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Development of *MAMEYA* Interactive Learning Media to Improve Students' Critical Thinking Skill at Elementary School

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Abstract

This research aims to develop an interactive learning media called MAMEYA *(Mari Mengenal Gaya)* to improve students' critical thinking skills. The method used is R&D (Research and Development) with the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). The subjects of this research were all 25 fourth-grade students of SD Negeri Tempuran 1. Data collection techniques used validation questionnaire instruments, response questionnaires, and test questions. Questionnaire data analysis used descriptive categorical and percentage techniques. At the same time, the test data analysis used a paired sample T-test and the N-Gain test, which had previously carried out a data normality test as a prerequisite test. The research results showed that the validation (feasibility) assessment obtained very feasible criteria with a score of 90% from the media aspect, 93% from the material aspect, and 87% from the language aspect. The practicality assessment obtained very practical criteria based on the response value given by the teacher of 97% and students of 89%. The effectiveness assessment was obtained by calculating the data normality test with a Sig. value pre-test 0.079 and post-test 0.850 > 0.05, which shows that the data of the students' test assessment results are normally distributed. The calculation of the paired sample T-test obtained a Sig. (2 tailed = 0.000) < 0.05, which means that MAMEYA interactive media affects students' critical thinking skills. At the same time, the N-Gain test obtained a value of 0.6644 with a moderate category, which shows an increase in critical thinking skills after using MAMEYA interactive media. It is concluded that MAMEYA interactive media can be feasible, practical, and effective in improving critical thinking skills and facilitating better student understanding.

Keywords: Critical Thinking Skill, Interactive Learning Media, MAMEYA

Abstrak

Penelitian ini bertujuan untuk mengembangkan sebuah media pembelajaran interaktif yang diberi nama MAMEYA (Mari Mengenal Gaya) dalam meningkatkan kemampuan berpikir kritis peserta didik. Metode yang digunakan adalah R&D (Research and Development) dengan model ADDIE (Analisis, Desain, Pengembangan, Implementasi, dan Evaluasi). Subjek penelitian ini adalah seluruh peserta didik kelas IV SD Negeri Tempuran 1 yang berjumlah 25 orang. Teknik pengumpulan data menggunakan instrumen angket validasi, angket respon, dan tes soal. Analisis data angket menggunakan teknik deskriptif kategoris dan persentase. Sedangkan analisis data tes menggunakan uji T dua sampel saling berpasangan dan uji N-Gain yang sebelumnya dilakukan uji normalitas data terlebih dahulu sebagai uji prasyarat. Hasil penelitian menunjukkan bahwa penilaian validasi (kelayakan) memperoleh kriteria sangat layak dengan skor sebesar 90% dari

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aspek media, 93% dari aspek materi, dan 87% dari aspek bahasa. Penilaian kepraktisan memperoleh kriteria sangat praktis berdasarkan nilai respon yang diberikan oleh guru sebesar 97% dan peserta didik sebesar 89%. Penilaian keefektifan diperoleh dari perhitungan uji normalitas data dengan nilai Sig. pre-test 0,079 dan post-test 0,850 > 0,05 yang menunjukkan bahwa data hasil penilaian tes peserta didik berdistribusi normal. Perhitungan uji T dua sampel saling berpasangan diperoleh nilai Sig. (2 tailed = 0,000) < 0,05 yang berarti media interaktif MAMEYA berpengaruh terhadap kemampuan berpikir kritis peserta didik, sedangkan uji N-Gain memperoleh nilai sebesar 0,6644 dengan kategori sedang yang menunjukkan adanya peningkatan kemampuan berpikir kritis setelah menggunakan media interaktif MAMEYA. Disimpulkan bahwa media interaktif MAMEYA dapat dikatakan layak, praktis, dan efektif digunakan guna meningkatkan kemampuan berpikir kritis dan memfasilitasi pemahaman peserta didik agar lebih baik.

