization of learning media is more attractive to students.

Learning media using Canva can help make it easier for students to be more interested and motivated by the lessons conveyed in the media. According to Raaihani [37], the advantages of the Canva application are as follows: (1) It has an attractive variant of graphic design templates; (2) it can train teacher creativity in making learning media; (3) Making learning media can save time; and (4) Students can review material that has been distributed by the teacher.

This is also in accordance with Miarso's statement (in Mahnun [38]), which states that the first thing a teacher must do when using media effectively is to find, find, and choose media that meets children's learning needs, attracts children's interest, and is in accordance with developmental maturity and experience, as well as special characteristics that exist in the study group.

Furthermore, according to Purba [39], learning mathematics with the Canva application is very useful, and there is an increase in the ability to make mathematics learning media through the use of the Canva application in schools. According to Fadillah [40], Canva learning media is feasible to implement in class or independently by students. Then, according to Rohayati [41], learning innovation by utilizing technology in the form of the Canva application during the COVID-19 pandemic can improve student learning outcomes in elementary school mathematics.

Based on some of the explanations above, it can be concluded that the Canva application-based mathematics learning media can be called a good learning media if the learning media can improve student learning outcomes. The use of Canva application-based mathematics learning media allows students to more easily understand and master learning material.

4. CONCLUSION

1. The Canva application-based mathematics learning media product developed for Betania Medan Private Elementary School students meets the requirements and is suitable for use as learning media. This was concluded based on research results from learning material experts (89.16%), media experts (83.47%), design experts (95%), student responses to individual trials (92.66%), small group trials (95.8%), and field trials (98.75%), which as a whole stated that the Canva application-based mathematics learning media was in the "very good" category".
2. The effectiveness of the developed Canva application-based mathematics learning media is considered more effective than conventional learning media. The results of testing the hypothesis prove that there is a significant difference between the learning outcomes of students who are taught using the Canva application-based learning media and the learning outcomes of students who are taught using conventional learning media. This is indicated by the results of data processing, tcount = 1.98 and ttable = 1.66, so that tcount > ttable at a significant level $\alpha = 0.05$. So the learning outcomes of students who are taught with learning media based on the Canva application have an effectiveness of 84.37% higher than learning outcomes using conventional learning media with an effectiveness of 65.62%.

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