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INCREASING SCIENCE LEARNING MOTIVATION IN ELEMENTARY SCHOOLS: INNOVATION WITH INTERACTIVE LEARNING VIDEOS BASED ON PROBLEM BASED LEARNING

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ABSTRACT

The problem found in fourth grade is that the learning process tends to only use the lecture method so that students are not motivated to learn because it tends to be boring. In addition, the use of learning media is not optimal. This development research has objectives, namely to: (1) describe the design of PBL-based interactive learning video media, (2) find out the acceptability of PBL-based interactive learning video media, (3) find out the effectiveness of the application of PBL-based interactive learning video media used to increase IPAS learning motivation of grade IV elementary school students. This development research uses the ADDIE model, there are five stages, namely: (1) analysis, (2) design, (3) development, (4) implementation, and (5) evaluation. Data collection method with document study and questionnaire. The instrument used to collect data is a questionnaire guideline. The effectiveness of the model was tested through an experiment involving control and experimental groups, where pre-tests and post-tests were used to measure differences in student learning motivation before and after the application of learning media. The results showed that: (1) this study has succeeded in producing PBL-based interactive learning video media that ensures a more interactive and engaging learning experience, particularly suited for fostering problem-solving skills in science education of grade IV elementary school students. (2) media acceptability validation index of 0.944 with very high predicate / qualification; (3) the significance value (2-tailed) in the correlated t-test shows a number of <0.001, smaller than 0.05 (significance level of 5%). In conclusion PBL-based interactive learning video media is effectively used to increase IPAS learning motivation of grade IV elementary school students.

Keywords: interactive learning videos, problem based learning, science learning motivation

INTRODUCTION

Education is a very important and inseparable main thing in human life to determine a nation's progress. In general, education is a life process in developing each individual so that they can live and survive. In Indonesian National Education in accordance with law no. 23 of 2003, namely that education aims to develop students into human beings who have faith and devotion to God Almighty, have noble character, are healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens (Soedarto et al., 2021; Sujana, 2019). Meanwhile, the aim of providing education in elementary schools is to form attitudes and abilities, provide basic knowledge and skills that will be needed in life in society and also prepare students for further education (Albro & Turner, 2019; Dipuja et al., 2018). Education is not only seen as an effort to provide information and develop skills, but is also expanded to include efforts to realize individual needs and abilities so that a satisfactory personal and social lifestyle can be achieved (Adijaya et al., 2023; I. W. Widiana et al., 2024). The educational goal to be achieved is of course

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to produce graduates who have good character within themselves.

Along with the times, the development of Science and Technology (IPTEK) is increasingly rapid from time to time. The development of science and technology has resulted in competition in various fields of life because the development of science and technology has been very rapid in various fields, one of which is in the field of education (Fu et al., 2022; Uygun, 2018). The development of science and technology certainly has a huge influence on human life (Aurum & Surjono, 2021; Makarova & Makarova, 2018). In the field of education, of course there are changes, namely the change from the conventional era to the digital information space so that it becomes a new challenge for all professions, one of which is teachers, along with the development of science and technology, there is a lack of ability to master technology (Costantino & Bonati, 2014; Qi et al., 2021). Since the development of science and technology, especially in the field of education, it is expected that a teacher must be able to manage technology and information that is more useful and can support the learning process well (Stanojević et al., 2018; Turiman et al., 2012). Apart from being able to use the available tools, teachers must also be able to develop the available tools, teachers must also be able to develop skills in making teaching materials that will be used if these materials are not yet available. In order to realize this, it is necessary to increase the competence and creativity of teachers in teaching. Although various efforts have been made, there are still many teachers who are vulnerable to the development of technology in the world of education (Ayyakkannu, 2018; Chen & Chuang, 2021).