Kata Kunci: *Kemampuan Berpikir Kritis, Media Pembelajaran Interaktif, MAMEYA*

INTRODUCTION

The current technological development known as the Society 5.0 era is the main reason for the very rapid changes towards digital, and is filled with technology in various aspects of life, including education (Dermawan et al., 2025; Kaliongga et al., 2023). Education in the Society 5.0 era or the 21st century facilitates the development of 21st-century skills or The 4Cs, one of which is critical thinking (Purwasih et al., 2021; Rahmawati et al., 2023). The development of critical thinking skills can be carried out optimally by adjusting the interests and talents of students through the use of digital technology-based learning media, which is an important foundation in supporting an active, innovative, and relevant learning process, with the demands of the times (Aldila & Ulfa, 2024; Firmansyah et al., 2024; Maulidiana et al., 2021). The use of media in teaching should be the central aspect that must receive attention from teachers as facilitators, because learning media is an element that cannot be separated from the learning process (Ismiyanti & Afandi, 2022). Learning media is one of the options that teachers can use to provide a meaningful and enjoyable understanding for students (Rahmadhani et al., 2025). The limitations of teachers in integrating technology into learning media can hinder students' understanding of abstract material (Sahade et al., 2024; Y. Sari et al., 2024). Therefore, every educator needs to learn how to choose and determine the right learning media so that learning objectives in the teaching and learning process can be achieved optimally (Dewi et al., 2024; Yuliandari et al., 2024). The selection of innovative learning media is essential to support a compelling, interesting, and appropriate learning process for students, so that it can increase students' motivation, participation, and understanding of concepts (Afandi et al., 2024).

Previous research conducted by Astuti & Widodo, (2024) stated that the development of interactive, creative, and innovative learning media can overcome problems that arise in the learning process. Interactive learning media is an intermediary tool for delivering learning materials by teachers to students, where they provide actions and reactions between each other (Nata & Putra, 2021). Using appropriate interactive learning media to help teachers stimulate students' thoughts, feelings, attention, and desires encourages the student learning process to be more concrete and active, and to achieve learning goals. In addition, the use of interactive learning media can help students understand the learning materials taught by teachers more easily and create a more enjoyable and meaningful learning atmosphere (Saputra et al., 2025). Interactive learning media contain materials, images, animations, navigation, quizzes, and evaluations that can help students' understanding. In addition, many other interactive learning media are equipped with videos, songs, and material summaries that aim to help achieve learning goals (Setyo et al., 2024). This is useful as feedback to improve the learning process. The use of interactive learning media has a positive impact on skills development and prepares students for the future (Azmi et al., 2024).

Based on the results of observations of the problems in SD Negeri Tempuran 1 class IV, it was found that students were less actively involved in thinking activities, and the learning process

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was still centered on the teacher. Students were only given learning related to theory and were not faced with concrete things. In addition, teachers in delivering or explaining learning materials still use accompanying textbooks and LKS only to support the learning process. There is no other learning media that can attract the interest and attention of students in learning activities. The lack of learning media in the learning process causes students to be less active and disciplined when participating in the teaching and learning process, which has an impact on low student learning outcomes (Afandi et al., 2020). Based on these conditions, it is necessary to develop interactive learning media that can facilitate students' learning needs in response to the demands of the times.

Interactive learning media have been successfully developed and utilized in previous studies. Asiah et al. (2025) developed OKY application-based learning media that focused on improving elementary school students' understanding and involvement. Weninggalih, (2024) designed gamification-based interactive learning media aimed at encouraging students' understanding and creativity development. Asnur et al. (2025) utilized the Canva application as an effective interactive learning media in increasing student engagement and learning outcomes. Murba et al. (2025) developed digital media based on interactive animation and video that successfully attracted elementary school students' interest in learning. Meanwhile, (Nabila et al. (2023) carried out an ethnomathematics approach based on interactive learning media that was proven to increase interest in learning through the context of local culture. However, the media developed in the research did not target specific learning competency achievements, and there was limited accessibility for its users.

Based on this statement, the researcher developed MAMEYA interactive learning media, MAMEYA is Let's Get to Know Force in science natural, in the form of an application that can make it easier for users to access the media and is oriented towards learning competency achievements and critical thinking skills of students. The use of applications in learning makes it easier for students to receive and understand learning materials and makes it easier for teachers to deliver learning, because with the application, students can access learning materials or information anywhere and anytime (Apriyono et al., 2024; Saharani & Abadi, 2024). Thus, this study aims to develop and test the level of feasibility, practicality, and effectiveness of MAMEYA interactive learning media, which is designed to be integrated with strengthening students' critical thinking skills. This media is expected to be a solution to increase learning activity, concrete understanding of concepts, and encourage students' critical thinking processes.

