AULADUNA: Jurnal Pendidikan Dasar Islam
Vol. 12 No. 2, Desember 2025, pp. 207-225
p-ISSN: 2407-2451, e-ISSN: 2621-0282
DOI: https://doi.org/10.24252/auladuna.v12i2a8.2025

CANVA-BASED INTERACTIVE MULTIMEDIA ON STUDENTS' CRITICAL THINKING SKILLS AND MATHEMATICS SELF-EFFICACY

MULTIMEDIA INTERAKTIF BERBASIS CANVA TERHADAP KETERAMPILAN BERPIKIR KRITIS DAN EFIKASI DIRI MATEMATIKA SISWA

Aan Yuliyanto[1], Candra Tri Utami[2], Ari Fujiarti[3], Andriyantono[4], Rizki Ramdani[5]
[1,2]Universitas Pelita Bangsa, [3]Universitas Pamulang, [4]SD IT As-Sakienah
[5]Institut Pangeran Dharma Kusuma
[1,2]Jl. Inspeksi Kalimalang No. 9, Cibatu, Cikarang Selatan., Kabupaten Bekasi, Jawa Barat
[3]Jl. Raya Puspitek, Buaran, Kec. Pamulang, Kota Tangerang Selatan, Banten
[4]Tugu, Sliyeg, Kabupaten Indramayu, Jawa Barat,
[5]Jl. K.H. Hasyim Asy'ari, Segeran Kidul, Kabupaten Indramayu, Jawa Barat

Email: aanyuliyanto@pelitabangsa.ac.id[1], candra.triutami@pelitabangsa.ac.id[2], dosen02920@unpam.ac.id[3], andriyanto05050@gmail.com[4], rizkiram167@gmail.com[5]

Submitted: 04-11-2025, *Revised*: 08-11-2025, *Accepted*: 20-11-2025

Abstract

The purpose of this study was to determine the outcomes of critical thinking skills and mathematical self-efficacy when using interactive multimedia with canva. This study used a quasi-experimental, unequal pretest-posttest control-group design. The study population was all fifth-grade elementary school students in West Java. The instruments in this study were tests, attitude scales, observations, and documentation. The results of the critical thinking ability test and the mathematical self-efficacy attitude scale were tested using descriptive and inferential statistics. The results showed that there was a difference in the outcomes of critical thinking skills in the experimental class, when canva-based interactive multimedia was applied, compared to the control class. The outcomes of mathematical self-efficacy also differed between the experimental class, which used canva-based interactive multimedia, and the control class. Thus, critical thinking skills and mathematical self-efficacy learned through canva-based interactive multimedia were significantly better than those learned through conventional instruction.

Keywords: *Interactive Multimedia, Critical Thinking Skills, Mathematical Self-Efficacy, Canva*

Abstrak

Tujuan penelitian ini adalah untuk mengetahui bagaimana pencapaian keterampilan berpikir kritis dan self-efficacy matematika menggunakan multimedia interaktif melalui canva. Penelitian ini menggunakan jenis kuasi-eksperimental dari desain kelompok kontrol pretest-posttest yang tidak setara. Populasi penelitian: seluruh siswa kelas V SD di Jawa Barat. Instrumen dalam penelitian ini berupa tes, skala sikap, observasi, dan dokumentasi. Hasil uji kemampuan berpikir kritis dan skala sikap efikasi diri matematis diuji menggunakan statistik deskriptif dan inferensial. Hasil penelitian menunjukkan bahwa terdapat perbedaan pencapaian kemampuan berpikir kritis pada kelas eksperimen melalui penerapan multimedia interaktif berbasis canva dengan kelas kontrol. Pencapaian efikasi diri matematika juga berbeda antar kelas eksperimen melalui penerapan multimedia interaktif berbasis canva dengan capaian efikasi diri matematika pada kelas kontrol. Dengan demikian, keterampilan berpikir kritis dan efikasi diri matematis yang dipelajari dengan multimedia interaktif berbasis canva secara signifikan lebih baik daripada yang dipelajari dengan pembelajaran konvensional.

Kata Kunci: *Multimedia Interaktif; Keterampilan Berpikir Kritis, Self-efficacy Matematis, Canva*

How to Cite: Yuliyanto, A., Utami, C. T., Fujiarti, A., Andriyantono, & Ramdani, R. (2025). Canva-Based Interactive Multimedia on Students' Critical Thinking Skills and Mathematics Self-Efficacy. *AULADUNA: Jurnal Pendidikan Dasar Islam*, *12*(2), 207-225.

1. Introduction

Mathematics is an important science. However, because mathematics involves many formulas, definitions, different types of problems, and abstract concepts, it is often considered difficult and undesirable, even scary, for many students, especially in elementary school (Dwidarti, Mampouw, & Setyadi, 2019). This perception happens because learning is not limited to the level of development of elementary school students. Elementary school students are at the concrete operational stage. At this stage, children develop logical thinking and are still very attached to perceptual facts, meaning they can think logically but are still limited to concrete objects and can conserve (Yuliyanto, Farikhin, Sofiasyari, & Rogibah, 2023).

Learning mathematics is not only about numbers, but it also involves a variety of skills that can be developed and are useful in daily life. These abilities include logical, critical, systematic, and creative thinking. Critical thinking is a process of analyzing information that involves knowledge, reasoning, and evidence to make the right decisions (Yuliyanto, 2024). Critical thinking skills are essential to face future challenges. Critical thinking is related to the way a person handles a problem. To solve math problems, effective, critical thinking, and mathematical independence skills are essential, as a continuous, systematic process is necessary to solve them correctly (Afifah & Kusuma, 2021). In addition to critical thinking, mathematical problem-solving can be supported by an affective ability, namely, mathematical self-efficacy. Self-efficacy is a person's confidence to act to face and solve problems, so that the goals to be achieved can be realized (Yuliyanto, 2024). Therefore, to solve mathematical problems, critical thinking skills and mathematical self-efficacy are very necessary. Mathematical problems are closely related to a continuous and systematic process to obtain good and correct results.

Based on the results of observations made by researchers at one of the private elementary schools in Sliyeg District, Indramayu Regency, especially the fifth grade, it was found that there is still a low level of critical thinking skills and mathematical self-efficacy among students, of the 32 students, only 10 students were able to solve the math problems and only 5 of the 32 felt confident in being able to solve the math problems. This is because the volume of cubes and blocks is one of the topics that students find difficult in mathematics. As a result, some students become reluctant to play an active role in teaching and learning. In general, teachers still tend to give procedural concepts and practice questions that support the development of low-level thinking but lack in developing and honing high-level thinking skills. Thus, it affects students' low critical thinking ability and their mathematical self-efficacy regarding the material delivered by the teacher.

Research by Wibowo, Peri, Awang, & Rayo (2022), conducted with the homeroom teacher of class 5A, found that students' low critical thinking ability was due to several factors. The factors that led to low critical thinking skills included students' passivity during the learning process. Students often recorded and memorized the material taught, making learning activities less fun. In the learning process, students must be encouraged by the teacher to ask questions about the material being taught. Most students still could not understand the concepts and material taught. It can be seen in how students

work on questions in story form. Many students still could not understand the problem's meaning or how to solve it.