Regarding the new policy, namely the independent curriculum policy, Natural Sciences and Social Sciences (IPAS) is one of the scientific subjects prepared by combining scientific and social concepts taught in elementary schools (Puger et al., 2024; Zaqiyah & Sari, 2024). Natural Sciences has two elements (scientific and social), namely science which includes the interaction of living things and non-living things in the universe, and the interaction of human life as individual creatures and social creatures with their environment (I. M. Tegeh et al., 2020; I. W. Widiana et al., 2020). Natural Sciences is included in the elementary school curriculum of course because natural sciences are knowledge the basis of technology because science has an effort to arouse human interest and the ability to develop science and technology so that it becomes science that can be applied in everyday life (Kalogiannakis & Papadakis, 2019; Young et al., 2018). In learning science, students are expected to be able to act scientifically in solving problems they will face later.

Based on preliminary observations conducted in several elementary schools, it was found that students' academic achievement, particularly in science subjects, has not yet reached the expected outcomes. This observation involved 120 students from three different elementary schools, where data showed that more than 60% of the students scored below the Minimum Competency Criteria (KKM) means that they have low learning motivation. Upon further investigation, it was discovered that the primary factor contributing to low academic performance is not the students' intellectual ability, but rather their lack of motivation to learn. This was reinforced by interviews with several teachers, who revealed that students often appeared unenthusiastic during lessons, especially in science. Students tended to be passive and only engaged in learning when directed by the teacher, showing little initiative for independent learning.

These findings support the statement that low academic achievement is not solely due to a lack of ability but is largely influenced by the students' lack of motivation to learn (I Wayan Widiana et al., 2022; Williams et al., 2009). Motivation plays a crucial role in the learning process, as motivated students are more likely to exert effort and effectively direct their abilities. Without adequate motivation, students will not be able to learn effectively, ultimately leading to suboptimal learning outcomes. The current science learning process in elementary schools seems to be ineffective in enhancing students' learning motivation (Miller & Krajcik, 2019; Qodr et al., 2021). As a result, the learning outcomes have not yet reached their optimal potential. Therefore, a more focused approach is needed to improve students' motivation in learning science, which in turn can enhance their academic performance.

The learning process so far has often not used learning that applies analysis and problem solving (Fariji, 2019; Tyas, 2021). Currently, the process of learning science in schools tends to still use lecture methods and the use of non-interactive media, which makes students passive. This causes a lack of student involvement or limited learning media that do not interest them.

Low learning motivation in science learning can be overcome with a Problem-Based Learning approach that directs students to play an active role in solving problems. This learning

model is used to stimulate the ability to analyze and solve problems, one of which is the learning model Problem Based Learning (C. S. Lai et al., 2021; Yu & Shen, 2022).

Advances in technology and information allow teachers to choose various media that support the delivery of material. The use of media in learning is expected to be able to optimize learning activities. Learning media plays an important role in the learning process. This interactive learning video has the function of clarifying the presentation of material, overcoming limitations of space, time and sensory power, and can make students more active in the learning process (Rasheed et al., 2020; Sudirtha et al., 2022; I. W. Widiana et al., 2023). Using this interactive learning video media can certainly increase students' motivation and enthusiasm during the learning process (Qodr et al., 2021; Triana et al., 2021).

Based on the problems described above and in accordance with the needs of teachers and students, it is urgent to ensure that the objectives of science subjects, especially in the field of Natural Sciences (IPA), are achieved optimally. This requires the use of learning media and models that can create effective, engaging, and meaningful learning experiences (Hanif, 2020; Ritter et al., 2019). The aim of this study is to development video-based interactive learning media problem based learning to increase science and science learning motivation for fourth grade elementary school students.

METHODS

This research uses research and development methods (Research and development). This development research uses the ADDIE model. The ADDIE model was chosen because its development stages are suitable for use in developing interactive video-based learning media Problem Based Learning. The ADDIE development model is a development model that has systematic steps, this model is developed programmatically with systematic activity stages in an effort to solve problems related to learning resources that suit the needs and characteristics of students (I Made Tegeh & Kirna, 2013). The ADDIE model consists of 5 stages, namely (1) analyze (analysis), (2) design (planning), (3) development (development), (4) implementation (implementation), and (5) evaluation (evaluation). The visualization of ADDIE model is show in Figure 1.

