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Results of Validation of Interactive Learning Media with Problem Based Learning Approach to Improve Students Critical Thinking Ability

Niza Devi Irvalina
Primary School Teacher Education Study Program
PGRI Kanjuruhan University Malang
Malang, Indonesia
nizadevi19@gmail.com

Nyamik Rahayu Sesanti
Primary School Teacher Education Study Program
PGRI Kanjuruhan University Malang
Malang, Indonesia
nyamik.malang@gmail.com

I Ketut Suastika
Primary School Teacher Education Study Program
PGRI Kanjuruhan University Malang
Malang, Indonesia
suastika@unikama.ac.id

Abstract

This research aims to develop interactive learning media with Problem Based Learning approach on the material of rhombus flat area in fifth grade. This research is a development research (Research & Development). This research has gone through a product trial stage to validate the media by conducting a feasibility test. The test stage is carried out by applying three steps from the ADDIE development model, namely Analysis is the initial stage in examining the problems, needs, and basics for developing media, Design is the stage of researchers in making media designs developed based on the results of the analysis, and Development is the stage of researchers in producing learning media in the form of interactive videos. In this article, the focus of writing is only on the presentation of validation results. The instrument used in this research is a questionnaire. The product validator team includes media experts, material experts, and linguists. The results of media expert validation with a percentage of 95%, material experts 86.87%, and linguists 82.5%, so this media is considered very feasible to use.

Keywords: interactive learning media, problem based learning, critical thinking

I. INTRODUCTION

World life in the 21st century shows a development characterized by technological advances. This brings challenges that need to be faced wisely. To face the various challenges of this era, it is necessary to master the abilities that need to be mastered by students as the younger generation who will inherit the baton in managing the system of life. These abilities are known as the 5C skills which include critical thinking, creativity, collaboration, communication, and character. One of the abilities that need to be cultivated in students is the ability to think critically because it can support students in carrying out their roles in life. Critical thinking ability is the competence of students in thinking by linking the knowledge process and encouraging students to think deeply when facing problems (Saputra, 2020).

Critical thinking is one of the higher-level skills related to rational intellectuals to make judgments and behaviors based on considerations of belief in the truth (Khastini, 2020). Students' ability to focus on problems is still relatively low, so they have difficulty in making strategies, finding ways to work, and making the right arguments when solving math problems (Puspita et al., 2021). Not only that, students' critical thinking competence is in the low category because critical thinking habits have not been formed in the learning that is carried out (Nababan, 2018). This also occurs in mathematics learning at SDN 3 Pujiharjo, especially in grade five. Learning is centered on classroom teachers who provide one-way information without involving interactive learning media. Teachers rarely utilize learning media when teaching and learning activities take place. As a result, students' responses in capturing the material presented are less than optimal and passive so that students tend to be less able to express simple explanations about the information received. In addition, most students immediately accept and are satisfied with the results of their work without rethinking the truth of the answers that have been compiled.

Based on the results of a preliminary study conducted by researchers on Thursday, September 26, 2024, there are several findings that underlie the urgency of the need for research. Most students have difficulty in understanding the concept of the area of the rhombus flat shape, some students experience the inability to imagine the shape of the rhombus being studied. To foster students' skills in critical thinking, researchers created an interactive learning media that combines the syntax in the problem-based learning model as a learning approach. The form of novelty of this research is the development of interactive learning media integrating problem-based learning models as an approach in the form of a flat area learning video with the topic of rhombus. The role of this media can be a learning strategy that facilitates the process of receiving student information on the material of flat area, especially rhombus. The importance of using interactive learning media can make teachers have a positive and productive role (Wahid et al., 2018). Therefore, teachers and students play an active role during learning so that learning will be more effective. Thus, learning is successfully carried out in a fun and meaningful way because both teachers and students can be actively involved during the learning process.

Technology provides opportunities to use various media in the form of digital platforms in the form of the internet, videos, online learning materials, and interactive applications in learning activities (Iskandar et al., 2023). The utilization of technology in education is a motivation to build collaborative relationships and explore the context to be more easily understood (Nurillahwaty, 2022). By optimizing the functions and benefits of technology, learning can run efficiently and have a positive impact on the quality of student competencies (Tekege, 2017).

Interactive learning media is a means in the form of learning tools designed and utilized with the aim of providing stimulus to students to play an active role in the continuity of learning. Interactive learning media has the meaning of learning media as a student learning facility that mutually influences learning materials (Faturrokhman, 2024). The development of this media has proven to be valid and practical in spurring critical thinking skills and student interest in learning (Monica T. & Pramudiani P., 2022, Pertami et al., 2021, Oktiningrum W. & Putri T. A., 2022). The implementation of this media can help teachers in transferring knowledge to students (Ningsih et al., 2022).