Critical thinking includes the ability to think at a high level, or high order thinking. The ability to think critically is very important in daily life. Research by Farib, Ikhsan, & Subianto (2019) found that students with high critical thinking skills are more careful and thorough in analyzing problems, identifying relevant information, and performing calculations, leading to the correct conclusions from the presented issues. Students' critical thinking skills play a significant role in improving the learning process and outcomes. Self-efficacy is the belief a person has in their ability to find, arrange, and carry out a task to achieve their goals (Afifah & Kusuma, 2021). A sense of confidence is useful in dealing with problems in daily life. With self-efficacy skills, students find it easier to solve problems and assignments, and can even improve their learning outcomes.

In mathematics, students often encounter a wide range of counting problems, from low to high difficulty levels. When solving problems, students are expected to have confidence in their ability to solve the given problem. Students with high self-efficacy will focus more on solving problems than on their shortcomings. In addition, students with high mathematical self-efficacy are more courageous and generate more ideas when determining the steps to solve problems. According to Cahyani & Winata (2020), students with low self-efficacy tend to become unconfident, resulting in suboptimal learning outcomes. Self-efficacy can encourage students to complete their assignments (Yuliyanto & Turmudi, 2020). One of the problems with low self-efficacy in students has been researched by Yuliyanto, Turmudi, Putri, Muqodas, & Rahayu (2021), where it can be seen that most students have low self-efficacy, many students who cheat during exams, students are not sure of their answers, and students hesitate when writing answers in front of the class. Students are not confident in learning mathematics because mathematics is not interesting and seems monotonous. This condition significantly hinders the transfer of learning, especially in mathematics, making students unable to understand the lesson and its application in daily life. Therefore, in the classroom learning process, it is necessary to vary how teachers transfer mathematical knowledge to students, relating it to daily problems.

In the digital era, information and communication technology offer opportunities to develop more interactive and engaging learning media. One platform to use is canva. Canva is one of the many applications that teachers can use to create learning media. Canva is an online design platform that offers a variety of graphic design options, including presentations, posters, pamphlets, graphics, banners, invitation cards, and more (Tanjung & Faiza, 2019). Canva makes it easier for teachers and students to learn through technology, skills, creativity, and other benefits. This is because canva design results can increase students' interest in learning activities and motivation by attractively presenting teaching materials. In this study, canva was developed as interactive multimedia. Interactive multimedia can improve early knowledge and problem-solving (Marji, Komarudin, Sutadji, & Widiyanti, 2020) and enhance critical thinking skills through high-level problems that require critical thinking to solve (Djamas & Tinedi, 2021; Winarni, Akhyar, & Sudiyanto, 2022). Even interactive multimedia provides an opportunity to engage actively with the material, making learning fun and motivating students to solve problems concretely (Kadarsih & Fitria, 2022).

Interactive multimedia for student learning aligns with previous research by Hanifah, Wulan, & Sumiati (2023), Hartanti & Yulia (2022), dan Nafsi (2023) which found that canva-based interactive multimedia significantly improves students' critical

thinking skills and confidence. Interactive media offer many advantages, especially by providing an attractive display for students, thereby motivating them to learn the subject matter. In addition, interactive multimedia presents learning in a new, interesting, and meaningful way. The integration of multimedia in the classroom promises not only changes in information for learning but also the way learning takes place. The research on critical thinking skills and self-efficacy, including the implementation of interactive multimedia in adobe flash CS6 in mathematics learning, was conducted with 75 elementary school students and analyzed descriptively and using a t-test. It was found that $6.418 \geq 1.678$, indicating that interactive multimedia has a significant effect. The percentage of learning outcome completeness for the experimental and control classes was only 79.17%, with an average of 78.67 for the experiment and 56.48 for the control (Hidayati & Khasanah, 2017). The use of interactive media has also increased critical thinking skills. The greatest improvement was only in focusing on questions, with an n-gain of 74.5%, and there was a difference in critical thinking skills between the experiment and the control, with an average of only 76.75 in the experiment and 70.5 in the control (Zulhelmi, Adlim, & Mahidin, 2017). Students were very interested in learning to use macromedia flash based on observation. They were more enthusiastic, active, and creative. In addition, the results of the interviews and questionnaires clearly show that interactive media is visually appealing and easy to understand (Dwiana, Samosir, Sari, Awalia, Budiyono, Wahyuni & Masrul, 2021).

This research examined the exploration of HOTS for elementary school students, such as critical thinking skills and affective aspects, namely self-efficacy. In addition, the research method used was considered sharp and clarified differences in student outcomes through quasi-experimental methods supported by descriptive and inferential statistics. Based on the previous description, the researcher is interested in conducting research on the outcomes of critical thinking skills and mathematical self-efficacy of elementary school students in mathematics learning through canva-based interactive multimedia. The purpose of this study is to determine whether there is a difference in the development of critical thinking skills and mathematical self-efficacy between the experimental class that uses canva-based interactive multimedia and the control class that uses conventional instruction.

2. Research Method

The approach used in this study was the quantitative approach. This study used a quasi-experimental design with a nonequivalent control group. The purpose of the nonequivalent control group design experiment is to determine whether critical thinking skills and mathematical self-efficacy are achieved through the application of canva-based interactive multimedia in mathematics learning in the experimental classroom. The following is a chart of the nonequivalent control group design:

Table 1. Nonequivalent Control Group Design

Group	Pre-test	Treatment	Post-test
Experiment	O_1	X	O_2
Control	O_3	-	O_4

Information:
O_1 : Experimental class pre-test results
O_3 : Control class pre-test results

O_2 : Experimental class post-test results
O_4 : Control class post-test results
X : Treatment

This research was conducted at one of the private elementary schools in Sliyeg District, Indramayu Regency, and at state elementary schools in Banjaran District, Bandung, West Java. The population in this study comprised all fifth-grade students in elementary schools in West Java. The sampling technique used was purposive, with several objectives. As for the sample for this study, classes V-A and V-B were taken from one of the private elementary schools in Sliyeg District, Indramayu Regency, and from one of the public elementary schools in Banjaran District, with a total of 100 students. Class V-A served as the control class with 40 students, while Class V-B served as the experimental class with 60 students. The selection of these two schools was based on several considerations, namely that the schools implement the same curriculum, the same selection of new students, and the same school accreditation, namely very good, which is equivalent to most schools in West Java Province, as well as the reason that the state and private schools were chosen to represent the type of school so that not only state schools were used as samples. In addition, the data sources used in this study comprise two types: primary and secondary data. The primary data in this study include the pre-test and post-test results, the attitude scale, and documentation. Meanwhile, the secondary data are student grade lists and school data.

The data collection techniques used were tests, attitude scales, and documentation. A test was used to assess students' critical thinking skills. This test consisted of a description of 4 (four) questions related to cube and block material and referred to the curriculum of the fifth-grade elementary school, semester 2 (two). The test given to students consisted of a pre-test and a post-test, which were used to determine the effectiveness of canva-based interactive multimedia and the development of critical thinking skills. Critical thinking skills were measured using indicators such as: (1) focus, which involved determining the focus of a problem; to make work more effective, as without understanding the focus of the problem, we could waste a lot of time, (2) reason, providing reasons for an answer or conclusion, (3) inference, estimating the conclusion to be drawn, and (4) overview, checking the accuracy of the answer.

