



Interactive Video Learning Media Based on the Problem Based Learning (PBL) Model in the Circulatory System

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Abstract

The use of interactive video media in learning plays an important role because it can increase active student engagement, provide a more meaningful learning experience, and facilitate the understanding of abstract concepts. In addition, the application of the Problem Based Learning (PBL) learning model is also effective in developing students' critical and collaborative thinking skills through contextual problem solving. The circulatory system material was chosen because this topic requires an understanding of complex concepts and is directly related to health and daily life. This study aims to develop interactive learning videos based on the PBL model for the science subject, focusing on the circulatory system topic for junior high school students. The development model used is Analysis, Design, Development, Implementation, Evaluation (ADDIE). Data were obtained through expert validation, observation, questionnaires, and limited trials. The validation results from media experts, material experts, and learning experts with a very valid category. The student response is categorized as very appropriate. Thus, the developed interactive video media is declared valid, practical, and effective in improving conceptual understanding and student learning motivation. This media can help students more easily understand the relationship between the circulatory system and everyday life.

Keywords: development; interactive; media; problem based learning (PBL); video

INTRODUCTION

Education is an effort to rise up for equality and increase the potential of students to achieve the desired quality of education (Ujud *et al.*, 2023; Priyanto, 2024). Education means nurturing and providing training (Purwanto 2021). These two words can be concluded that education can help students develop healthily, develop character, and acquire adequate knowledge and skills. Education is a lifelong process that helps individuals survive, grow, and adapt to various life challenges by continuously developing knowledge, values, character, and skills (Yuristia, 2021; Tatık & Ayçiçek, 2022). In this process, learning serves as a continuous activity in which individuals seek, acquire, and apply knowledge to improve their abilities and behaviors for future use (Utari & Ramadan, 2021; Putri *et al.*, 2023). The learning process is considered important when feedback occurs between teachers and students, and learning is considered successful when the majority of students are actively engaged physically, mentally, and socially. In this learning process, effective communication between students and teachers requires learning media.

Learning media is a method for overcoming various problems in the teaching process by not only solving instructional challenges but also providing students with comprehensive information and serving as a tool to facilitate effective teaching and learning (Rambe, 2019; Nurfadhillah *et al.*, 2021).

With media, students will be more motivated to learn, encouraging them to write, speak, and imagine. Thus, through learning media, the teaching and learning process can be made more effective and efficient, and good relationships between teachers and students can be established. Furthermore, media can play a role in overcoming boredom in class. One learning media that can be used in the teaching and learning process is interactive learning videos. Interactive learning video media is a video based learning aid designed to actively engage students during the learning process (Saputri & Fransisca, 2020; Sadewa *et al.*, 2022). Unlike conventional learning videos, interactive videos allow students to participate directly through various features such as quizzes, simulations, questions, multiple choice, or additional explanations that can be accessed by students.

Learning media can be utilized in science lessons in junior high schools. By utilizing appropriate learning media, complex concepts can be explained in a more engaging, interactive, and easily understood manner by students. One such topic in science learning is the human circulatory system. The circulatory system is an important topic in the science curriculum in junior high schools. This concept encompasses an understanding of the function and structure of the circulatory system, its components, and the processes that occur within it. However, learning about the circulatory system often faces challenges, such as a lack of student interest and difficulty in understanding abstract concepts. Conventional teaching methods, such as lectures and textbooks, are not always able to meet the diverse learning needs of students (Rahmatika *et al.*, 2020; Rusdi *et al.*, 2022).

The media developed is based on Problem Based Learning (PBL). This model is a sequence of teaching and learning activities that focus on solving real problems that occur in everyday life (Anggreni *et al.*, 2021; Handayani & Koeswanti, 2021; Pratiwi *et al.*, 2023). The selection of the PBL model is based on the need for more meaningful, interactive learning, and challenges students' critical thinking skills. Based on observations and interviews with science teachers, it is known that learning is still dominated by lecture methods and limited use of media such as PowerPoint and textbooks, so that students tend to be passive and have a poor understanding of abstract concepts in the circulatory system material. The PBL model was chosen because it is able to overcome these problems. Through a problem based approach, students are invited to actively participate in identifying, discussing, and solving real problems related to the circulatory system, for example in relation to body health and lifestyle. PBL requires students to think critically, work together in groups, and relate theory to everyday life.