The objectives of the research and development of interactive learning media with a problem-based learning approach are as follows, namely describing the feasibility of interactive learning media with a problem-based learning approach on the material of the area of flat shapes (rhombus) to improve the critical thinking ability of grade V SDN 3 Pujiharjo.

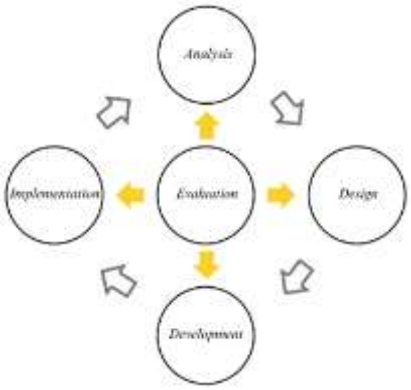
The use of a problem-based learning approach in making interactive learning media is expected to enable an interesting, interactive, and positive learning atmosphere for students. This media is also expected to provide solutions related to the problem of student competence in critical thinking. In addition, the problem-based learning approach can shape students' ability to solve real problems that are relevant to the learning topic. Thus, this media can contribute significantly to improving the quality of education.

II. METHOD

The approach applied in this research is research and development (Research and Development). This research uses the ADDIE model which includes five development steps, including Analysis (analysis), Design (design), Development (development), Implementation (implementation), Evaluation (evaluation) (Hidayat & Nizar, 2021). This model was chosen because the development stages in it are structured and systematic in each stage. The first stage is Analysis, where researchers observe and conduct questions and answers with the principal and class teacher to explore data about the curriculum, needs, and characteristics of students; Design stage, where researchers design the material design, model, media, and instruments used;

Development stage, where researchers design learning media according to the design and revise the product based on the results of the validator's assessment.

Figure 1. The stages of the ADDIE development model (Waruwu, 2024)



The following is a table of media expert validation instrument grids that aim to validate the media developed based on established standards. This process is carried out by media experts who have the ability and expertise in the media field.

Table 1. Media Validation Grid

Aspects assessed	**Indicator**
Visual display	Visually the media looks attractive and is able to attract the attention of users
	The layout of elements in the media is well organized and neat
	The use of colors, fonts, and visual elements is harmonious and consistent
	The use of images, writing, sound illustrates the problems to be analyzed
Audio and video quality	Audio presentation sounds clear
	Video has clear visual quality
	Audio and video facilitate students to know the problems presented
Interactivity	The media provides opportunities for users to interact with the content
	There is clear feedback for every interaction made by users
	The media is easy to use
Aesthetics	Creative media and not monotonous
	There are interesting elements, such as animation or interactive images

Source: modified from (Hanuji, 2015)

The following is a table of material validation instrument grids that aim to review the material on the media developed based on established standards. This process is carried out by material experts who have the ability and expertise in the specific field of the material being validated.

Table 2. Material Validation Grid

Aspects assessed	Indicator
The material is relevant to the Learning Outcomes and Learning Objectives	Completeness of material
	Breadth of material
	Depth of material
Accuracy of material	Accuracy of concepts and definitions
	Accuracy between data and reality
	Accuracy of examples and cases
	Accuracy of designations (terms)
Stimulating curiosity	Stimulating student curiosity
Presentation method	Appropriateness of concepts
Presentation support	Clear presentation introduction
Presentation of learning	Student involvement
Coherence	Linkages between learning activities
Order of thought	The syntax of the problem-based learning model.

Source: modified from (Hanuji, 2015)

The following is a table of linguist validation instrument grids which aims to ensure that the language used in the developed media has met the established standards. This process is carried out by linguists who have the ability and expertise in the field of language.

Table 3. Language Validation Grid

Aspects assessed	Indicator
Language appropriateness	Appropriateness to the topic
	Appropriateness of font type and size on interactive learning media
	Language delivery in sentences on interactive learning media is easy to understand
Language rules	Clarity of language in sentences presenting material
	Presentation of sentences and punctuation based on Refined Spelling rules (EYD)

Source: modified from (Nabila, et al., 2021)

Data processing to determine the feasibility obtained from the assessment of media experts, material experts, and linguists using a Likert scale with categories (4) very good, (3) good, (2) quite good, and (1) less good, with the percentage calculation proposed by (Sugiyono, 2016). Then, to determine the interpretation of the feasibility of interactive learning media with a problem-based learning approach, you can see the percentage criteria obtained using the following table:

Tabel 1. Kriteria Kelayakan Media

Perscentage of Feasibility	Criteria
81 – 100%	Sangat Layak
61 – 80%	Layak
41 – 60%	Kurang Layak
21 – 40%	Sangat Kurang Layak
<20%	Sangat Tidak Layak

