Journal of Primary Education
10 (1) (2021) : 64 – 74

https://journal.unnes.ac.id/sju/index.php/jpe/article/view/34028

Learning Motivation and Students' Critical Thinking Ability in Science Learning through a Problem Based Learning Model Assisted by Video Media

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Article Info

History Articles
Received:
July 2019
Accepted:
August 2019
Published:
April 2021

Keywords:
critical thinking ability,
learning motivation,
media video,
PBL model

DOI
https://doi.org/10.15294/jpe.v10i1.34028

Abstract

This study purpose of determining the effectiveness of PBL learning models assisted by video media on learning motivation and students 'critical thinking ability, determine the correlation between learning motivation and students' critical thinking ability. This research is an experimental research with quasi-experimental design in the form of one-group pre-test – post-test. The research subjects were 63 students of fifth grade in Public Elementary School Danareja 02 and Public Elementary School Cilongok 02 Balapulang, Tegal in the 2018/2019 academic year. Data collected by questionnaire, test, interview, documentation, and observation. Learning motivation scores are obtained by learning motivation questionnaires and critical thinking ability by test. Data of motivation and critical thinking are analyzed quantitatively by completeness test, N-Gain test, and correlation test between learning motivation and critical thinking ability. The results showed that science learning through PBL learning models assisted by video media effective to increase learning motivation and critical thinking ability on experimental class students. The result of the learning motivation N-Gain test is 0.56 medium criteria and result of the critical thinking ability N-Gain test is 0.54 medium criteria; there is a correlation between students' motivation and critical thinking ability. Learning motivation affects critical thinking ability by 34.9%, while the remaining 65.1% caused by other factors.

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p-ISSN 2252-6404
e-ISSN 2502-4515

INTRODUCTION

Education in the 21st century is a future-oriented education. Education is demanded to be relevant to the needs of the people who are always developing due to advances in science and technology. One of the tools in education as a response to the progress of the current era is the Curriculum 2013. The implementation of Curriculum 2013 aims to provide meaningful learning experiences by developing various attitudes, knowledge, and skills, especially through science learning. Science learning in Curriculum 2013 is applicative oriented, development of thinking ability, learning ability, curiosity, and the development of caring and responsible attitudes towards the natural and social environment.

Natural science learning achievements based on the 2015 Trends in Mathematics and Science Study (TIMSS) survey by the International Association for the Evaluation of Educational Achievement (IEA) in Indonesia ranks 45th out of 48 countries with an average rating of 397 (IEA, 2016). The science ability of Indonesian students is below the grade point average (500) and is generally at the lowest stage or what is known as the low international benchmark.

The scientific ability of Indonesian students is also evident in the International Program for International Student Assessment (PISA) study conducted by the Organization for Economic Cooperation and Development (OECD) every three years. Indonesia's achievements in the 2015 PISA study on the aspect of scientific literacy are at the bottom. Indonesia's ranking has increased in science competencies, with an average score of 403 (Ministry of Education and Culture, 2016). This increase lifted Indonesia's position jumped six levels up in 2015 from the last position 2 in 2012. Indonesia is included in the lower category countries in achieving PISA studies despite an increase. The results of the TIMSS and PISA surveys that have been reviewed can be as the indication that Indonesian students' natural science learning achievement is relatively low.

Human Development Index (HDI) in Tegal Regency in 2013 according to the Central Statistics Agency (BPS) in Central Java was ranked 27th out of 35 districts/cities in Central Java. The HDI of Tegal Regency in 2016 was 65.84, and in 2017 it was 66.44 so that it increased by 0.60 points (BPS of Tegal Regency, 2018). HDI viewed from the level of welfare, health, and education. The level of welfare in Tegal Regency ranks 10th; the health and education level is in the 5th lowest position Index.