Furthermore, the attitude scale was used to assess students' mathematical self-efficacy. The aspects and indicators of the self-efficacy questionnaire in this study were (1) the aspect of success experience in mathematical problems, (2) the aspect of social experience in mathematical problems, (3) the aspect of verbal praise when facing mathematical problems, and (4) the aspect of psychological conditions when facing mathematical problems. In each of these aspects, there are 3 indicators, namely the belief that they can perform difficult, varied, and challenging tasks.

This research was divided into three stages: preliminary studies, data collection, data analysis, and conclusions. At the preliminary study stage, literature and field studies are conducted, and problems are formulated, after which research objectives and research questions are defined. The data collection stage is carried out by preparing instruments for testing critical thinking ability and mathematical self-efficacy, instrument feasibility tests, expert validation and instrument trials on students who are not research subjects, namely the sixth grade of elementary school, after the instrument is considered feasible based on expert suggestions, validity, reliability, differentiation and the level of difficulty, research is carried out in the experimental and control classes starting with a pre-test of

critical thinking skills and scales initial mathematical self-efficacy. The last stage is analysis and conclusion. At this stage, after completing the research implementation in both classes, data processing involves performing prerequisite tests, normality tests, homogeneity tests, and hypothesis tests on the post-test data. Data interpretation and conclusions are then prepared, along with research results articles. The following is a chart of the flow of this research to clarify:

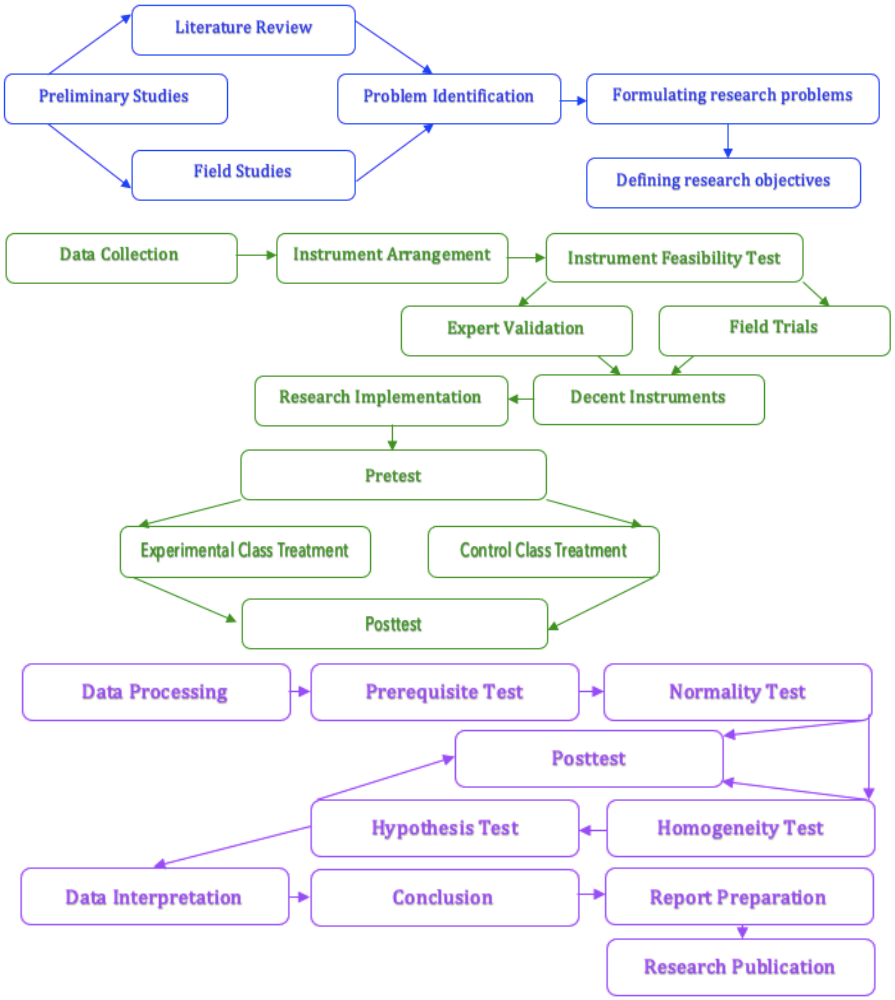

Figure 1. Research Procedure

The research data were analyzed using descriptive and inferential statistics. The results of the critical thinking ability test in the form of a post-test for the experimental class and the control class through the calculation of benchmark reference assessments and normative reference assessments, as well as the results of the mathematical self-efficacy attitude scale in the form of a final scale for the experimental class and the control class through the rating scale method (Yuliyanto & Turmudi, 2020). The researchers measured only the post-test because they wanted to assess students' outcomes in critical thinking and their self-efficacy in learning mathematics. Furthermore, it is tested using descriptive and inferential statistics processed with the help of SPSS version 25, with a hypothesis test using the t-test if the data is normally distributed and the Mann-Whitney U test if the data is not normally distributed, to determine the outcomes of students' critical

thinking abilities and mathematical self-efficacy through canva-based interactive multimedia.

3. Results and Discussion

3.1 Results

3.1.1 Students' Critical Thinking Skills

3.1.1.1 Descriptive Statistics on the Outcomes of Students' Critical Thinking Skills

Descriptive statistics are useful for describing research data, including the number of data points, the maximum and minimum values, the average value, and so on. In this analysis, the data processed are the data from the post-test results of the experimental class and the control class using SPSS version 25, with the following results in tabel 2.

Table 2. Recapitulation of Posttest Results of Experimental and Control Classes

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Post-test of Experimental Class	40	49	47	96	80.85	13.531
Post-test of Control Class	60	44	43	87	73.05	12.215
Valid N (listwise)	100					

Based on the results of table 2, it can be seen that the value range, minimum value, maximum value, and average value (mean) of the post-test results of the experimental class are higher than the results of the control class post-test. The average score for critical thinking outcomes is presented in figure 2 below to clarify the difference between the two:

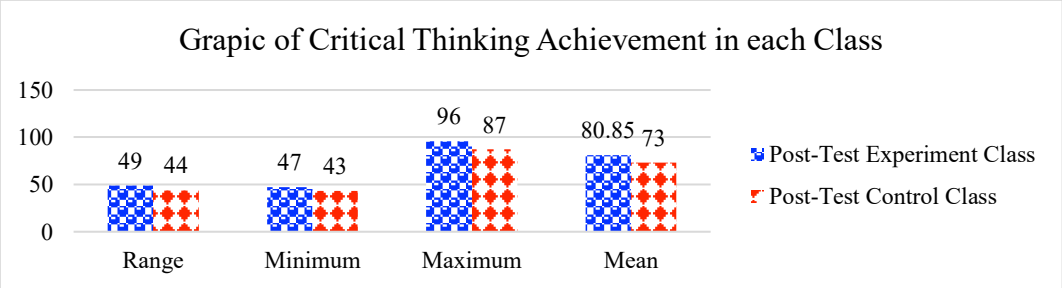

Figure 2. Critical Thinking Outcomes in each Class

Based on figure 2, the outcomes of critical thinking skills using canva-based interactive multimedia (experiment) is higher than in the conventional learning (control) condition. Furthermore, to determine whether interactive multimedia shows an average difference in the development of critical thinking skills, inferential statistics are used in the next discussion.