The first stage, namely the analysis stage (analyze), at this stage there are three things that are analyzed, namely identifying the needs of students and teachers in the learning process, content or materials, and school facilities. This analysis stage was carried out after interviews and observations were carried out at SD Negeri 4 Suwug, especially in class IV. The obstacles experienced by students during the learning process in class are the lack of variety in learning activities, in learning they tend to only apply the lecture method and only occasionally use media. The facilities at SD Negeri 4 Suwug can also be used to support the use of learning media, namely projectors, LCDs, Speaker, Chromebook, and textbooks. Based on the results of this analysis, learning media is needed to increase students› learning motivation in the learning process. It is very important to use learning media to support and facilitate students› needs to obtain optimal learning, especially in the science and science lesson content, namely regarding plant body parts and their functions. So the learning media is in the form of interactive video-based learning Problem Based Learning can be developed and continued at the next stage.

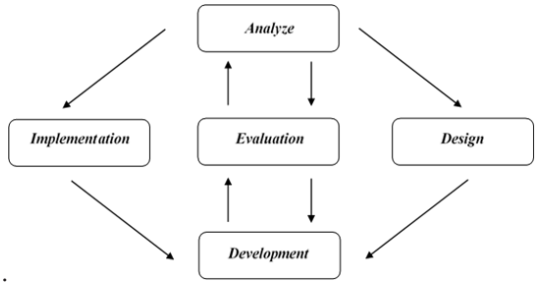

Figure 1. ADDIE Model Chart

The second stage, namely the design stage (design). At this stage, it is necessary to prepare material that will later be used in the media. Determining the software (software) used in making this learning video is an application Canva and Lumi Education, followed by designing a sketch or storyboard from video-based interactive learning media Problem Based Learning. In creating media using several applications such as Canva and Lumi Education. Application Canva Use it to create animated designs, add materials and audio to applications Lumi Education used to add interactive features to the video being developed. After creating the media, the next step is to provide media guidance to the supervising lecturer to provide suggestions and input aimed at finding out whether the media being developed can be continued to the next stage. The next stage is the preparation of the instrument. There

is a stage of preparing this instrument using an instrument in the form of a questionnaire/ questionnaire.

The third stage, the development stage (development) which at this stage is the submission of interactive video-based learning media Problem Based Learning which has been developed for experts to be assessed or reviewed using questionnaires. Then, after reviewing it, it will be used to improve the interactive video-based learning media Problem Based Learning which has been developed to be better.

The fourth stage, namely the implementation stage (implementation), at this implementation stage interactive learning videos are based Problem Based Learning what is developed is applied to learning. The media developed can be accessed and used well by research subjects, without any significant technical obstacles. The test instrument used in the effectiveness test, this research employed a pre-test and post-test design to measure the impact of the Problem-Based Learning (PBL)-based interactive video on students› learning motivation. Specifically, the learning motivation questionnaire was the main instrument used for data collection. It consisted of items designed to assess five indicators of student motivation: desire to start learning, interest in learning activities, enjoyment of learning, prioritization of learning, and persistence over time. The questionnaire was administered to both the experimental group (who received the PBL-based interactive video) and the control group (who did not receive the intervention / conventional method), allowing for a comparison of results to determine the video's effectiveness. Regarding the research subjects, the study involved fourth-grade students from SD Negeri 4 Suwug. There were 17 students in the experimental group and 18 students in the control group, selected randomly from this school. The focus was on evaluating whether the use of interactive videos could enhance the students› motivation to learn, particularly in science subjects. The product trial design can be seen in the following image.