The low learning achievement of students in Indonesia, especially in Tegal Regency, one of which is caused by the quality of teachers in implementing learning, students' ability to learn, and school facilities that do not support learning activities. The learning that was carried out was also still dominated by the teacher (teacher-centered) by giving lectures and giving exercises, even though the curriculum applied was already referring to contextual and meaningful learning. Students are less motivated during the learning process. Students have difficulty when they have to apply the concepts they know to problems in real life.

Learning in schools should apply contextual, discovery, and meaningful learning to achieve learning goals. Learning with discovery or laboratory activities is limited to carrying out the steps of the activity according to the worksheet used. Students are not allowed to experiment according to their ideas and knowledge, so the learning process becomes less interesting and less meaningful. Students are not accustomed to being trained to actively think critically namely to think full of skills in making understanding or concept, applying, analyzing, making a synthesis, and evaluating where all the activities are based on observations, experiences, thoughts, considerations, and communication, which will guide in determining attitude and action.

Internal factors, namely learning motivation, can influence the success of students in learning. Motivation becomes a driving force in students to carry out learning activities so that they can achieve the expected goals (Palupi, 2014). Student motivation in the learning process

can be seen from student behavior when learning (Bakar, 2014). Students who have high learning motivation will be diligent in doing assignments, resilient in facing difficulties, showing interest in various problems, preferring to work independently, and not getting bored in doing assignments.

Motivation has a large role in improving learning outcomes. The higher the motivation of a person, the higher the intensity of the effort and effort made in learning, so that the ability to think critically as one of the learning outcomes will increase.

Science learning that is carried out in elementary schools should develop students' thinking abilities towards higher-order thinking abilities such as critical thinking, reasoning, reflective, and science process skills. Scriven, and Paul (2013) explained that critical thinking is important because it can improve the quality of thinking for an individual to skillfully analyze, assess, and reconstruct what students think to solve problems. The science learning process can foster student confidence, curiosity, build knowledge, and develop the students' way of thinking and reasoning.

Based on the opinions of several experts, it is concluded that the ability to think critically is the ability of students to solve problems and decision making (conclusions) from various aspects and points of view. Critical thinking provides the environment and activities for students to improve their cognitive abilities. The ability to think critically is an important intellectual capital owned by students when dealing with problems in daily life.

The observations in grade V Public Elementary School Danareja 02 and Public Elementary School Cilongok 02 Balapulang District Tegal Regency, found several problems that came from students and teachers. Student problems include students who tend to be passive, lack concentration, pay less attention to the teacher's explanation, dare not ask questions and answer questions verbally, are less motivated when learning, and have not been able to solve problems properly. These problems indicated that students' critical thinking ability was also still relatively low.

Based on the results of interviews with the fifth-grade teachers of Public Elementary School Danareja 02 and Public Elementary School Cilongok 02, information was obtained that the students who were studying at the elementary school did not yet have high learning awareness, especially demanding general knowledge. Student learning motivation is low for learning general knowledge because students prioritize studying religion. Communities in the area around elementary schools make the learning in schools a means for their children not to play in the morning.

The learning that was carried out was already good. However, the low motivation of student learning has caused the difficulty of students in developing the critical thinking ability of students. The learning carried out also did not use a learning instrument that supports the development of students' critical thinking ability. The methods and models used were limited to lecture and assignment methods. The learning model should be able to provide the widest possible space for students to increase their learning motivation and develop their abilities.

Student-centered learning and involving students actively in solving learning problems will increase student motivation. Problem Based Learning (PBL) is a learning model that actively involves students by applying a variety of learning methods, namely lectures, discussions, and practicum. PBL is a learning model that uses real problems encountered in the environment as a basis for gaining knowledge and concepts through critical thinking skills and problem-solving (Fakhriyah, 2014).

Problem-based learning, according to Vasconcelos (2011) is recognized as an inquiry activity that can foster students' curiosity more deeply towards the problem at hand. The problem that becomes the starting point for learning is unstructured (Chin, and Chia, 2004). The problem serves as a stimulus so that students are more motivated in learning (Sahin, 2010), so that student learning activities will increase.