Evidence from prior studies demonstrates that PBL-based interactive video media not only meet expert feasibility standards but also produce significant gains in students' motivation and learning outcomes, highlighting their effectiveness in supporting meaningful biology learning (Pulungan & Hasanah, 2022; Rahmasari & Syofyan, 2023). Building on these findings, the present study aims to further explore the role of learning media in the teaching and learning process by developing interactive learning video media. This media is designed to actively engage students in learning, thereby increasing their motivation and improving learning outcomes. Specifically, the purpose of this study is to develop interactive learning videos based on the Problem Based Learning (PBL) model for the science subject, focusing on the circulatory system topic for junior high school students.

METHODS

This study uses the Research and Development (R&D) method, a method and step for producing new products or developing and refining existing products to test their effectiveness and ensure they are accountable (Okpatrioka, 2023). The model used in this development research is the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) model. The ADDIE model was chosen because it provides systematic stages in designing, developing, and evaluating learning media so that the resulting product is valid, practical, and effective for use in the learning process. In the research stage, the researcher only reached the development stage. Due to time and cost constraints, the researcher wanted to develop an interactive video media based on problem-based learning for the science subject, subchapter on the human circulatory system for junior high school.

The research site included two schools which were Pekanbaru 22 Junior High School and Siak Hulu 4 Junior Hugh School. The sampling technique used was purposive sampling. Purposive sampling is a sampling technique used when researchers already have target individuals with characteristics that match their research (Turner, 2020). The schools were selected because they had implemented the Merdeka Curriculum and had the necessary facilities to support technology-based learning. The research sample consisted of 55 students of grade eight at each school. The sampling technique used was simple random sampling. Sampling members from the population is done randomly without paying attention to the strata in the population. Trials were conducted during the learning process to determine responses and the practicality of media use. The instruments used in this study were validation sheets from material experts, media experts, and learning experts, and a student response questionnaire.

The resulting product was validated by experts consisting of one material expert, one media expert, and three learning experts. Validation was conducted using a four-point Likert-scale assessment sheet, covering aspects of appearance, language, content, and ease of understanding. The experts' suggestions were used to refine the product until it achieved high feasibility for testing. The scoring criteria were assigned as follows: Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2, and Strongly Disagree (SD) = 1. Meanwhile, the total weighted values on the validation sheet filled out by the validator will be averaged to determine whether the developed video learning media is valid or not. Melissa & Imania (2022) states that the formula for descriptive validity level analysis is as follows:

$$V\alpha = \frac{TSe}{TSh} \times 100\%$$

$$Vme = \frac{TSe}{TSh} \times 100\%$$

$$Vp = \frac{TSe}{TSh} \times 100\%$$

$$Vs = \frac{TSe}{TSh} \times 100\%$$

Where: $V\alpha$ = material suitability validation; Vme = media suitability validation; Vp = learning feasibility validation; Vs = student validation; TSh = total maximum expected score; TSe = total empirical score obtained from the validation results.

RESULTS AND DISCUSSION

The validation of interactive video learning media, which is designed based on PBL model for the science subject, specifically the sub chapter on the circulatory system, was carried out by a team of five expert validators who provided detailed assessments according to their respective fields of expertise. This validation process aimed to ensure that the interactive video meets the standards of educational quality, content accuracy, media design, and pedagogical effectiveness suitable for junior high school. The feedback and scores provided by the experts were then systematically compiled and analyzed to determine the overall quality and feasibility of the media for classroom implementation. The results were expressed in percentage scores for each criterion, allowing for a comprehensive overview of the media's strengths and areas for improvement. These findings are summarized in Table 1.