METHOD

The research method used is research and development (R&D) with a research and development model developed by Dick and Carry, namely the ADDIE model, which consists of several stages: (1) analysis, (2) design, (3) development, (4) implementation, and (5) evaluation. The ADDIE development model is presented in a simple, systematic, and easy-to-learn manner (Proklawati, Roekhan, & Susanto, 2021). So, the model is relevant for use in developing an interactive media design and can produce a quality product in the learning process (Geni, Sudarma, & Mahadewi, 2020). The sampling used was saturated sampling using all members of the population in class IV of SD Negeri Tempuran 1 in the 2024/2025 academic year, totaling 25 students. The data in this research came from the results of observations, the results of expert validation questionnaire assessments, the results of teacher and student response questionnaire assessments, and the results of student test assessments in solving problems. Where the data is collected using a questionnaire and test instruments. The questionnaire instrument tests the level of feasibility and practicality of the media developed. The feasibility questionnaire (validation) addresses three validators or expert teams: media, material, and language experts. The practicality questionnaire is addressed to teachers and students. Both questionnaires are in the form of closed questions using a Likert scale on each question

item, which is categorized based on the scoring provisions in Table 1 (Maulana, Maulana, & Isrok'atun, 2025). The score data obtained from the results of filling in each validation questionnaire question item and response questionnaire will later be processed and analyzed using statistical calculations to determine the product assessment criteria in Table 2 (W. Sari, Nugraha, & Ali, 2025) using the following formula (Rahman, Uswatun, & Sutisnawati, 2025):

$$Presentase\ (\%) = \frac{Total\ score\ (x)}{Maximum\ total\ score\ (xi)} \times 100\%$$

Table 1. Questionnaire Category

Category	Score
Strongly Agree (SS)	4
Agree (S)	3
Disagree (TS)	2
Strongly Disagree (STS)	1

Table 2. Product Assessment Criteria

Presentase	Criteria
>75 – 100%	Very Good
>50 – 75%	Good
>25 – 50%	Not Good
0 – 25 %	Very Not Good

Next is the test instrument. The test instrument contains 10 questions with a descriptive format. The instrument is arranged based on the test question grid using critical thinking indicators and cognitive levels C4-C6. The test instrument aims to determine the effectiveness of the media developed on students' critical thinking skills. The test assessment data in this research were obtained from students' pre-test and post-test scores before and after using MAMEYA interactive media in the learning process. The data obtained from the results of the student test assessment will be processed and generalized into statistical calculations using the paired sample T-test and the N-Gain test to determine the effect and improvement of students' critical thinking skills after using MAMEYA interactive media, which was previously tested for data normality as a prerequisite test.

RESULT AND DISCUSSION

The research and development resulted in a digital product in the form of interactive learning media named MAMEYA (Mari Mengenal Gaya). They can be operated via an Android or a laptop. This product is expected to support the development of students' critical thinking skills and help facilitate the learning process of IPAS content on style material for grade IV elementary school. This media product is an innovation developed by researchers to create a fun learning experience because, with this media, students can actively participate in learning in the classroom. The development model used in this research is ADDIE, which consists of five stages. The explanation of each stage is as follows:

Analysis

At the analysis stage, problems related to the need to use the learning media that will be developed are identified. Through direct interviews with class IV teachers at the research school, it was found that the scope of IPAS learning was still relatively low. IPAS learning activities in the

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classroom tend to be passive due to schools' limited facilities and reading resources. Apart from that, the material delivery still uses the conventional model, namely the lecture method. Therefore, learning media is needed to stimulate students' learning process and improve their critical thinking skills.

Design

The design stage involves designing plans, concepts, and content needed to prepare the learning media to be developed. At the design stage, the product is in the conceptual stage, and design plans are carried out on the material and media aspects. The design of the material must be adjusted to the needs and level of understanding of students, and the reference sources used must be based on the competency of the material that will be taught in the 1st-semester IPAS material content. Next is media design. Media design functions as an initial representation of the product to be developed. The media design consists of the first page and the menu page. The first page has a cover that says the name of the media and a start button, and the main menu page contains menus for the entire content of the MAMEYA interactive media. The instructions menu contains navigation button instructions and instructions for evaluating the evaluation. The material identity menu contains learning objectives, learning outcomes, and indicators. The material menu contains style materials. The evaluation menu contains practice questions simultaneously with the post-test assessment. The content of the media to be developed must be adjusted to indicators of critical thinking skills so that when using MAMEYA interactive media in the learning process, students experience increased critical thinking skills.