Abidin (2014) stated that the PBL model has the following advantages: (1) able to develop student learning motivation, (2) encourage students to be able to think at a high level, (3) encouraging students to optimize their metachogical abilities, and (4) creating meaningful learning so as to encourage students to have high self confidence and be able to learn independently. This opinion is supported by the results of studies on the application of PBL, which have an impact on increasing student motivation and critical thinking ability. Research Susilo (2012) showed that the Problem Based Science learning instrument was able to increase students' motivation and critical thinking ability. Research Nugraha, Suyitno, and Susilaningsih (2017) shows that the critical thinking ability of fifth-grade elementary school students has increased after learning using PBL models with outdoor learning. Critical thinking ability also has a strong relationship with science process skills and are very strong with student motivation.

The implementation of the PBL model with the help of video media to attract students' interests and support the learning process. Video media, including audio-visual media, is a medium that combines two materials, namely visual and audio material. The use of audio-visual media as a teaching aid or aid in teaching and learning activities will provide audio and visual experience. Audio-visual media such as films or videos can present messages that are informative, factual, or fictitious.

Video media is used to convey concepts, ideas, and experiences to students so that they can encourage motivation to learn, clarify, and facilitate complex and abstract concepts. Video media in learning can improve critical thinking and encourage students to build new knowledge independently (Prijanto, 2017). According to Gowasa, Harahap, and Suyanti (2019) learning through video, media can improve students 'high-level thinking skills since the retention of students' memories will be better by using video media.

Video media has its attraction and motivates students to learn because the shows that are displayed on the video can attract the stimulation of the stimulus (stimulus) students to listen more deeply. Sidi, and Mukminan (2016) explained that PBL learning combined with video media is useful to motivate students, to improve learning outcomes achieved in the form of knowledge (cognitive), attitude (affective), and skills (psychomotor). Susilowati (2018) showed that the implementation of the problem-based learning models assisted by audio-visual media could improve students' critical thinking ability.

This study was intended to determine the effectiveness of PBL learning models assisted by video media on the learning motivation and students 'thinking abilities and determine the correlation between the learning motivation and students' critical thinking ability in science learning through PBL models assisted by video media.

METHODS

This study was conducted in grade V SD Danareja 02 and SD Cilongok 02 Balapulang District Tegal Regency. The study was conducted on April-May 2019. The population in this study were all of the fifth-grade students in the RA Kartini Cluster Balapulang District Tegal Regency. The sample in this study was taken using a non-probability sampling technique, taking subjects where each object of the research taken did not have the same opportunity to be the subject of the research. The sampling technique used in this study was the type of non-probability sampling which is in the form of purposive sampling due to certain considerations dan purposes, which are (1) Public Elementary School Danareja 02 and Public Elementary School Cilongok 02 Balapulang, Tegal has implemented Curriculum 2013, (2) The problems faced are relatively the same, (3) The ability of fifth grade students are relatively the same, and (4) Academic qualifications of fifth grade teachers have S1 degrees, civil servants, have participated in Teacher Professional Education activities and passed certification

This study was a quantitative research with the experimental method. Quantitative research was used to analyze the increase of the students'

motivation and critical thinking ability in science learning through video-assisted PBL models. The design of the experimental method used was quasi-experimental (quasi-experimental) with one-group pre-test – post-test design.

This research using a one-group pre-test – post-test design does not use a comparison class but has used a preliminary test so that the magnitude of the effect or effect of using a video-assisted PBL model can be known with certainty. The research subjects in this study were first given a pre-test to find out the extent of the students' initial abilities before being given science learning through video-assisted PBL models. After being given the preliminary test, then the students were given the treatment of learning science through a video-assisted PBL model. After students were given treatment, then students were given a final test (post-test) to find out the extent of the effect of science learning through video-assisted PBL models on students' motivation and critical thinking ability.