Table 1. Validator assessment results

Validator	Average Percentage Before Revision (%)	Average Percentage After Revision (%)	Validity level
Media expert	84.44	90.30	Very valid
Subject matter expert	83.33	91.67	Very valid
Learning expert	80.83	91.94	Very valid

Validation using a validation sheet questionnaire instrument to determine the feasibility of the learning media to be used in learning by eighth grade junior high school students, which will be evaluated by experts against the interactive video learning media in the sub chapter on the circulatory system that has been developed. The results of the expert validation indicate that the developed learning media is included in the very valid category. The validation process by experts is important to ensure that learning media meets the appropriateness standards in terms of appearance, content, and language before implementation (Sugiharni 2018; Hidayati *et al.*, 2021). Furthermore, expert validation also serves to measure the extent to which the development product has met the learning objectives and user needs in the field (Safitri *et al.*, 2022; Okpatrioka 2023).

This learning media was validated twice to ensure the quality of the developed product. The first validation phase was the average percentage before the revision, as shown in the table above. This revision generated several inputs regarding appearance, content, and language. The second validation phase was the average percentage after the revision, as shown in the table above. After the revision, the developed media's feasibility score increased, as recommended by the validator. This multistep validation procedure is also used in other media development research because it has been proven to improve the quality of the resulting learning products (Pulungan & Hasanah, 2022; HL *et al.*, 2023). The repeated revision process at the validation stage is an important part of development research to ensure that learning media are truly appropriate, effective, and able to improve the quality of learning in the classroom (Handayani & Koeswanti, 2021; Istiqamah *et al.*, 2023).

Media experts assessed the display, programming, and readability aspects. Based on the expert assessment, the developed interactive video media achieved a score of 90.30%, which is considered very valid. In terms of display, the video is suitable for use in the learning process. The attractive learning media in terms of size, images, and color can attract students' attention, allowing them to observe and understand the material presented by the teacher, and making learning more enjoyable (Wulandari *et al.*, 2023; Wulandari *et al.*, 2024). Furthermore, a good media display design will simplify the process of conveying information and increase interaction between teachers and students, so that learning objectives are more easily achieved (Utari & Ramadan, 2021; Laurenza *et al.*, 2023; Bland *et al.*, 2024).

Validation by material experts was conducted on the content feasibility aspect of the video media development. Overall, the average assessment of material experts for all aspects was 91.67%, categorized as very valid. This indicates that the material included in the learning media is in accordance with the considerations and covers all the material or content of the lesson. The learning material must be relevant and related to the learning objectives and learning outcomes. The alignment between learning objectives and learning outcomes ensures their relevance to the intended curriculum objectives (Johnson *et al.*, 2020; Rokayah *et al.* 2025). In developing science learning media, ensuring alignment between the material content and the basic competencies is a key indicator of content validity and contributes to enhancing students' conceptual understanding, which requires incorporating field-based scientific data and student experiential involvement to ensure the material reflects authentic scientific contexts (Putri *et al.*, 2023; Rostikawati *et al.*, 2024; Al Khairina *et al.*, 2025).

Learning experts assessed the display layout, language, and readability aspects. Based on the expert assessment, all aspects achieved an average of 91.94% and had a very valid level of validity. The very valid qualification for this developed learning media indicates that the interactive video learning media developed complies with good and correct media layout, language aspects according to the Kamus Besar Bahasa Indonesia (KBBI)-the official dictionary of the Indonesian language, and readability. A good learning media is media with an attractive appearance, clear language, and organized presentation that makes it easier for students to understand the material (Sugiharni, 2018; Fauziah *et al.*, 2025). Well structured media not only makes it easier for students to understand the lesson content, but also helps teachers create an effective and interactive learning atmosphere (Rambe, 2019; Ulumi *et al.*, 2023).

This study used a sample of students who had already studied the subchapter on blood circulation. The validation instrument for students consisted of 32 statements, covering four aspects: appearance,

language, material, and benefits. These four aspects were selected for assessing the quality of learning media which states that good learning media must be assessed in terms of visual appearance, clarity of language, appropriateness of content to learning objectives, and its benefits in improving student motivation and learning outcomes (Sugiharni, 2018; Nurfadhillah *et al.*, 2021). Students were given the opportunity to view videos and interact directly during the trial. The results of the trial of the students' suitability for the developed interactive video learning media are presented in the following table.