The fifth stage, namely an evaluation (evaluation) by processing the data that has been collected. In this research, the evaluation carried out was an evaluation of interactive video-based learning media Problem Based Learning that has been produced. Evaluation is carried out to measure the acceptability and effectiveness of the media. At this evaluation stage, input is also provided on the media development and conclusions are drawn regarding the effectiveness of the media being developed. With that, you can find out the shortcomings of the media being developed.

Data collection in this research was carried out using document recording methods and questionnaires. The document recording method is a data collection method by collecting and analyzing documents, both written and images, work results and electronic devices (Piscayanti, 2014). Meanwhile, the questionnaire method is a data collection method that is carried out by asking a number of written questions to obtain information on respondents or research subjects.

The instruments used in collecting research data are; questionnaire sheet. The questionnaire sheet is in the form of a written statement sheet containing statements by respondents to test acceptance and motivation to learn. The instrument grid for media acceptance and learning motivation can be presented in Table 1.

Table 1. Media Acceptance Instrument Grid

Aspect	Indicator
Usage (*Utility)*	The use of media for teachers. Uses of media for students. The use of media to improve learning outcomes. The use of media to improve learning outcomes.
Qualifications) (*Feasibility)*	Attractiveness of media appearance. Cheap procurement costs. Does not contain pornographic elements. Does not contain elements of discrimination. Does not contain elements that cause division among the community. The language used is easy to understand. Ease of media use. Ease of accessing media.
Accuracy (*Accuracy)*	Suitability to student character. Suitability of media to learning objectives. Suitability of media to learning material.

Source: (Nugraha & Widiana, 2021)

Table 1 shows the instrument grid that will be used to assess the developed media. The instrument contains three aspects consisting of usage, qualification, and accuracy, each of which has its own indicators. Then, in order to measure

student learning motivation using the instrument as shown in table 2.

Table 2. Learning Motivation Instrument Grid

Indicator	Number of Items	
	Favorable	*Unfavorable*
There is a desire or encouragement to start learning.	2	1
Interested in learning activities.	2	1
Enjoy learning activities.	2	1
Prioritize learning activities among other activities.	2	1
Persist over a long period of time or the time it takes to learn.	2	1

Source: (Rubini et al., 2018)

Table 1 shows the instrument grid that will be used to assess the students› learning motivation. The instrument contains five aspects that are visualized into fifteen item statements.

This development research uses two data analysis methods, namely qualitative descriptive analysis and quantitative descriptive analysis. The qualitative descriptive analysis method is a way of processing data by arranging words systematically. In this research, descriptive data is in the form of written or spoken words in sentence form so that a general conclusion can be found (Suryantoro & Kusdyana, 2020). This qualitative descriptive analysis technique is used to process data resulting from media acceptance expert reviews. Meanwhile, quantitative descriptive analysis is a method of processing data that is carried out regarding the object under study with a systematic arrangement in the form of numbers or percentages so as to obtain a general conclusion (Sugiyono, 2013). In quantitative statistical analysis there is inferential analysis, which is used to test, interpret and determine conclusions based on data obtained from samples that possibly represent the characteristics of the same population being studied. This quantitative descriptive analysis technique is used to process data obtained through questionnaires. There are several quantitative data analyzes carried out in this research, namely media acceptance analysis and media effectiveness analysis. Media acceptance analysis uses the Aiken validity formula. In this research, the development of inferential statistical analysis was used to determine the results of the level of effectiveness of the product for developing interactive video learning media based on Problem Based Learning to increase the science and science learning motivation of fourth grade elementary school students before and after using the product. Data was collected using tests, namely pre-test and post-test.

Hypothesis testing is carried out using the t-test. Before carrying out the t-test, the prerequisite tests are first carried out, namely normality and homogeneity. Based on the normality test criteria, data is normally distributed if the resulting significant number is greater than 0.05. This shows that the data distribution in all analysis units is normally distributed. Meanwhile, the homogeneity of variance test show that two or more groups of sample data come from populations that have the same variation. The hypotheses reviewed in this development research are: H_1 : Interactive Learning Video Media based on Problem Based Learning is effectively used to increase the science and science learning motivation of class IV elementary school students.