Sumber: (Agusti, et al., 2023)

III. RESEARCH RESULTS AND DISCUSSION

Media research and development is carried out by applying the ADDIE model which goes through five stages, including Analysis, Design, and Development. The following is an explanation of the results and discussion covering the five stages:

Analysis is the initial stage that is done by conducting an indepth study to identify problems, learning needs, and tha basics for media development. The procedure is described as follows:

1. Curriculum Analysis

Researchers conducted question and answer activities with the school, namely the Head of SDN 3 Pujiharjo on Thursday, September 26, 2024. The interview results show that the place uses the Merdeka Curriculum. This is also supported by the results of analyzing curriculum documents at school, namely teachers using teaching tools in the form of Learning Outcomes (CP), Flow of Learning Objectives (ATP), and teaching modules.

2. Needs Analysis

Based on the results of observation activities in the field on Thursday, September 26, 2024, researchers found the necessary needs in learning mathematics. The process of learning mathematics, especially on flat shapes, is limited to introducing concepts and memorizing formulas written on the blackboard and contained in textbooks. The utilization of technology in the research location is not optimal and there is no interactivity between teachers and students and learning media. This shows that in the research location there is a need for interactive learning media to be the most basic need to support learning activities.

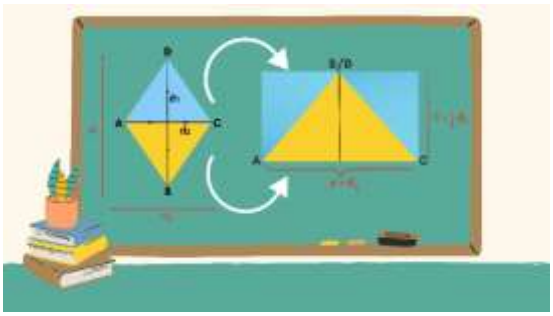
3. Analysis of Students Characteristic

The development stage of fifth grade elementary school students or children aged 11 years is at the concrete operational stage, meaning that in their learning activities they need concrete learning media to support the understanding process. Based on the observation of learning activities in class V, the following information was obtained: students do not understand the material on the area of flat shapes, especially rhombuses, because there is no learning media used; students tend to like to discuss outside the material taught with peers because learning does not attract their attention; when the teacher asks questions about the material reviewed, students show a passive attitude and do not have the enthusiasm to answer or ask questions to the teacher; students are less able to state simple explanations about the information they receive.

Design is the stage where researchers design interactive learning media using a problem-based learning approach, determine the material contained in it, namely the area of the rhombus flat shape, using software namely Canva and Capcut. The media is equipped with images, writings, animations, materials, and sounds that cause action-reaction activities (interactivity) between teachers and students and students with media. In addition, researchers created tools used in research in the form of validation questionnaires and evaluation questions.

Development is the stage where researchers produce and revise interactive learning media products. The media production process is carried out using Canva as an initial design, then formed into a learning video using the Capcut application. The media developed by researchers is an animated learning video that can move and has sound to help interact with students. Interactive learning media is developed based on videos containing material, daily problems, and integrating a problem-based learning approach to train students' critical thinking skills.

Figure 2. Interactive Learning Media Display



Students can achieve a better understanding of the area of rhombus flat area through the use of interactive learning media that uses a problem-based learning approach. In this learning model there is a visualization of interactive learning media based on syntax:

a. Syntax 1: introducing students to the problem (as a learning topic)

In syntax one, the teacher conveyed information about the problems faced by Farhan. The problem arises when Farhan makes a rhombus-shaped kite that fails when flown. In this syntax, students are expected to play an active role in exploring information to solve the problems faced by Farhan.

Figure 3. Interactive Learning Media Display Syntax 1 Problem Based Learning

a. Syntax 2: organizing students to follow the learning

In this syntax, students are guided by the teacher in managing learning tasks that are relevant to the problems presented in the interactive learning media. Students are divided into five groups with four members in each group. Interactive learning media facilitates interaction between media and students in managing tasks in groups.

Figure 4. Interactive Learning Media Display Syntax 2 Problem Based Learning

b. Syntax 3: facilitating individual and group inquiry

In syntax three, students gather appropriate information to implement the experiment and find solutions to the problems that have been presented in the previous syntax. Students record various findings such as concepts, formulas, images of rhombuses on interactive learning media so that they can solve the problems faced by Farhan.

Figure 5. Interactive Learning Media Display Syntax 3 Problem Based Learning

c. Syntax 4: develop and display work and present

In syntax four, students organize tasks in groups and prepare appropriate work products. Each group receives a group worksheet as a place to write down the results of the discussion which contains the solution to Farhan's problem and a new rhombus-shaped kite drawing. At this stage, students receive ample opportunities to interact with their peers and write answers based on the pure results of their discussions. The interactive learning media displays sounds and texts that indicate the time for group discussion to students.