3.1.1.2 Inferential Statistics on Critical Thinking Ability Outcomes

After conducting a descriptive statistical test, the next step is to conduct an inferential statistical test, namely a normality test, a homogeneity test, and an independent-samples t-test to test the research hypothesis. However, if the data are not

normally distributed, the analysis proceeds with the nonparametric Mann-Whitney U test. The data processed were post-test results of the experimental class and control class using SPSS 25.

This normality test was conducted to determine whether the samples studied were normally distributed. In processing normality test data, the researcher used SPSS version 25. The criteria for the normality test are that if the p-value is greater than 0.05, the data are normally distributed; if the p-value is less than 0.05, the data are not normally distributed. The results are presented in the table 3:

Table 3. Recapitulation of the Results of the Normality Test, Posttest Results of Critical Thinking Skills for the Experimental and Control Classes

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Group	Statistic	df	Sig.	Statistic	df	Sig.
Critical Thinking Skills	Experimental Classes	0.213	40	0.018	0.862	40	0.008
	Control Classes	0.201	60	0.033	0.818	60	0.002

a. Lilliefors Significance Correction

Based on table 3, the significance (Sig.) value for the kolmogorov-smirnov test is as follows: the post-test results for the experimental class (0.018 < 0.05) were deemed abnormally distributed, the results of the control class post-test (0.033 < 0.05) were deemed abnormally distributed. The test concluded that the research data were abnormally distributed. Therefore, a nonparametric statistical test, the Mann-Whitney U test, was performed.

The Mann-Whitney U test was carried out to find out if there was a difference in the outcomes of two unpaired samples, where:

H_0: There was no difference in the average outcomes of critical thinking skills of students using canva-based interactive multimedia

H_a: There is a difference in the average outcomes of students' critical thinking skills using canva-based interactive multimedia

Table 4. Summary of Mann-Whitney U Test Results and Posttest Results of Critical Thinking Skills for Experimental and Control Classes

Test Statistics[b]

	Critical Thinking Skills
Mann-Whitney U	111.000
Wilcoxon W	321.000
Z	-2.435
Asymp. Sig. (2-tailed)	0.015
Exact Sig. [2*(1-tailed Sig.)]	0.015[a]

a. Not corrected for ties.

b. Grouping Variable: Class

Based on the output above, the value of Asymp. Sig. (2-tailed) If 0.015 < 0.05, then the hypothesis is accepted. Thus, it can be said that there is a difference in the outcomes of mathematical critical thinking skills between the post-test results of the experimental class that uses canva-based interactive multimedia and those of the control class that uses conventional learning. The average outcomes of critical thinking skills in the experimental class using canva-based interactive multimedia was 80.85 points higher than in the control class using conventional learning. It can be concluded that the critical thinking skills of students who learn with canva-based interactive multimedia are significantly better than those of students in a control class using conventional learning.

3.1.2. Mathematical Self-Efficacy

3.1.2.1 Descriptive Statistics of Mathematical Self-Efficacy Outcomes

Descriptive statistics are useful for describing research data, including the number of data points, the maximum and minimum values, the average value, and so on. In this analysis, the data processed are the final scale data of the experimental class and the control class using SPSS version 25, with the results in table 5 as follows.

Table 5. Recapitulation of Self-Efficacy Outcomes Results: Final Scale of Experimental and Control Classes

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Experimental Class Final Scale	40	25	23	48	34.50	8.140
Control Class Final Scale	60	24	19	43	29.20	5.988
Valid N (listwise)	100					

Based on table 5, it can be seen that the value range, minimum value, maximum value, and mean value of the final scale results of the experimental class are higher than the results of the final scale of the control class. The average outcomes score of mathematical self-efficacy for each class is presented in the graph figure 3 below:

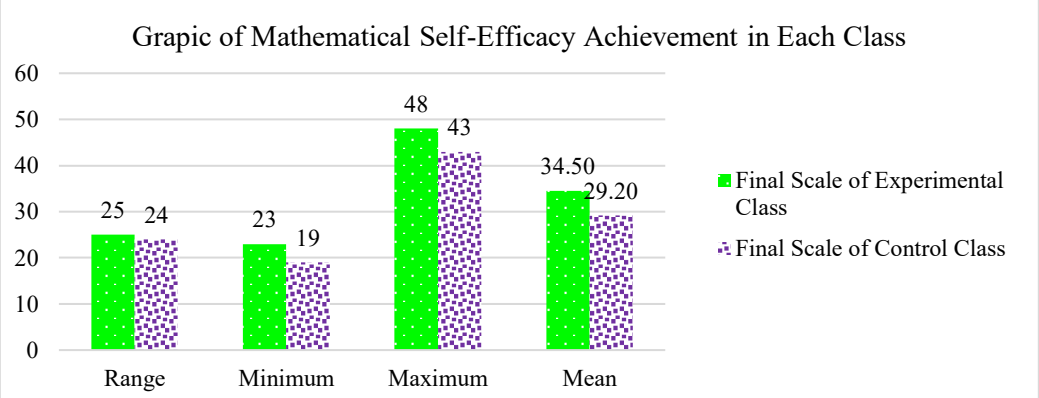

Figure 3. Mathematical Self-Efficacy Outcomes in Each Class

Based on figure 3, the outcomes of self-efficacy in the canva-based interactive multimedia (experiment) are higher than in conventional learning (control). Furthermore,

to determine whether interactive multimedia shows an average difference in achieving mathematical self-efficacy, inferential statistics are used in the next discussion.

3.1.2.2 Inferential Statistics of Mathematical Self-Efficacy Outcomes

After conducting a descriptive statistical test, the next step is to conduct an inferential statistical test, namely a normality test, a homogeneity test, and an independent-samples t-test to test the research hypothesis. The data processed are the final scale scores for the experimental and control classes using SPSS 25.

This normality test is used to determine whether the samples studied are normally distributed. In processing normality test data, the researcher used SPSS version 25. The criteria for the normality test are that if the p-value is greater than 0.05, the data are normally distributed; if the p-value is less than 0.05, the data are not normally distributed. The results are as follows in table 6:

Table 6. Recapitulation of Self-Efficacy Normality Test Results

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Group	**Statistic**	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Mathematical Self-Efficacy	Experiment	0.171	40	0.129	0.926	40	0.132
	Control	0.103	60	0.200*	0.980	60	0.931

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

Based on table 6, it is known that the significance value (Sig.) in the Kolmogorov-Smirnov test is as follows: the results of the final scale of the experimental class, which are $0.129 > 0.05$, are declared to be normally distributed, and the final scale results for the control class, which are $0.200 > 0.05$, are declared to be normally distributed. Therefore, it can be concluded that the research data is normally distributed. Then, parametric statistical tests (homogeneity test and t-test) were performed.