RESULTS AND DISCUSSION

The results of this development produce products in the form of interactive video-based learning Problem Based Learning. Development of interactive video-based learning Problem Based Learning This has gone through several trials such as media acceptance validity tests and effectiveness tests. The video media display is based on interactive learning videos Problem Based Learning can be seen in Figure 2.

Figure 2. Interactive video-based learning media Problem Based Learning

Figure 2 shows the cover or beginning of the Interactive video-based learning media problem based learning. The selected material is plant parts and their functions. This video-based media

is also equipped with teaching materials, practice questions, and other activities to support the learning process.

The developed media was then tested by media experts, these experts were educational technology specialists and science educators with significant experience in both creating and implementing instructional materials. The results of which are shown in Table 3.

Table 3. Acceptance Test Results for Video-Based Interactive Learning Media Problem Based Learning

Acceptance Test Assessment				n(c-1)	IN	Is.
I	II	III	IV			
60	58	55	57	180	0.944	Very High Validity

Based on the results of media acceptance validity tests carried out by media experts, a validity index result of 0.944 was obtained with very high qualifications. With very high validity, the product developed is suitable for application in the learning process in science lessons. Based on the results of the validity of media acceptance, the learning video product receives suggestions, input and comments which will then be used as a reference for consideration for revising the product for the perfection of the product being developed.

Then continue with an experimental test to test the effectiveness of the previously designed learning media. Test the effectiveness of video-based interactive learning media development products Problem Based Learning In this study, it was measured using questionnaire / questionnaire sheet for experimental class students totaling 17 class IV students at SD Negeri 4 Suwug. The learning motivation questionnaire is given via pre-test and post-test. Based on value pre-test and post-test then a t-test is carried out for correlated samples.

Table 4. Independent Samples t Test Results for Learning Motivation

Independent Samples Test					
Levene's Test for Equality of Variances		t-test for Equality of Means			
F	Say.	t	df	Say. (2-taile)	Mean Difference
1.638	0.210	7.201	33	<0,000	5.614
		7.250	32.036	<0,000	5.614

Based on the table 4, the probability value (p) of the t test is obtained equal variances assumed Sig. (2-tailed) of <0.001. Probability value (p) < 0.05, so H_1 accepted. This shows that interactive learning video media is based Problem Based Learning effectively used to increase the science and science learning motivation of fourth grade elementary school students.

The design of this development product is in the form of interactive video-based learning media Problem Based Learning in the IPAS content, material on plant body parts and their functions. Design and development of interactive video-based learning media Problem Based Learning made according to the ADDIE development model. The five stages of the ADDIE development model are analysis (analyze), planning (design), development (development), implementation (implementation), and evaluation (evaluation). This learning media is different from other learning media because this learning media combines two types of learning media, namely audio and visual which are packaged in the form of interactive learning video media where students can interact directly with the media. Interactive video-based learning media Problem Based Learning can be accessed on the link or html. This media is designed using an application, namely application assistance Canva and Lumi Education. The designs in this media are of course made attractively and cover the material in detail. This media display contains several sections such as the initial display which contains the cover, learning objectives, and problems solved by students. Then the material display contains a detailed discussion of the material regarding plant body parts and their functions, complete with illustrations such as pictures that can help realize students' understanding through these pictures. There is also a quiz section which contains several questions that can be answered directly with interactive features. The final part contains the closing.

This interactive learning video media has the advantage of providing direct interaction features, such as interactive quizzes which allow students to test their understanding directly which can help in measuring students' understanding and providing feedback. Interactive learning videos can be accessed from various devices, such as computers, cellphones (Dudu & Vhurumuku, 2012; Vartiainen et al., 2016). Apart from that, interactive learning video media can be used as a source of the same information for students who work in groups or individually in the PBL approach. They can watch videos together, discuss, and

work together to solve a given problem.

