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The Development of LKPD Multimedia using Problem-Based Learning Model to Improve Critical Thinking Ability of Elementary School Students

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Abstract

This study aims to improve students' critical thinking skills and instill a good understanding of learning concepts through the use of Multimedia Student Worksheets based on Problem Based Learning (PBL) Models. The LKPD that will be developed only contains the sub-themes of Temperature and Heat, this is due to the limitations of the researcher. The development model used in this study is the Dick & Carey development model which consists of 10 steps. The data obtained were analyzed descriptively and statistical tests using SPSS. To produce quality products, the development of LKPD in research uses criteria consisting of Relevance, Consistency, Practically and Effectively. The population used in this study were fifth grade students of SD Negeri Gebang-Langkat District. Based on the results of the study showed that (1) LKPD was declared very valid (86.87%) by validators, (93.3%) by teachers and (87.3%) by students in three different schools (2) Differences in critical thinking skills Significant students between classes using PBL Model-based Multimedia LKPD have an average score (86.27) while the LKPD available at school (43.63), where the significant t-test shows 0.000 <0.050 H_a is accepted.

Keywords
LKPD multimedia; problem based learning; critical thinking

I. Introduction

One way to apply active learning in the learning process is to apply teaching materials and learning models that are able to make students directly involved in the formation of the concepts being studied. Teaching materials that facilitate active learning is to develop LKPD. According to Lee, teachers use LKPD aims to support students in learning, implementing learning (Lee, 2014). In addition to teachers, Mulyasa stated that one of the factors that caused the low quality of learning, among others, had not been utilized optimally by learning resources by both teachers and students [Suwarni and Erna, 2015). The existence of LKPD is very important, with LKPD both teachers and students it will be easier to increase the effectiveness of learning (Hasanah, 2019). According to Nawawi, learning resources are everything that can be used as a place where teaching materials exist or are of origin for someone's learning (Jailani and Abdul Hamid, 2016)

Although learning resources such as textbooks or worksheets used in schools have met national standards, according to his observations, there are still many shortcomings to support students to learn actively (Millah, 2012). It is rare that the circulating Student Worksheets consider critical thinking skills such as the ability to analyze students. According to Scriven and Paul, critical thinking is defined as a disciplined process that is intellectually active and skilled at conceptualizing, applying, analyzing, synthesizing, and evaluating the information collected (Suwarni, 2015). Critical thinking can help students

improve understanding of the material being studied by critically evaluating arguments in textbooks, journals, discussion partners, including teacher arguments in learning activities (Widodo, S. 2014).

Therefore, it is necessary to design a Student Worksheet (LKPD) especially in science learning that focuses on critical thinking skills. Certainly not an ordinary LKPD, but an LKPD that can develop students' conceptual, analysis, synthesis and evaluation skills in the form of multimedia to make it easier for students to use them through online learning (on the network) during this covid-19 pandemic. The purpose of this development research is to answer whether the problem-based learning model's Multimedia LKPD can be said to be valid, practical and effective in improving the critical thinking skills of SD/MI students in Gebang District.

To develop a learning device, a development model that is in accordance with the education system is needed (Efendy, et al. 2018). Education is considered to have a very important role in promoting the civilization of a nation. Good quality education can encourage the creation of a quality society, creative and productive until finally able to achieve welfare. Through this national education system, the government should be able to ensure equal distribution of educational opportunities, as well as the relevance and efficiency of education management to face challenges in line with the changing demands of local, national and global life. The budget allocation system for education in Indonesia is heavily influenced by government policies (Saputra, A. 2018). In this era of the industrial revolution, students are required to have special skills in carrying out creative and fun learning under these conditions (Sagita & Khairunnisa, 2020).

According to Briggs, the model is a sequential device concept to realize a process, such as a needs assessment, media selection and evaluation (Aji, 2016). The LKPD development model in this study uses the Dick and Carey model because the stages are systematic and in accordance with the needs. This model was developed based on research by Robert Gagne which states that human behavior is very complex and is controlled more by internal mental processes than by external stimuli and reinforcement (Aji, 2016). The Dick & Carey model is a development model that was developed through a systems approach and consists of several components that need to be done to design larger learning activities (Qoriah, 2017). Furthermore, the components as well as the steps of the development model proposed by Dick, Carey & Carey [22] are (1) needs analysis to identify goals, (2) instructional analysis, (3) learner and context analysis, (4) formulating performance goals. , (5) developing assessment instruments, (6) developing learning strategies, (7) developing and selecting learning materials, (8) conducting formative evaluations, (9) revising, (10) designing and conducting summative evaluations. The following is an image of the Dick and Carey development flow.