The homogeneity test is used to determine whether the variances (diversities) of data from two or more groups are homogeneous (the same) or heterogeneous (different). The homogeneity test was performed to assess differences in variance using a one-way ANOVA. The criteria for the normality test are that if the p-value is greater than 0.05, the data are normally distributed; if the p-value is less than 0.05, the data are not normally distributed. The results are as follows in table 7:

Table 7. Recapitulation of Self-Efficacy Homogeneity Test Results of Experimental Class and Control Class

		Levene Statistic	df1	df2	Sig.
Mathematical Self-Efficacy	Based on Mean	3.770	1	38	0.060
	Based on Median	2.249	1	38	0.142
	Based on the Median and with adjusted df	2.249	1	34.761	0.143
	Based on the trimmed mean	3.745	1	38	0.060

Based on the output of table 7, the mean value of 0.060 > 0.05 indicates that the variances of the final scale data for the experimental and control classes are homogeneous (the same). Thus, one of the (not absolute) requirements of the independent sample t-test is met.

An independent-samples t-test was conducted to determine whether there was a difference in the final scale scores of the experimental and control classes. The hypothesis testing criteria are as follows:

H_0: There was no difference in the average outcomes of mathematical self-efficacy of students using canva-based interactive multimedia

H_a: There is a difference in the average outcomes of students' mathematical self-efficacy using canva-based interactive multimedia

Table 8. Recapitulation of Independent Sample Test Results: T-Test Self-efficacy Experimental Class and Control Class

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Mathematical Self-Efficacy	Equal variances assumed	3.770	.060	2.346	38	.024	5.300	2.260	0.726	9.874
	Equal variances not assumed.			2.346	34.904	.025	5.300	2.260	0.712	9.888

Based on table 8, the value of Sig. (2-tailed) Since 0.024 < 0.05, it can be concluded that there is a difference in students' outcomes in mathematical self-efficacy between the experimental class using canva-based interactive multimedia and the control class using conventional learning media. The average outcomes of mathematical self-efficacy in the experimental class using canva-based interactive multimedia was 34.50 points higher than in the control class using conventional learning. Therefore, it can be concluded that the mathematical self-efficacy of students who learn with canva-based

interactive multimedia is significantly higher than that of students in a control class using conventional learning.

3.2 Discussion

3.2.1. Outcomes of Critical Thinking Skills

Based on the post-test results, the outcomes of critical thinking skills is shown in table 1, which is 80.85 for the experimental class and 73.05 for the control class. Furthermore, based on the Mann-Whitney test results, the value of Asymp. Sig. (2-tailed) of 0.015 < 0.05, thus it can be said that there is a significant difference in the outcomes of critical thinking skills between students who use canva-based interactive multimedia and those who use conventional learning. In line with the results of the study, other studies show that the effectiveness of learning using interactive multimedia can be seen through the learning outcomes of students' critical thinking skills in the experimental class (class that uses interactive multimedia) and the control class (class without using interactive multimedia) (Nofitri, Desyandri, Eriyanti, & Yerizon, 2024; Samihah, Wiyanto, Widiyatmoko, Rusilowati, & Saptono, 2024; Saputra, Murti, & Astuti, 2025; Suja, Armoni, Putra, & Sarja, 2021). The learning outcomes of students' critical thinking skills in the cognitive domain were measured before treatment with a pre-test and after treatment with a post-test (Illahi, Sukartiningsih, & Subroto, 2018). The results are quite consistent, showing that interactive multimedia can be an effective tool for improving elementary school students' critical thinking skills in science inquiry (Juhriah, Hayadi, Yusuf, Sepriyanti, & Yuningsih, 2024). This is because interactive media provides opportunities for students to learn actively through interaction and exploration, thereby strengthening understanding and reducing learning saturation (Utomo, 2023).

The results of this study are consistent with those of a previous study by Lana, Miyono, & Rowati (2023) who concluded that the problem-based learning model supported by canva media can improve the critical thinking skills of grade II students at Mijen 2 Demak state elementary school. Further research by Sholikhah, Prasetya, & Andriani (2023) found that applying the problem-based learning model, supported by canva media, can improve students' learning outcomes and critical thinking skills. Research by Erdyati, Meliasari, Damayanti, & Sulistriyaniva (2024) found that using canva can significantly improve students' critical thinking skills, as evidenced by higher test scores in analysis, synthesis, and evaluation. Canva can combine audio and visual elements, increasing student engagement and making it an effective learning tool for supporting critical thinking skills (Hernawati & Supriatna, 2025; Hilmiyati, Nafsi, & Sabri, 2024). Students are more active and motivated during learning, according to observations. The teacher said that canva helps make the abstract concepts of Pancasila easier to understand and interesting.

Another study found that the Interactive multimedia-based cheerful garden model can increase students' critical thinking activity at each meeting. The critical thinking skills of students have raised the bar for being highly skilled. Students' critical thinking increased by 28% from the first to the second meeting, whereas in the first meeting, most students were in the "Quite Skilled" criterion. This is because students have not been able to make basic assumptions about the problem, and are related to the teacher's activities in presenting problems through group assignments. Students have not compiled the collected information, and the related teacher activities have also not been maximized in the delivery of learning materials. Students have not presented arguments in clear, easy-to-understand language, nor have they related them to the teacher's activities in guiding

the course of group discussions (Sun, Kangas, Ruokamo, & Siklander, 2023). Students have not been able to evaluate initial questions, present arguments in clear, easy-to-understand language, or respond to others' opinions (Pratiwi, Prahani, Suryanti, & Jatmiko, 2019).

Interactive multimedia can have a positive impact on learning in elementary school in the form of increased learning activities, learning motivation, concept understanding, critical thinking, science literacy, learning outcomes, and student learning outcomes with the characteristics of being able to provide an interesting and effective learning experience by providing opportunities for students to actively engage in understanding concepts in a way that is appropriate to the level of learning speed, easy access, practical, and flexible (Safira & Nahdi, 2024). Interactive multimedia helps students practice and improve their critical thinking skills (Hamdani, Prima, Agustin, Feranie, & Sugiana, 2022). From the above studies, it can be concluded that the use of canva-based interactive multimedia has a significant positive impact on improving students' critical thinking skills compared to conventional learning media.

3.2.2. Outcomes of Mathematical Self-Efficacy

Self-efficacy outcomes were assessed using the final scale, which showed a final score of 34.50 for the experimental class and 29.20 for the control class. The results of the t-test for mathematical self-efficacy showed a significant difference (Sig.) (2-tailed) of $0.024 < 0.05$, so it can be concluded that there is a difference in the outcomes of students' mathematical self-efficacy from the results of the final scale of the experimental class using canva-based interactive multimedia and the outcomes of students' mathematical self-efficacy from the results of the final scale of the control class using conventional learning media.