The data collection instruments used questionnaire sheets, test questions, interview guidelines, documents, and observation sheets. The data collection techniques using test, questionnaires, interviews, documentation, and observation. The learning motivation instruments using questionnaires and critical thinking ability using test questions. The analysis technique used was quantitative analysis techniques. The quantitative analysis consists of completeness test, N-Gain test, correlation test between the learning motivation and critical thinking ability. The data on learning motivation and critical thinking ability were categorized into high, moderate, and low.

Indicators of critical thinking ability in this study are: (1) focusing questions, (2) analyzing arguments, (3) asking and answering questions, (4) considering whether sources are reliable or not, (5) observing and considering observational reports, (6) inducing and considering the results induction, (7) making and determining the results of consideration, (8) defining the terms and considering them, (9) identifying assumptions, and (10) determining an action. Indicators of the learning motivation used in this study were: (1) encourage and attempt to succeed, (2) encouragement and needs in the learning, (3) expectation and aspirations for the future, (4) the existence of rewards in the learning, (5) interesting activities in the learning, and (6) a conducive learning environment.

RESULTS AND DISCUSSION

The Increase on The Learning Motivation

The data of the learning motivation obtained through the learning motivation of students questionnaire experimental class, grade V Public Elementary School Danareja 02 and Public Elementary School Cilongok 02. The questionnaire was given before and after students carry out science learning through PBL models assisted by video media material of change in the shape of objects, so that obtained the questionnaire scores on the pre-test and post-test of learning motivation. Pre-test and post-test student motivation can be seen in the following Table 1.

Table 1. Percentage of Students Learning Motivation on Pre-test and Post-test

Percentage (%)	Criteria	Students motivation	
		Pre-test	Post-test
0 < 55	Low	30	-
56 < 68	Moderate	6	12
69 < 80	High	15	11
81 < 100	Very high	12	40
Percentage		64% (Moderate)	84% (Very high)

Based on Table 1, the results of the calculation of the percentage of pre-test and post-test student learning motivation increased by 20%, which was from 64% or medium criteria to 84% or very high criteria. The results of an increase in the learning motivation test can be seen in Table 2.

Table 2. Result of the Increase of Learning Motivation

N-gain score	Criteria	Number of students	Percentage (%)
g > 0.70	High	27	43
0.30<g <0.70	Moderate	24	38
g < 0.30	Low	12	19

Based on Table 2, the results of an increase in learning motivation test obtained normalization gain of 0.56 and are in the moderate criteria. These calculations indicate that students have increased motivation to learn after carrying out science learning through PBL models assisted by video media. This is confirmed by the research that has been carried out by Fukuzawa, Boyd, and Cahn (2017) showed that students with more experience have higher learning motivation; however, during the course, the motivation of students decreases. At the end of the course, most students have high motivation towards PBL. Students give positive responses in the learning and class discussions give students the confidence to feel comfortable involved in the learning process through the PBL model.

Pradnyana, Marhaeni, and Made (2013) state that the learning motivation of students who take part in problem-based learning has significant differences with students in conventional learning. The problem-based learning model influences the motivation to learn and mathematics learning achievement of the fourth-grade elementary school students in Cluster I Buleleng District. Learning using PBL makes students' attitudes toward learning more positive and their motivation levels better. Students were eager to solve problems and actively participate in the discussions to solve the topic being raised.

Research by Ramlawati, and Yunus (2017) showed that the PBL model influences the motivation and learning outcomes of students in grade VII of Public Junior High School 5 Pallangga, Gowa Regency on the subject matter of Environmental Pollution. The research strengthens the founding that learning through the PBL model guides students to link concepts that have been understood with everyday life so that they can feel the benefits.

The learning process can influence learning motivation, and if learning is carried out monotonously without variation, it will be difficult to foster student motivation (Ismail, 2016). Students must be intrinsically motivated to engage in independent learning (Savin-Baden, 2014) successfully. PBL increases students' intrinsic motivation since through PBL, students are responsible for their collaborative processes to investigate problems that can be overcome. The learning process that involves students actively will influence student learning motivation. The more students have control over their learning process, the greater their intrinsic motivation as much as student involvement in the arrangement of subject matter (Douglass, and Morris, 2014).