II. Research Methods

This type of research is research and development (Research and Development). Research and development methods are research methods used to produce certain products, and test the effectiveness of these products. This type of research is different from other educational research because the goal is to develop products based on trials and then revised to produce products that are suitable for use. The development model used in this study is the model of Dick & Carey.

To obtain a product in the form of LKPD that can improve critical thinking skills of elementary school students, data collection was carried out through: Observation, Product Validation and Critical Thinking Test Critical thinking tests were given related to the

material on the subthemes of temperature and heat. Based on the data collection that will be carried out later, qualitative and quantitative data will be obtained. Qualitative data were analyzed descriptively by exploring the results of observations during the trial and implementation of LKPD, as well as describing students' critical thinking skills after using the product in order to obtain whether the product developed met the valid, practical and effective criteria. Meanwhile, quantitative data were analyzed statistically using the ANOVA test. This was done to measure students' abilities in the subtheme of Temperature and Heat after using LKPD based on the Problem Based Learning Model.

III. Results and Discussion

The aspects that are assessed by expert lecturers are aspects of the feasibility of the content/material, the feasibility of the PBL model, and the aspect of the feasibility of the graphic/design.

Table 1. Average Validation Score of Expert Lecturers on All Aspects

Stage Validation	No	Assessment Aspect	Score Average	%	Category
1	**1.**	Eligibility of content/material	Well	Well	Well
	2.	PBL Model Eligibility	Well	Well	Well
	3.	Graphic eligibility	Well	Well	Well
average score			**3,65**	**78,94**	Well
2	**1.**	Eligibility of content/material	Well	Well	Well
	2.	Language eligibility	Very good	Very good	Very good
	3.	Graphic eligibility	Very good	Very good	Very good
average score			**4,15**	**86,87**	Very good

In the table, it can be seen that there is a significant increase between validation stage 1 and validation stage 2. The percentage shows an increase from 78.94% to 86.87% in the "very good" category. The following is a graph of the results of material expert validation, PBL models and graphics.

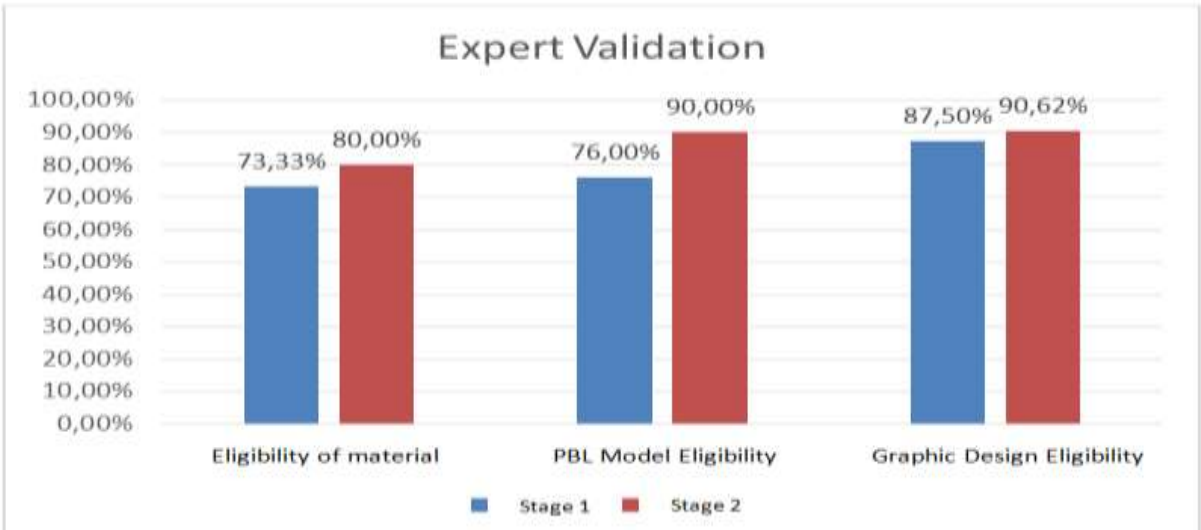

Figure 1. *Diagram of Expert Validation Results Stage 1 and Stage 2*

After validating the material, model and design expert validators, the researcher then carried out the 3 aspects of the validation to teachers with different schools. Based on the description of the results of teacher validation, the data obtained from the average score of all aspects as follows:

Table 2. Average Score of Teacher Validation on Products for All Aspects

No	Rating Indicator	**Average Score**	**100%**	**Category**
1.	Eligibility of Content/material	4,45	Very good	Very good
2.	Serving Eligibility	4,37	Very good	Very good
3.	Language Eligibility	4,75	Very good	Very good
Amount		**13,57**	**280%**	
Average Score		**4,52**	**93,3%**	Very good

Based on the data in the table above, the average score obtained by teacher 1 (93%), teacher 2 (90%) and teacher 3 (97%) it can be concluded from the three validations that the category "very good" with 1 validation stage by three teachers from 3 different schools. The following is a graphic display of the results of teacher validation 1, 2 and 3 which are presented in Figure 2.