The results of this study are consistent with those of previous research by Fajri, Johar, & Ikhsan (2016), who concluded that improving students' spatial ability and self-efficacy through the application of a multimedia-based discovery learning model is more effective than discovery learning without multimedia. Interactive multimedia creates an engaging learning environment that helps students regulate their understanding and strengthens their belief in their mathematical abilities, leading to higher self-efficacy scores compared to traditional instruction (Aryfien, Atmojo, & Matsuri, 2025; Firdaus, Surur, & Seituni, 2022). In line with this, the interactive multimedia developed by Winarso, Toheri, & Udin (2023) proved effective in supporting students' conceptual understanding while simultaneously improving their self-efficacy through structured scaffolding and cognitive conflict strategies. These findings are reinforced by Vera & Vargas (2025), who found that multimedia-supported learning environments promote greater motivation, engagement, and self-efficacy, especially when interactive features allow students to explore concepts independently. Therefore, students who learn with technology, including interactive multimedia, show a greater increase in self-efficacy than those who learn using conventional methods.

The study shows that 100% of respondents agree that, through interactive digital teaching materials, they are more confident in understanding the material during the learning process by completing the practice questions provided and achieving good results. Technology provides a direct learning experience and an interesting, fun, and memorable learning process for students, created through teachers' efforts in delivering material and science by effectively and efficiently organizing and creating learning

environment conditions. Interactive digital teaching materials, such as multimedia, make it easier for students and teachers to understand the learning process.

In addition, the form of this interactive digital teaching material is based on students' familiarity with technology and the conditions of the digital technology-based learning paradigm (Nafidah & Suratman, 2020). In addition, the impact on teachers, such as the application of technology, makes them more confident and easier to teach their students, thereby transforming the classroom into a creative, innovative, and fun learning space (Fudhla, Aulia, Oktoviandry, & Haq, 2023). Technology continues to be a part of classroom activities and aids in daily life. The use of technology and information can help humans communicate, practice life skills, and better understand concepts (Swara, Ambiyar, Fadhilah, & Syahril, 2020). Moreover, understanding the concept encourages a person's confidence in facing problems. One source of self-efficacy is personal experience, one of which is to understand the concept of material.

Furthermore, the results showed a significant increase in students' mathematical self-efficacy in the experimental group compared to the control group. The use of interactive multimedia helps students better understand mathematical concepts, which, in turn, positively affects their confidence in solving mathematical problems and their mathematical self-efficacy (Apriani, 2018). Further research by Rahmawati, Sari, Gian, & Arika (2023) found that Students who used canva showed greater improvement in mathematical self-efficacy than those who learned using conventional methods. Through the canva application, students who are enthusiastic about designing images feel more motivated and more confident in their math skills.

Fifth-grade elementary school students in this study who had entered the concrete operational stage were considered suitable for interactive multimedia learning. Research reveals that interactive media can provide guidance and help learn many fun things. The results of this study show an improvement in students' conceptual understanding, supported by the use of animations and daily-life analogies that make Solar System material easier to grasp. This is consistent with previous findings showing that interactive multimedia enhances conceptual understanding through concrete visualization and allows students to revisit materials as needed (Hadi, Yuksafa, Yarmi, Safitri, Lestari, Suntari, Umasih, Marini, Sudrajat, & Iskandar, 2022). Interactive multimedia also provides repeated opportunities for academic success, which strengthens students' mathematical self-efficacy. In line with these findings, the application of an interactive multimedia-based mathematics learning process can increase interest and improve student learning outcomes, especially in mathematics subjects (Amelia & Harahap, 2021; Kadarsih & Fitria, 2022). Additional research also confirms its positive impact, where interactive digital tools improve students' confidence, motivation, and self-efficacy (Handayani, Musa, & Pikoli, 2024; Rafniwati, Yona, Dekdi, & Herlinawati, 2025). Therefore, canva-based interactive multimedia can significantly enhance students' mathematical self-efficacy compared to conventional learning methods, as students feel more confident and motivated when learning with visually rich and engaging media.

4. Conclusion

Based on the study's results, there is a difference in the development of critical thinking skills in the experimental class through the application of canva-based interactive multimedia. In line with the results of the critical thinking skills, there is also a difference in students' mathematical self-efficacy: the experimental class, through the application of

canva-based interactive multimedia, achieved an average of 34.50, while the control class achieved 29.20. Thus, it can be concluded that elementary school students' critical thinking skills and mathematical self-efficacy are achieved through the application of canva-based interactive multimedia in mathematics learning. Based on this research, the researcher believes that in the future, students will be treated to a variety of technologies. More research is needed to test other interactive multimedia and evaluate the long-term impact of using canva in education. Based on this study, interactive multimedia can be seen to encourage the development of critical thinking skills and mathematical self-efficacy among elementary school students, and there is a need for further tests of other students' attitudes and skills. Researchers hope that the use of interactive multimedia in canva will be a more comprehensive research subject, with more complex materials, to improve students' critical thinking skills and mathematical self-efficacy across various levels of education.

References

Afifah, S. N., & Kusuma, A. B. (2021). Pentingnya Kemampuan Self-Efficacy Matematis serta Berpikir Kritis pada Pembelajaran Daring Matematika. *Jurnal MathEdu (Mathematic Education Journal)*, *4*(2), 313–320. https://doi.org/10.37081/mathedu.v4i2.2642

Amelia, D. P., & Harahap, A. (2021). Application of Interactive Multimedia-Based Mathematics Learning Media to Increase Students' Interest in Learning. *Budapest International Research and Critics Institute (BIRCI-Journal): Humanities and Social Sciences*, *4*(2), 3153–3161. https://doi.org/10.33258/birci.v4i2.2040

Apriani, N. (2018). *Pengembangan Multimedia Interaktif PowerPoint dalam Pendekatan Saintifik untuk Meningkatkan Kemampuan Pemahaman Konsep Matematika pada Pokok Bahasan Statistika*. Universitas Lampung. http://digilib.unila.ac.id/id/eprint/32565

Aryfien, W. N., Atmojo, I. R. W., & Matsuri. (2025). Interactive Learning Media for Better Learning Outcomes in Elementary School: A Systematic Literature Review. *Mimbar Sekolah Dasar*, *12*(1), 132–147. https://doi.org/10.53400/mimbar-sd.v12i1.82323

Cahyani, N., & Winata, H. (2020). Peran Efikasi dan Disiplin Diri dalam Peningkatan Hasil Belajar Siswa. *Jurnal Pendidikan Manajemen Perkantoran*, *5*(2), 234–249. https://doi.org/10.17509/jpm.v4i2.18008

Djamas, D., & Tinedi, V. (2021). Development of Interactive Multimedia Learning Materials for Improving Critical Thinking Skills. In *Research Anthology on Developing Critical Thinking Skills in Students* (pp. 507–525). IGI Global.