Even though interactive video learning media has a number of advantages, there are several disadvantages that need to be considered in this media, namely that using interactive video media requires stable internet access. In areas that have slow or unstable internet connections, using this media can be difficult or even impossible to use.

In developing a media, the acceptability of the media must be appropriate and able to achieve learning objectives. Innovative learning media, such as technology-based learning media, can increase user acceptance, because it can help students understand teaching material better. Lai et al. (2020) state acceptance of learning media is a positive perception or satisfaction with the use of media in the learning process. The acceptability of this media can be determined by several indicators that are assessed, namely, usefulness (Utility), qualifications (Feasibility), and accuracy (Accuracy). The results of the acceptance test (Acceptability) The revised media obtained a media acceptance validity index of 0.944 with very high qualifications and it was stated that the media based on interactive learning videos was acceptable. Problem Based Learning it has been very well continued and implemented.

The effectiveness of developing interactive video-based learning media Problem Based Learning using the questionnaire/questionnaire method, it is measured based on the results obtained from pre-test and post-test which was given to 17 class IV students at SD Negeri 4 Suwug and 18 class IV students at SD Negeri 3 Suwug. This effectiveness can be seen from the results of the analysis carried out through the independent samples t test with the help of IBM SPSS Statistics 29.0 for Windows. Results pre-test which is given before the application of learning video media and post-test which was given after the application of learning video media to all 17 students in class IV of SD Negeri 4 Suwug. Based on the results pretest the total score obtained by the experimental class students was 1115 and for the control class it was 1187 then the results obtained after posttest for the experimental class it was 1312 and for the control class it was 1287. Changes in the students' total scores at pre-test and post-test shows an increase.

Learning syntax Problem Based Learning implemented through five syntaxes (Ertmer & Simons, 2006). The first syntax is to orient students to the problem, students are involved in solving the chosen problem. Second, organizing students in learning activities. Third, guide individual or group investigations. Fourth, develop and present the results of the work. Fifth, analyze and evaluate the problem solving process. Based on learning syntax Problem Based Learning. Accordingly, there are three stages which directly have stages or syntax on science learning motivation. First, through syntax, it orients students to the problem. Through this syntax, it encourages students to have the desire and encouragement to learn, where this syntax allows students to be involved in problem solving (Coker et al., 2018; Lasamahu et al., 2021). Second, through the syntax of organizing students in learning activities, through this syntax students have an interest in an activity in learning and prioritize learning activities where in this syntax students are given a task related to the problem that must be solved. Third, guiding individual or group investigations where in this syntax students enjoy a learning activity, an interactive learning video media is displayed to get explanations and solutions to the problem (Kibirige & Teffo, 2014; Kolesnikov et al., 2019). By learning using interactive learning video media, students certainly enjoy learning and it is not boring.

Empirically, the results of this research are supported by previous research conducted which states that interactive learning video media based on Problem Based Learning can increase students' learning motivation (Wastiti, 2022). According to research conducted state this video media can increase students' learning motivation in learning activities because they can listen and see pictures (Asokan et al., 2019). Video media has the ability to present information, explain complex concepts, explain processes, teach skills, shorten or lengthen time, and can influence attitudes. By developing video media in learning activities, it can increase students' learning motivation, especially students' motivation in participating in learning activities in class.

CONCLUSION

This study successfully developed and tested interactive video-based learning media using the Problem-Based Learning (PBL) model to enhance science learning motivation among fourth-grade elementary school students. The development followed the ADDIE model and achieved a high acceptability index of 0.944, demonstrating the media's suitability for classroom use. Experimental tests, comparing pre-test and post-test scores, revealed a significant increase in student motivation, supported by a t-test result with a p-value < 0.001. Despite the limitation of requiring stable internet access, the study provides valuable evidence on the effectiveness of technology-en-

hanced learning tools in boosting student motivation. The findings align with previous research, affirming that interactive, problem-based media can effectively address low student motivation in science learning and improve overall learning outcomes.

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