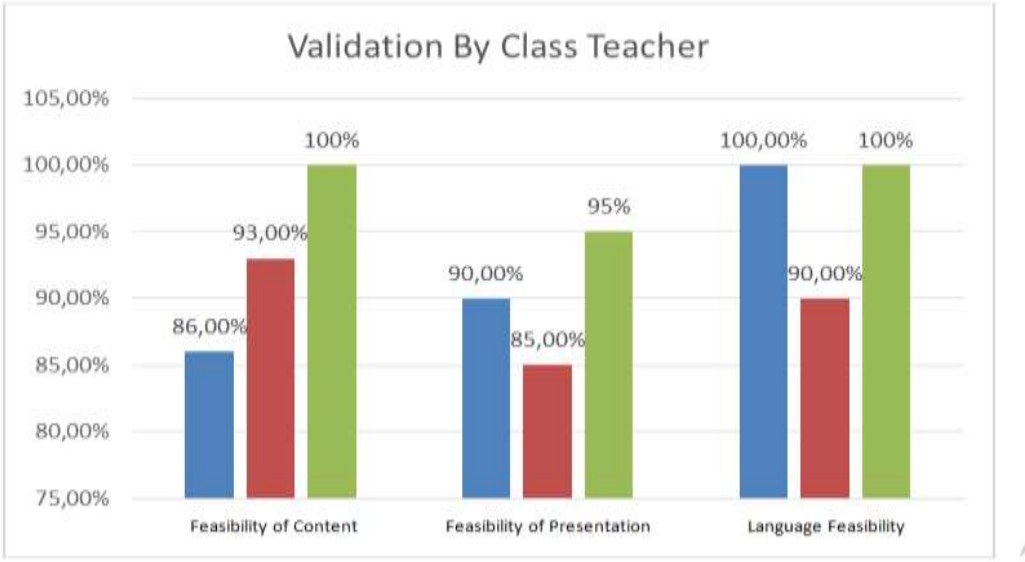

Figure 2. *Validation by Class Teacher*

The final stage of this development research is a limited student trial of a product in the form of LKPD Multimedia using Problem-Based Learning Model to Improve Students' Critical Thinking Ability on the Subtheme of Temperature and Heat. This test is limited to individuals, namely three people. The students who were sampled were fifth grade students from 3 different schools. The assessment carried out by students includes three aspects, namely content/material aspects, presentation aspects and language aspects with a total of 15 assessment indicators. Respondents were selected by the homeroom teacher 5. The following are the results of individual trials on each aspect, which are presented in Table 3.

Table 3. Data on the Average Score of Individual Limited Trials on Products for All Aspects

No	Rating Indicator	Average Score (n = 3)	Category	Category
1.	Eligibility of content/material	4,60	Very good	Very good
2.	Serving eligibility	4,17	Well	Well
3.	Language eligibility	4,33	Very good	Very good
Amount		**13,10**	**260,00**	
Average Score		**4,37**	**87,3%**	Very good

The data above shows that the results of the trial were limited to 3 students for all aspects of obtaining a score of 87.3% in the "very good" category. The following graph shows the results of the trial.