Dwiana, A. A., Samosir, A., Sari, N. T., Awalia, N., Budiyono, A., Wahyuni, M., & Masrul, M. (2021). Penerapan Media Pembelajaran Berbasis Macromedia Flash dalam Meningkatkan Kreativitas Siswa pada Mata Pelajaran Matematika di Sekolah Dasar. *Jurnal Basicedu*, *6*(1), 499–505. https://doi.org/10.31004/basicedu.v6i1.1669

Dwidarti, U., Mampouw, H. L., & Setyadi, D. (2019). Analisis Kesulitan Siswa dalam Menyelesaikan Soal Cerita pada Materi Himpunan. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *3*(12), 315–322. https://doi.org/10.32505/qalasadi.v5i1.2366

Erdyati, F., Meliasari, W. O., Damayanti, M. I., & Sulistriyaniva, R. (2024). Penggunaan Canva sebagai Media Interaktif dalam Meningkatan Keterampilan Berpikir Kritis

pada Pembelajaran Pendidikan Pancasila untuk Siswa SD Kelas IV. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, *9*(2), 4217–4226. https://journal.unpas.ac.id/index.php/pendas/article/view/14117

Fajri, H. N., Johar, R., & Ikhsan, M. (2016). Peningkatan Kemampuan Spasial dan Self-Efficacy Siswa melalui Model Discovery Learning Berbasis Multimedia. *Beta Jurnal Tadris Matematika*, *9*(2), 180–196. https://doi.org/10.20414/betajtm.v9i2.14

Farib, P. M., Ikhsan, M., & Subianto, M. (2019). Proses Berpikir Kritis Matematis Siswa Sekolah Menengah Pertama melalui Discovery Learning. *Jurnal Riset Pendidikan Matematika*, *6*(1), 99–117. https://doi.org/10.21831/jrpm.v6i1.21396

Firdaus, R., Surur, M., & Seituni, S. (2022). The Effectiveness of Using Interactive Multimedia in Solving Problems for Class VIII MTS Nurul Jadid Students in Informatics Learning. *Jurnal Inovasi Teknologi Pendidikan*, *9*(3), 299–311. https://doi.org/10.21831/jitp.v9i3.50554

Fudhla, N., Aulia, F., Oktoviandry, R., & Haq, M. (2023). Pelatihan Pembuatan Media Ajar Multimedia Interaktif Berbasis IT di SMAN 1 V Koto KP Dalam. *Abdi Humaniora*, *4*(2), 85–95. https://doi.org/10.24036/abdi-humaniora.v4i2.120248

Hadi, W., Yuksafa, R., Yarmi, G., Safitri, D., Lestari, I., Suntari, Y., Umasih, Marini, A., Sudrajat, A., & Iskandar, R. (2022). Enhancement of Students' Learning Outcomes through Interactive Multimedia. *International Journal of Interactive Mobile Technologies*, *16*(7), 82–98. https://doi.org/10.3991/ijim.v16i07.25825

Hamdani, S. A., Prima, E. C., Agustin, R. R., Feranie, S., & Sugiana, A. (2022). Development of Android-Based Interactive Multimedia to Enhance Critical Thinking Skills in Learning Matters. *Journal of Science Learning*, *5*(1), 103–114. https://doi.org/10.17509/jsl.v5i1.33998

Handayani, S., Musa, W. J. A., & Pikoli, M. (2024). Development of E-Modules for Science Subjects Based on Artificial Intelligence Technology to Improve Concept Mastery and Self-Efficacy of Students of Grade IV Elementary School. *International Journal of Science and Reasearch Archive*, *12*(01), 2393–2399. https://doi.org/10.30574/ijsra.2024.12.1.0854

Hanifah, S. S., Wulan, N. S., & Sumiati, I. (2023). Pengaruh Multimedia Interaktif Berbasis Canva terhadap Kemampuan Berpikir Krtisis Matematis pada Materi Analisis Data. *Didaktik: Jurnal Ilmiah PGSD STKIP Subang*, *9*(2), 1749–1758. https://doi.org/10.36989/didaktik.v9i2.896

Hartanti, A. R., & Yulia, C. (2022). Efektivitas Media Canva untuk Meningkatkan Kepercayaan Diri pada Siswa. *Research and Development Journal of Education*, *8*(2), 565–571. https://doi.org/10.30998/rdje.v8i2.13621

Hernawati, & Supriatna, E. (2025). Pengaruh Penggunaan Media Interaktif Berbasis Canva dalam Pembelajaran IPA terhadap Kemampuan Berpikir Kritis Siswa Kelas VI SD. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, *10*(1), 881–887. https://journal.unpas.ac.id/index.php/pendas/article/view/21523/10746

Hidayati, N., & Khasanah, U. (2017). The Relationship Between Self-Confidence and Learning Environment at Home with Students Mathematics Learning Outcomes in SMP Negeri 2 Sanden. *AdMathEduSt: Jurnal Ilmiah Mahasiswa Pendidikan Matematika*, *4*(4), 198–201. https://doi.org/10.12928/admathedust.v4i5.16365

Hilmiyati, F., Nafsi, A. G., & Sabri. (2024). The Development of Canva-Based Animated Videos to Improve Critical Thinking Skills of Elementary/Islamic Elementary School Students in Science Classes on Human Digestive System Materials. *Al-Aulad: Journal of Islamic Primary Education*, *7*(1), 28–37. https://garuda.kemdikti

saintek.go.id/documents/detail/4428881

Illahi, T. A. R., Sukartiningsih, W., & Subroto, W. T. (2018). Pengembangan Multimedia Interaktif pada Pembelajaran Materi Jenis-Jenis Pekerjaan untuk Meningkatkan Kemampuan Berpikir Kritis. *Jurnal Review Pendidikan Dasar: Jurnal Kajian Pendidikan dan Hasil Penelitian*, *4*(3), 826–835. https://doi.org/10.26740/jrpd.v4n3.p826-835

Juhriah, Hayadi, B. H., Yusuf, F. A., Sepriyanti, & Yuningsih, Y. (2024). Multimedia Interaktif Inkuiri IPA: Tingkatkan Berpikir Kritis Siswa SD. *Technical and Vacational Education International Journal F*, *4*(1), 54–57. https://doi.org/10.55642/taveij.v4i1.610

Kadarsih, I., & Fitria, Y. (2022). Implementation of Learning Using Interactive Multimedia Based on Android on Theme 9 be Class V SD. *Jurnal Ilmiah Sekolah Dasar*, *6*(1), 57–65. https://doi.org/10.23887/jisd.v6i1.41651

Lana, B., Miyono, N., & Rowati, S. (2023). Penerapan Model Problem Based Learning Berbantuan Media Canva Meningkatkan Kemampuan Berpikir Kritis Kelas II SD Negeri Mijen 2 Demak. *Prosiding Seminar Nasional Pendidikan Profesi Guru*, *1*(1), 44–51.

Marji, Komarudin, Sutadji, E., & Widiyanti. (2020). Interactive Multimedia Development Engine Management System (Ems) Using the Addie Model. *PalArch's Journal of Archaeology of Egypt/Egyptology*, *17*(4), 609–629. https://archives.palarch.nl/index.php/jae/article/view/396

Nafidah, R., & Suratman, B. (2020). Pengembangan Bahan Ajar Digital Interaktif Berbantuan Adobe Flash pada Mata Pelajaran Korespondensi Kelas X OTKP di SMK YPM 3 Taman. *Jurnal Pendidikan Administrasi Perkantoran (JPAP)*, *9*(1), 39–50. https://doi.org/10.26740/jpap.v9n1.p39-50

Nafsi, A. G. (2023). *Pengembangan Media Video Animasi Berbasis Canva untuk Meningkatkan Kemampuan Berpikir Kritis Siswa SD/MI pada Pelajaran IPA Materi Sistem Pencernaan Manusia*. UIN Sultan Maulana Hasanuddin Banten.