Motivation is one of the factors that determine student success in learning because motivation can facilitate learning and student learning outcomes. Students who are intrinsically motivated use their interests and satisfaction to challenging themselves with certain tasks (Raiyn, and Tilchin, 2015). Motivation is used as a measure to find out how far students are enthusiastic in learning science through PBL models assisted by video media.

The existence of a motivation to learn in students causes students to have the enthusiasm to try in the learning process so that learning objectives can be achieved. Based on the final score percentage and test results of improvement, it was concluded that the PBL model assisted by video media was effective in increasing the motivation to learn science.

The Increase on The Critical Thinking Ability

The critical thinking skills data were obtained through students' critical thinking tests in the experimental class, grade V Public Elementary School Danareja 02 and Public Elementary School Cilongok 02. Tests were given before and after students carried out science learning through PBL models assisted by video

media with material changes in the form of objects so that the score of critical thinking on pre-test and post-test were obtained. The completeness test results of critical thinking used were individual completeness test and classical completeness test, which can be seen in Tables 3 and 4.

Table 3. Completeness Score of Pre-test and Post-test

Information	Pre-test		Post-test	
	N	Percentage (%)	n	Percentage (%)
Complete	26	42.86	49	77.78
Incomplete	37	58.73	14	23.81

Table 4. The Increase on Critical Thinking Ability

N-Gain Score	Criteria	Number of Students	Percentage (%)
$\langle g \rangle > 0.70$	High	19	30
$0,30<\langle g \rangle<0.70$	Moderate	32	51
$\langle g \rangle < 0.30$	Low	12	19

Based on Tables 3 and 4, it can be seen that the classical completeness was analyzed from the results of students' critical thinking post-test which is 77.78% has reached the classical completeness criteria of more than 75%. The test results of the increasing critical thinking ability obtained normalized gain values of 0.54 and were in the moderate criteria. The calculation showed that students experience an increase in the critical thinking ability after students carry out science learning through PBL models assisted by video media. This is confirmed by research that has been carried out by Rasmawan (2017) that PBL teaching strategies were very beneficial in improving the achievement and the critical thinking ability (application, analysis, synthesis, and evaluation) of students. Susilowati (2018) stated that the implementation of problem-based learning models assisted by audio-visual media could improve students' critical thinking ability.

Research conducted by Firdaus, Kailani, Bakar, and Bakry (2015) showed that PBL model learning is an effective method for developing critical thinking skills in mathematics. Critical thinking ability must be applied and developed in all subjects because they are needed for students to solve various problems in school or social life.

Masek, and Yamin research (2011) shows that specific processes in PBL theoretically support the development of students' critical thinking according to the design applied. PBL requires a long term to foster students' critical thinking ability. The relationship between PBL and critical thinking is also influenced by other factors such as age, gender, and academic achievement, and educational background.

PBL is a strong pedagogical approach to teaching critical thinking skills (Kek, and Huijser, 2011). Students who have high critical thinking ability will tend to be able to review the opinions given based on the knowledge they already have. Science learning through PBL models assisted by video media stimulates students to play an active role in exploring the information needed following the learning objectives to be achieved.

The ability to think critically should be developed and taught in each subject because the ability to think critically is not innate from birth and does not develop naturally. Critical thinking skills can be developed through an interesting learning process, the application of learning models, and the use of learning an instrument that involves students actively participating in learning. Based on the final score percentage and test results of improvement, it was concluded that the PBL model assisted by video media effectively improved students' critical thinking ability in learning science.