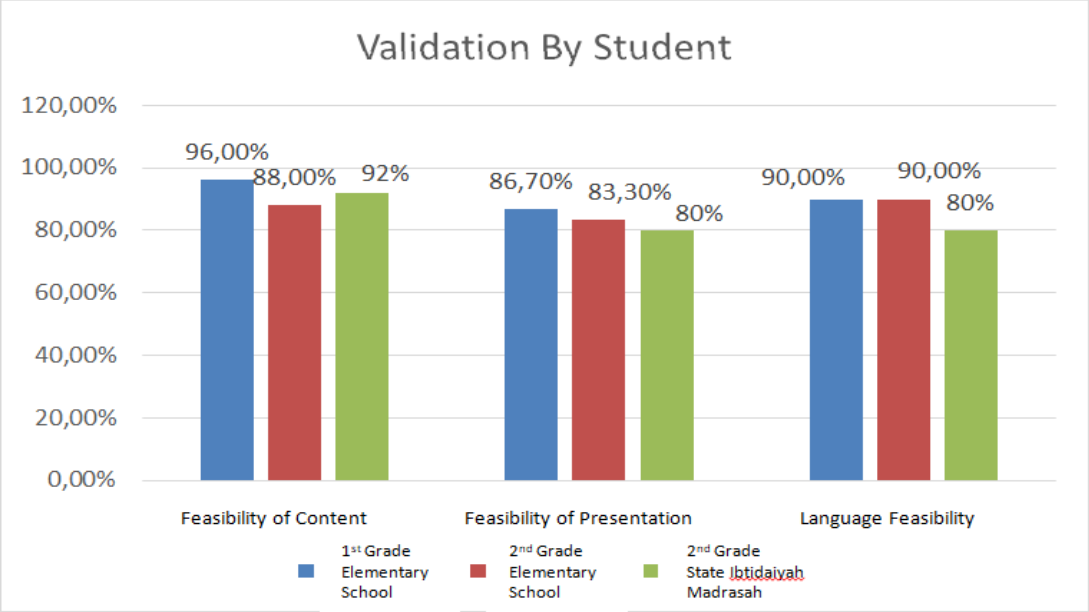

Figure 3. *Validation by Students at 3 Schools*

3.1 Test Result Analysis

This study measures the mastery of the material and students' critical thinking skills using tests. Students are expected to have increased critical thinking skills. contained in the LKPD Multimedia using Problem-Based Learning Model. Problem Based Learning (PBL) or problem-based learning is student-centered learning that presents real-world problems as a context for students to construct their own knowledge developing inquiry and higher-order thinking skills, problem solving to acquire knowledge and concepts that are essential from subject matter, develop independence, and self-confidence (Azrina, 2018). Before the test is given to students, the test instrument is normalized with the help of the SPSS 21 application. The following are the results of the Kalmogorov Smirnov test to see the normality of the critical thinking test instrument.

Table 4. Prerequisite Test Results

No	Test	Statistics	Description
1	Normality Test-Kolmogorov Smirnov	0,155 > 0,050	The critical thinking test instrument is declared Normal
2	Homogeneity Test- Levene Test	0,465 > 0,050	Both classes have the same covariance matrix

After the prerequisite tests were carried out in the form of normality and homogeneity tests which showed that the data on increasing critical thinking skills and all data were normally distributed and came from a homogeneous population, then proceed with the test of differentiating power.

The results of the difference power test are used to measure the effect or difference between the experimental class and the control class on critical thinking skills. The statistical test used is the t-test, because there is 1 dependent variable in this study, namely critical thinking skills. While the independent variables are class, with the category of experimental class (using LKPD Multimedia using Problem-Based Learning Model) and control class (using educator LKPD).

Table 5. Paired Samples Statistics

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PRETES	43,63	60	8,519	1,100
	POSTES	86,27	60	5,683	,734

In the table above, it can be seen that the results of the paired samples statistics test showed that the students obtained the pretest results with an average value of 43.63, while the learning outcomes after using the LKPD Multimedia using Problem-Based Learning Model, students obtained an average score of 86.27. The difference of -42.64 (43.63–86.27= -42.64) indicates that there is an increase of = 42.64 from the average before using LKPD Multimedia using Problem-Based Learning Model.

Table 6. Paired Samples Test

Paired Samples Test

Paired Differences					t	df	Sig. (2-tailed)
			95% Confidence Interval of the Difference				
Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
-42,633	10,121	1,307	-45,248	-40,019	-32,628	59	,000

Furthermore, the table of the results of the pired samples test can be seen that from the data contained in the column Sig. (2-tailed) of 0.000 0.05, it is stated that there is a significant difference in students' critical thinking abilities. The results of testing the data through the T-test in pairs with the truth level of the test reaching 95%, so that it can be concluded that the use of LKPD Multimedia using Problem-Based Learning Model can improve students' critical thinking skills on the theme of Temperature and Heat. This is in line with research (Hasanah, 2020) which states that the application of the PBL Model can

improve students' critical thinking skills with a percentage increase of 80% where problem-based independent learning makes students active and continues to think logically during learning. This Multimedia LKPD can be a solution to instill understanding the concept of the theme of temperature and heat as well as alternative teaching materials during the Covid-19 pandemic.

IV. Conclusion

Based on the results of the validation of the content/material expert test, the design and the PBL model, LKPD Multimedia using Problem-Based Learning Model was declared very valid (86.87%) by the validator. In addition, validation was also carried out by 3 teachers at 3 different schools and was also declared very valid (93.3%) as well as validation for 3 students (87.3%). The significant difference in students' critical thinking skills between classes using PBL-based Multimedia LKPD has an average score (86.27) while the LKPD available at school (43.63), where the significant t test shows 0.000 < 0.050 Ha is accepted. So it can be concluded that this LKPD Multimedia using Problem-Based Learning Modelcan improve students' critical thinking skills on the theme of temperature and heat.

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