Nofitri, F., Desyandri, Eriyanti, F., & Yerizon. (2024). Improving Critical Thinking Skills of Elementary Students through Science Learning with Interactive Teaching Materials and Problem Based Learning. *Jurnal Penelitian Pendidikan IPA*, *10*(10), 7624–7633. https://doi.org/10.29303/jppipa.v10i10.7503

Pratiwi, S., Prahani, B. K., Suryanti, S., & Jatmiko, B. (2019). The Effectiveness of PO2E2W Learning Model on Natural Science Learning to Improve Problem Solving Skills of Primary School Students. *Journal of Physics: Conference Series*, *1157*(3), 032017. https://doi.org/10.1088/1742-6596/1157/3/032017

Rafniwati, Yona, S., Dekdi, & Herlinawati. (2025). The Effects of Digital Learning Media to Improve Mathematics Learning Outcomes and Motivation of Seventh Grade Junior High School Students. *International Conference on Education and Innovation*, *July*, 130–140. https://journal.unilak.ac.id/index.php/ICEI/article/view/28617

Rahmawati, R. D., Sari, H. N., Gian, M. S. I., & Arika, F. (2023). Desain Grafis untuk Meningkatkan Kreativitas Anak. *J-ADIMAS (Jurnal Pengabdian Kepada Masyarakat)*, *11*(1), 35–38. https://doi.org/10.29100/j-adimas.v11i1.3684

Safira, R. F., & Nahdi, D. S. (2024). Keragaman Perangkat Lunak Multimedia Interaktif untuk Meningkatkan Kualitas Pembelajaran IPA Sekolah Dasar. *Jurnal Madinasika: Manajemen Pendidikan dan Keguruan*, *5*(2), 68–77. https://doi.org/10.31949/madinasika.v5i2.7812

Samihah, I. M., Wiyanto, W., Widiyatmoko, A., Rusilowati, A., & Saptono, S. (2024). The Impact of STEM-based Interactive Multimedia on Vibrations and Waves to Improve Students' Critical Thinking Skills and Learning Independence. *Journal of Innovative Science Education*, *13*(1), 20–28. https://doi.org/10.15294/jise.v13i1.1271

Saputra, A. R., Murti, R. C., & Hastuti, W. S. (2025). The Effect of Web-Based Interactive Learning Media on Critical Thinking Skills of Elementary School Students. *Jurnal Prima Edukasia*, *13*(1), 159–168. https://doi.org/10.21831/jpe.v13i1.75228

Sholikhah, I. R., Prasetya, E., & Andriani, A. E. (2023). Peningkatan Hasil Belajar dan Kemampuan Berpikir Kritis Peserta Didik dengan Model PBL Berbantuan Media Canva pada Mata Pelajaran IPAS. *Kreatif: Jurnal Kependidikan Dasar*, *14*(1), 23–31. https://journal.unnes.ac.id/journals/kreatif/article/view/6955

Suja, I. K., Armoni, N. L. E., Putra, I. G. A. S., & Sarja, N. L. A. K. Y. (2021). The Effect of the Usage of Interactive Multimedia on the Students' Concept Mastery and Critical Thinking Skill. *International Conference on Applied Science and Technology on Social Science*, *647*, 223–226. https://doi.org/10.2991/assehr.k.220301.037

Sun, L., Kangas, M., Ruokamo, H., & Siklander, S. (2023). A Systematic Literature Review of Teacher Scaffolding in Game-Based Learning in Primary Education. *Educational Research Review*, *40*(June), 100546. https://doi.org/10.1016/j.edurev.2023.100546

Swara, G. Y., Ambiyar, A., Fadhilah, F., & Syahril, S. (2020). Pengembangan Multimedia Pembelajaran Matematika sebagai Upaya Mendukung Proses Pembelajaran Blended Learning. *Jurnal Inovasi Teknologi Pendidikan*, *7*(2), 105–117. https://doi.org/10.21831/jitp.v7i2.35028

Tanjung, R. E., & Faiza, D. (2019). Canva sebagai Media Pembelajaran pada Mata Pelajaran Dasar Listrik dan Elektronika. *Jurnal Vokasional Teknik Elektronika Dan Informatika*, *7*(2), 80–85. https://doi.org/10.24036/voteteknika.v7i2.104261

Vera, S. T, & Vargas, O. L. (2025). Academic Self-Efficacy, Online Self-Efficacy, and Fixed and Faded Scaffolding in Computer-Based Learning Environments. *Contemporary Educational Technology*, *17*(2), 1–17. https://doi.org/10.30935/cedtech/16030

Utomo, F. T. S. (2023). Inovasi Media Pembelajaran Interaktif untuk Meningkatkan Efektivitas Pembelajaran Era Digital di Sekolah Dasar. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, *8*(2), 3635–3645. https://doi.org/10.1088/1751-8113/44/8/085201

Wibowo, D. C., Peri, M., Awang, I. S., & Rayo, K. M. (2022). Analisis Kemampuan Berpikir Kritis Siswa dalam Menyelesaikan Soal Cerita pada Mata Pelajaran Matematika. *Jurnal Ilmiah Aquinas*, *5*(1), 152–161. https://ejournal.ust.ac.id/index.php/Aquinas/article/view/1651

Winarni, S., Akhyar, M., & Sudiyanto, S. (2022). Feasibility Assessment of Interactive Multimedia as an Innovation for Mathematics Learning in Elementary Schools. *Al-Ishlah: Jurnal Pendidikan*, *14*(4), 6675–6686. https://doi.org/10.35445/alishlah.v14i4.2279

Winarso, W., Toheri, & Udin, T. (2023). Addressing the Challenge of Mathematical Misconceptions: Development of Interactive Multimedia Based on Cognitive Conflict Strategy. *Journal of Education Technology*, *7*(3), 513–522. https://doi.org/

10.23887/jet.v7i3.63037

Yuliyanto, A. (2024). *Sikap dan Potensi Peserta Didik serta Indikator Pengukurannya*. Eureka Media Aksara.

Yuliyanto, A., Farikhin, I., Sofiasyari, I., & Rogibah, R. (2023). *Model-Model Pembelajaran untuk Sekolah Dasar* (A. A. Rochim (ed.)). Eureka Media Aksara.

Yuliyanto, A., & Turmudi, T. (2020). Study Based on the Early Mathematical Ability of Elementary Student Self-Efficacy through the Concrete-Pictorial-Abstract Approach. *Universal Journal of Educational Research*, *8*(11B), 5901–5912. https://doi.org/10.13189/ujer.2020.082224

Yuliyanto, A., Turmudi, T., Putri, H. E., Muqodas, I., & Rahayu, P. (2021). The Mathematical Self-Efficacy Instruments for Elementary School Students. *Journal of Physics: Conference Series*, *1987*(1), 012023. https://doi.org/10.1088/1742-6596/1987/1/012023

Zulhelmi, Adlim, & Mahidin. (2017). Pengaruh Media Pembelajaran Interaktif terhadap Peningkatkan Keterampilan Berpikir Kritis Siswa. *Jurnal Pendidikan Sains Indonesia*, *5*(1), 72–80. https://jurnal.usk.ac.id/JPSI/article/view/8414