Development

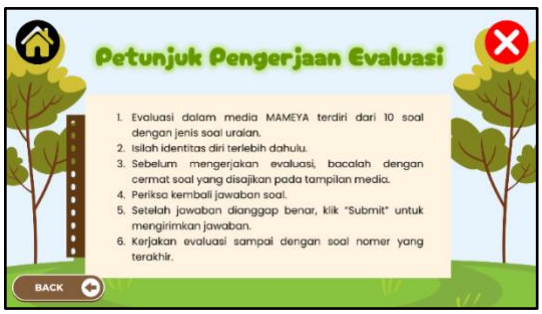
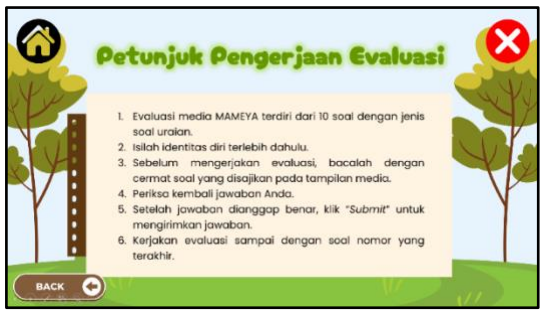
The development stage is realizing the product designed in the previous stage as a conceptual framework, which will later be realized as an actual product and be ready to be used. In this stage, all product development processes must be finished and prepared because the resulting learning media products will be validated by three validators: media experts, material experts, and language experts. MAMEYA interactive media validation is carried out to determine whether the media being developed is feasible or needs improvement. MAMEYA interactive media is considered suitable or valid for use if, during the testing process, the media obtains validation results of >75 – 100%. The following are the results of the validation assessment by the validator of the learning media developed:

Table 3. Recapitulation of Validator Assessment Results

Validation	Average Score	Criteria
Media	90%	Very Good
Material	93%	Very Good
Language	87%	Very Good
Statement	90%	Very Good

Based on Table 3, it can be seen that the average score results of the validation assessment given by the validator to the MAMEYA interactive media obtained the assessment criteria of "Very Good" in terms of media, material, and language. Thus, the media developed can be said to be feasible or valid and can be tested with improvements based on several suggestions and comments from the expert team validators as a basis for revision, namely paying attention to examples of images that are at the stage of student cognitive development, paying attention to language grammar, adding a menu of lists of terms or special words accompanied by definitions or brief explanations, and adding a quiz menu. The following are the results of the revision of the MAMEYA interactive media:

Table 4. Media Revision

Before Revision	After Revision
	
	
	

Based on the suggestions and comments submitted by the validator, improvements were made to the developed media, namely replacing more concrete image examples, improving language grammar, and adding a glossary and quiz menu. After the media was enhanced according to the validator's suggestions and comments, the MAMEYA interactive media was ready to be tested in classroom learning.

Implementation

The implementation stage is applying or testing the product developed for teachers and students of class IV SD Negeri Tempuran 1 to obtain feedback as a basis for evaluation. At this stage, the aims and objectives are to determine the effectiveness and practicality of MAMEYA interactive media in the learning process, which previously had a thorough product revision and was declared valid by a validator team of experts. Before implementing the media, a pre-test was conducted to measure and determine the students' initial critical thinking skills level before implementing learning using MAMEYA interactive media. After MAMEYA interactive media is used or tested on students, a post-test is carried out to measure and determine the increase in students' critical thinking abilities after learning using MAMEYA interactive media. The test questions used are prepared based on indicators of critical thinking abilities. The assessment results obtained will be analyzed to determine the effectiveness of MAMEYA interactive media in the learning process. Meanwhile, the level of

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practicality can be seen from the results of the responses given by teachers and students through questionnaires that have been distributed when using MAMEYA interactive media in the learning process.

Evaluation

The evaluation stage assesses product trial results by analyzing the data from the response questionnaire assessment results and the students' pre-test and post-test scores. The results of the questionnaire assessment of teacher and student responses to MAMEYA interactive media are used to determine the level of practicality of the media in the learning process. Next, the level of media effectiveness in the learning process will be determined by assessing the results of students' pre-tests and post-tests before and after implementing MAMEYA interactive media. The following are the results of the practicality test assessment of the learning media that have been developed:

Table 5. Recapitulation of Response Questionnaire Assessment Results

Response Questionnaire	Average Score	Criteria
Teacher	97%	Very Good
Student	89%	Very Good

Table 5 shows that the average score results of the teacher and student response questionnaire assessment of the MAMEYA interactive media obtained the "Very Good" assessment criteria. Thus, the MAMEYA interactive media can be said to be practical for use in the learning process. Furthermore, the results of the effectiveness test of the MAMEYA interactive media will be assessed. Before the effectiveness test is carried out, the data obtained from the results of the pre-test and post-test assessments will be tested for normality first. The following are the results:

Table 6. Normality Results of Critical Thinking Ability Tests

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pre-test	.139	25	.200*	.928	25	.079
Post-test	.088	25	.200*	.978	25	.850

The normality test results can be seen in the Shapiro-Wilk column because the number of data samples used is less than 50. In Table 6, the pre-test column obtained a significance value of 0.079, while the post-test column obtained a significance value of 0.850. Because the normality test of the pre-test questions and post-test questions obtained a significance value of > 0.05 (α), it can be said that the data from the pre-test and post-test assessments are normally distributed. Next, a paired sample T-test will be conducted to determine the difference between the pre-test and post-test assessment results. The following are the results:

Table 7. Paired Sample T-test Results

	Mean	Paired Difference				t	Df	Sig. (2-tailed)
		Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre-test Post-test	-32.600	5.148	1.030	-34.725	-30.475	-31.664	24	.000

Based on the results of Table 7, the value obtained by Sig. (2 tailed = 0.000) < 0.05, so it can be stated that there is a difference between the pre-test and post-test results, indicating that students' critical thinking is better. After learning the differences between the two assessment results, an N-Gain test will be carried out to determine the increase in students' critical thinking ability after using MAMEYA interactive media in the learning process. The following are the results:

Table 8. N-Gain Test Results

	N	Minimum	Maximum	Mean	Std. Deviation
Valid N (listwise)	25	.49	.78	.6644	.07408

Table 8 shows a mean value of 0.6644, which is included in the medium category. So, it can be concluded that class IV students at SD Negeri Tempuran 1, after learning to use MAMEYA interactive media, experienced an increase in critical thinking skills in the medium category.

Based on the stages of research and development that have been carried out, a product in the form of MAMEYA interactive learning media was obtained, which was considered feasible (valid) in terms of language, material, and design because the product developed was interesting and very good for encouraging students' independent learning motivation. From the language aspect, MAMEYA interactive media uses communicative, simple language, and is in accordance with the level of cognitive development of elementary school students, and uses terms that are easy to understand, thus minimizing confusion and increasing student understanding. From the material aspect, the content presented is based on the achievements IPAS of the Merdeka curriculum for grade IV of elementary school and critical thinking indicators with cognitive levels C4-C6, and has been validated by material experts and showing that the material presented is appropriate, complete, and accurate with students' learning needs. Meanwhile, from the design aspect, MAMEYA interactive media is designed with an attractive visual appearance with a structured and interactive layout, making it easier for students to navigate the media and increase learning engagement. Therefore, the use of MAMEYA interactive learning media in the learning process can help students understand a concept in depth and help develop critical thinking skills towards problems faced in real life.

MAMEYA interactive media also has a number of advantages that have a positive impact on students' critical thinking skills. This media presents interactive features such as simulations, trigger questions, and reflective exercises that can stimulate imagination and encourage student exploration (Elisabeth & Mawardi, 2025). This is in line with Piaget's learning theory, which states that at the concrete operational stage, students still need real or concrete objects to understand a concept logically (Estuhono & Efendi, 2024; Regina & Wulandari, 2025). With interactivity, students are not only recipients of information but also active in the thinking process (Ayu & Manuaba, 2021; Nurdin et al., 2024). Meanwhile, clarity of information, interactivity, high-level questions, formative feedback, contextualization of materials, and the use of visual and multimedia elements are things that can influence the improvement of students' critical thinking skills through MAMEYA interactive media. This allows learning to be more in-depth, meaningful, and relevant to students' intellectual development (Atikah et al., 2023; Aurum & Surjono, 2021). In line with research conducted by Wahyuni et al. (2022) stated that the use of interactive learning media in the learning process supports the improvement of students' critical thinking skills and encourages meaningful involvement in the learning process, so that it can increase students' interest and motivation in learning (Daniar & Sari, 2022; Legina & Sari, 2022; Ramadani et al., 2024). Thus, knowledge and abilities can develop optimally, and learning objectives can be achieved optimally (Azzahra et al., 2025; Sisri et al., 2025).

CONCLUSION

This research obtained important findings that MAMEYA interactive media is an effective learning media used to support students' critical thinking skills and is practical in its use. Therefore, the novelty in this research lies in the subjects used, namely IPAS, one of the subjects included in the Merdeka curriculum, which combines IPA and IPS study subjects. MAMEYA interactive media is designed and developed to provide convenience for its users, namely in the form of an application that can later be used on each student's Android by installing it via the link or barcode that has been

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provided. In addition, MAMEYA interactive media can also be accessed via the website without having to install the media application. Thus, the novelty in the research and development of digital-based MAMEYA interactive media is designed to contribute to the development of 21st-century education that coexists with technology and the development of 4C learning skills, including critical thinking skills. This research also has limitations in the material and its application, focusing only on grade IV elementary school style material. It is better if further media development can discuss broader material and add variations in learning activities that meet the needs of students. In addition, the limitation of MAMEYA interactive media is that it can only be installed via the Android system. Further research is recommended to develop media compatible with systems other than Android.

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