The Correlation of Learning Motivation and Critical Thinking Ability

A simple linear regression correlation test was used to state whether there is a relationship between the learning motivation variables and students' critical thinking ability. Correlation value (R) between students' motivation and critical thinking ability showed that there is a correlation of 0.591, including the strong category. The coefficient of determination seen from R square of 0.349. It can be interpreted that 34.9% of students' critical thinking ability can be explained by the level of student learning motivation, while the remaining 65.1% caused by other factors which not examined in the study.

The significance value using the t-test of the regression test results was used to determine the correlation between learning motivation and students' critical thinking ability. The significance value at 5.716 is 0.000. Significance value indicated 0.000 < 0.05, meaning that there is a correlation between the learning motivation and students' critical thinking ability.

The correlation test results above show that there is a relationship between motivation and critical thinking ability. This is consistent with research conducted by Purnasari (2017), that there is a significant relationship between motivation and students' critical thinking ability in mathematics learning. Fahim, and Hajimaghsoodi (2014) research showed that there is a significant and positive relationship between learning motivation and critical thinking ability in learning English. Astuti, Sumantri, and Boeriswati (2018) explain that there is a significant positive relationship between achievement motivation and critical thinking, along with reading comprehension skills. The stronger the motivation for student achievement, the ability to think critically and read comprehension is increasing.

Xu (2011) explained that language learning motivation is significantly correlated with critical thinking, and both are significant for achieving a better foreign language. Nugraha, Suyitno, and Susilaningsih (2017) explain that learning motivation has a very strong relationship with critical thinking ability. The higher the student's motivation to learn, the higher the student's critical thinking ability.

Based on the results of the correlation test that is a simple linear regression test between learning motivation and students' critical thinking ability, it was concluded that there is a positive relationship between motivation and critical thinking ability.

The Effectiveness of Model PBL Assisted with Video Media on Learning Motivation and Critical Thinking Ability

The increase in students' motivation and critical thinking ability from pre-test to post-test is influenced by the learning model used, which is the PBL model assisted by video media. Science learning through PBL models combined with video media helps present authentic problems in the environment to students. Video media is one of the interesting learning media for students since it displays images and sound simultaneously so that students feel like they are in the same place as what is shown.

The pre-test was carried out before applying the PBL model assisted by video media. Learning is still conventional, where students are only given practical concepts. The learning has not yet led to an increase in students' interest in learning, increase student motivation, and problem-solving abilities that develop students' critical thinking ability. This is consistent with the research conducted by Susilowati (2018) that the implementation of problem-based learning models assisted with audio-visual media can improve students' critical thinking ability.

Science learning through PBL models assisted by video media aims to develop learning motivation and critical thinking ability. Problem-Based Science Learning can improve students' motivation and critical thinking ability. The learning outcomes of the experimental class's critical thinking ability experienced a significant increase (Susilo, 2012).

Video media has its attraction in motivating students to learn because the shows displayed can attract students' stimulation (stimulus) to listen more deeply. The video-assisted PBL learning model in learning activities emphasizes understanding of a problem and solving problems displayed through video media. Video-assisted PBL learning actively engages students in analyzing, solving problems, and drawing conclusions from the problems found, to increase learning motivation and develop students' critical thinking ability.

CONCLUSION

Based on the results of research and discussion, concluded that science learning through PBL models assisted by video media is effective in increasing learning motivation and critical thinking ability of experimental class

students. The results of the learning motivation N-Gain test are 0.56 or medium criteria, and the results of the critical thinking N-Gain test are 0.54 or moderate criteria. The result of the simple linear regression test shows that there is a positive relationship between learning motivation and critical thinking ability. Learning motivation affects the ability to think critically by 34.9%, while the remaining 65.1% caused by other factors. Science learning through PBL models assisted by video media actively engages students in analyzing, solving problems, and drawing conclusions from the problems found, to increase learning motivation and develop students' critical thinking ability.

ACKNOWLEDGMENT

Acknowledgment is given to Public Elementary School Danareja 02 and Public Elementary School Cilongok 02, Balapulang District, Tegal Regency and journal reviewers who have provided advice on improving writing and helping with the publication of this article.

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