Based on Table 2, which is the result of student responses to the interactive video media developed, it is known that the average student assessment of all statements is 87.105% with a qualification level of use of learning media is very good. This value indicates that the interactive video learning media based on PBL that was developed is able to meet students' learning needs comprehensively. From the aspect of appearance, it obtained a value of 87.025% with the category of very good because the visual design of the media is made attractive with a combination of colors, animation, and interactive navigation that makes it easier for students to understand the flow of the material. An attractive visual display can increase student focus and participation during learning. In terms of language, the score was 84.91%, categorized as good, due to the use of communicative sentences that are appropriate for junior high school students' understanding (Utari & Ramadan, 2021; Widiya *et al.*, 2021).

Table 2. Student response results

Assessment Aspects	Pekanbaru 22 Junior High School (%)	Siak Hulu 4 Junior High School (%)	Average (%)	Category
Appearance Aspect	90.30	83.75	87.025	Very good
Language Aspects	86.67	86.15	84.91	Good
Material Aspect	89.77	85.38	87.575	Very good
Benefit Aspects	88.96	85.92	87.425	Very good
Average	88.92	85.29	87.105	Very good

Clear and straightforward language helps students understand complex concepts, such as the circulatory system, and ensures that the learning media meet the primary requirement of being effective (Sugiharni, 2018; Hitasthana *et al.*, 2021). Furthermore, the material aspect received a score of 87.57%, categorized as very good, because the content presented aligns with students' learning outcomes and real life contexts. The relevance of the material to students' everyday experiences can also strengthen their conceptual understanding (Kervinen *et al.*, 2020; Putri *et al.*, 2023). The relevance of the material to students' everyday experiences can strengthen their conceptual understanding. Meanwhile, in terms of benefits, the media received a score of 87.42%, categorized as very good, indicating that it is very helpful in increasing students' motivation and understanding of learning. Interesting media can foster students' interest in learning, encourage active participation, and improve learning outcomes (Nurrita 2022; Siregar *et al.*, 2022).

The details of the average percentage of assessments for the overall statements of each school are Pekanbaru 22 Junior High School with a percentage of 88.92%. This value indicates that students responded very good to the use of interactive videos on the blood circulation submaterial. Siak Hulu 4 Junior High School with a percentage of 85.29%. This value indicates that students responded very good to the use of interactive videos on the blood circulation submaterial. These figures suggest that when media are aligned with student learning preferences and share real life context, engagement increases significantly. Prior research has shown that well designed interactive media on circulatory system topics result in high student response rates and improved understanding (Wardani & Syofyan, 2018; Mujahidah & Sulistiyawati, 2022). Building on these findings, further research could explore how different types of interactive media such as simulations, games, or augmented reality affect students' motivation and long-term retention in biology learning.

Overall, the results indicate that the developed PBL based interactive video learning media is not only feasible but also highly effective in supporting students' understanding of the circulatory system. The consistently high scores across various aspects appearance, language, material, and benefits

demonstrate that integrating engaging visuals, clear language, and contextually relevant content can create a meaningful learning experience. These findings reinforce the importance of designing instructional media that are both pedagogically sound and responsive to students' needs and characteristics. Therefore, the developed media has strong potential to be implemented more widely in science learning to enhance students' conceptual mastery, motivation, and active engagement. This interactive video media can be used by teachers as an innovative alternative in science learning, especially on the circulatory system material to increase learning motivation, improve student learning outcomes and active student involvement.

CONCLUSION

The interactive video learning media based on Problem Based Learning (PBL) for the science subject, sub chapter of the circulatory system for junior high school, was declared very valid, practical, and effective. The validation results from media experts, material experts, and learning experts after revisions from the validator showed a very valid category. Student response trials were conducted in two schools are obtaining the very good category. Thus, this media is able to improve conceptual understanding, motivate students to learn, and facilitate teachers in delivering material and managing the class. In a broader context, this research contributes to strengthening the implementation of the national curriculum by promoting innovative and student-centered learning practices. Furthermore, it supports the national education goals of enhancing digital literacy and ensuring equitable access to high-quality learning media across schools in Indonesia.

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