Figure 6. Interactive Learning Media Display Syntax 4 Problem Based Learning

d. Syntax 5: analyze and evaluate the problem-solving process

In the implementation of syntax five, students receive teacher guidance in processing and evaluating problem solving. Students are directed to do the task according to the correct working procedure. In this stage the interactive learning media presents the correct working steps and results to overcome the problems experienced by Farhan.

Figure 7. Interactive Learning Media Display Syntax 5 Problem Based Learning

After the interactive learning media with problem-based learning approach was developed, the media entered the validation stage by media experts, material experts, and linguists. Based on the assessment of the validators, the interactive learning media received a percentage of 95% from media experts, 86.87% from material experts, and 82.5% from linguists. Then, researchers made product improvements based on suggestions and comments from experts.

Table 4. Interactive Learning Media Feasibility Validation Results

Nu	Validator	Percentage
1	Media	95%
2	Material	86,87%
3	Language	82,5%

The media feasibility test has gone through the validation stage by validators, including media experts, material experts, and linguists. The feasibility of learning media has been calculated by researchers according to the criteria described by (Sugiyono, 2016). The results showed that the validity of interactive learning media with a problem-based learning approach by media experts reached 95% with several indicators getting a score of 4, namely in the aspects of visual appearance, audio and video quality, and interactivity that researchers emphasize because these aspects are benchmarks in assessing the effectiveness of learning media feasibility on critical thinking skills. This is in line with the opinion of (Krismanja Hendra & Dani Hasan, 2021.,

Anggraini Dona, et al., 2025.) which states that the feasibility of learning media is highly dependent on the quality of visual, audio, video displays, and the level of interactivity because this can produce learning media that is attractive, effective, easy to learn, and can have a positive influence on student learning outcomes. In addition, there are suggestions as a form of revision of the developed product, namely the background design and font type are more varied so that the learning media attracts students' attention in understanding the teaching material contained in it.

Then, the material expert gave a percentage assessment of 86.87% with a score of 4 on the results of the assessment of the material completeness indicator, stimulating student curiosity, and the presentation of crucial learning. This is reinforced by (Lestari et al., 2025., Ningtyas & Rahmawati, 2023) the feasibility of the material is closely related to the completeness of the content, the effect of the material in stimulating student curiosity, and the way the presentation is coherent, interesting, and can be easily understood. There are suggestions as a form of revision from material experts is to display more clearly about the problems presented as learning topics so that students can easily understand the learning topics presented in the problems.

Meanwhile, linguists gave a percentage of 82.5% with an assessment score of 4 on the indicators of the suitability of the language used with the topic and the delivery of language in the media is easy to understand. As support, there is a statement from (Rihanah & Irma, 2022., Hikmah et al., 2022., Annisa et al., 2021) that the suitability of language and delivery in a learning media is the main thing in ensuring that the material can be understood properly, does not have double meaning, and minimizes misinterpretation so that media that meet these elements can be considered effective in the learning process. In addition, there are suggestions for improvement, namely the use of appropriate punctuation so that students can read using intonation, pauses, and understand the meaning of sentences clearly.

Based on the results of the feasibility assessment of interactive learning media with a problem-based learning approach, the percentage of media experts is 95%, material experts are 87.86%, and linguists are 82.5% so that the media developed has been validated and is in the “very feasible” category. Therefore, the media can be tested on students at school. This is in line with (Eka et al., 2022) who developed animated video learning media which obtained a percentage from media experts and material experts of 92.36% in the “very feasible” category. The results of this validation can be used as a consideration in using interactive media in the learning process.

IV. CONCLUSIONS AND SUGGESTIONS

Thus, it can be concluded that interactive learning media with a problem-based learning approach is very feasible to use. This is because the media developed by researchers in the media aspect can convey messages or information to students well equipped with visualization of images, sound, and writing that can spur students' enthusiasm for learning. In the material aspect, it is in accordance with the learning outcomes. Then, in terms of language aspects, it shows that the media is in accordance with EYD writing and the language used is in accordance with the level of student development.

Based on the assessment of the criteria for interactive learning media with a problem-based learning approach on the material of the area of the rhombus flat shape, it can be concluded that the media has met the important criteria, namely feasibility. Therefore, interactive learning media with a problem-based learning approach on the material of the area of the rhombus flat shape can be considered ready for use in learning activities. With this media, it is expected that students can more easily understand the material of flat area, especially rhombus.

Based on the results of the study, optimal results were obtained in the feasibility validation results. This practicality assessment can be considered as a reference for using this media as an intermediary between teachers and students in implementing wider learning so that the media can be used on a larger scale.

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