

Validity of Teaching Materials Based on the Inquiry Based Learning Model with the CTL Approach to Improve Students' Creative Thinking Skills

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Abstract— In compliance with the mandate of the 2013 curriculum, physics learning is carried out, meaning students are actively pursuing their own expertise. School facts indicate that physics inquiry instruction has not been adequately applied, and the use of instructional materials is also insufficient to facilitate the learning process. A solution that can be done is to make teaching materials based on an inquiry based learning model with the CTL approach to improve students' creative thinking. The purpose of this study was to produce and determine the validity of teaching materials based on the inquiry based learning model with the CTL approach to improve students' creative thinking. The research carried out includes the type of Research and development (R&D). The object of this research is teaching materials based on the inquiry based learning model with the CTL approach to improve students' creative thinking. Based on the data analysis that has been done, it can be stated that the research results show that the validity of the product has a high level of validity with an average validation value of teaching materials based on the inquiry based learning model with the CTL approach to improve students' creative thinking by 0.837 with valid criteria. It can be concluded that in this research, the validation of teaching materials based on the inquiry based learning model with the CTL approach to improve students' creative thinking is valid for use in physics learning for class XI semester 1 students.

Keywords — Contextual teaching and learning, Creative Thinking, Inquiry Based learning, Physics learning, Teaching Material.

I. INTRODUCTION

Education is an effort to build a learning environment for individuals to be able independently carry out their duties so that they are responsible for acquiring individual skills in social attitudes and actions. In Indonesia, an increase in the level of education is needed a strong vision for education and a real effort. In order to realize this vision, the government's efforts in developing the world of education in Indonesia are to provide the requisite facilities and infrastructure, enhance teacher professionalism as educators, credential teachers, and

upgrade the curriculum and now the new curriculum, namely the 2013 curriculum. The 2013 curriculum has the goal of capable students. contribute to the life of society, nation and world civilization as an active, creative, innovative and effective human being^[1].

In essence, learning is a process of interaction between learners and the environment, such that behavior changes for the better[2]. The learning process will be a forum for students to change attitudes, behavior and behavior towards more value and character. The many roles of learning

materials in learning, such as accommodating learning material for students and teachers, are the main source of material content, detail ideas about the basic characteristics of learning, provision of knowledge building materials, and become the main route for developing teacher strategies in learning[3]. Learning activities can take place at school. One of the compulsory knowledge given to students in high school is Physics.

Physics is part of Natural Science, which is a systematic effort to build and organize knowledge in the form of hypotheses that can be tested and can predict natural phenomena. In learning physics, the most important thing is for learners who are actively learning. In order to support and inspire students to learn physics by increasing interest in researching objects or events in the student environment, the efforts of all teachers must be directed. Following a preliminary review, the fact observed in the field is that physics learning is to be carried out not properly. The school-issued textbooks still use the materials used for teaching. This suggests that the textbook used does not precisely fit students' characteristics and learning styles. Teaching materials that will allow students to learn according to their and curriculum requirements are therefore required.

Curriculum demands suggest that every learning activity uses a model and approach. The learning model is a design that describes the process of determining and producing environmental situations that cause students to interact in such a way that there is a change in behavior. One of the learning models recommended in the 2013 curriculum is the Inquiry Based Learning (IBL) model. Learning with the inquiry based learning model is learning that involves students in formulating questions that lead to investigations in an effort to build new knowledge and meaning^[4]. So, so that students are better able to develop their abilities based on the problems they formulate and find their knowledge, the appropriate teaching materials to be developed are inquiry-based learning model-based teaching materials.

If the content is in line with their daily life, students may find it easier to understand learning material. Therefore, the Contextual Teaching and Learning (CTL) approach is the best. The approach used in the production of Inquiry-Based Learning teaching materials. CTL is a learning philosophy that helps teachers associate learning content with the real thing world and allows students to enter the link between their education and the application of everyday life. It will be able to build the abilities of students by using the right teaching materials, so that learning can be meaningful and will

enhance the creative thinking skills of students. Creative thinking is a philosophy that aims to generate fresh ideas.

A teaching material based on the inquiry based learning model with the CTL approach can be a solution for teachers and students to support the learning process and improve students' creative thinking. Based on this background, teaching materials based on the inquiry based learning model with the CTL approach were developed for class XI high school students. Therefore, researchers are interested in conducting research with the title "The validity of teaching materials based on the inquiry based learning model with the CTL approach to improve students' creative thinking". The formulation of the problem in this study is: "What is the validity of teaching materials based on the inquiry based learning model with the CTL approach to improve students' creative thinking skills?". The purpose of this study was to determine the validity of teaching materials based on the inquiry based learning model with the CTL approach to improve students' creative thinking skills.

II. METHODS

This research was conducted referring to the research and development design (R & D). This study aims to develop teaching materials, namely development studies. Therefore, this type of research is a design research type of development studies. The teaching materials developed were physics teaching materials based on the inquiry based learning model with the CTL approach to improve the creative thinking of students who have valid criteria. Design research conducted using the ADDIE model. The ADDIE model consists of five steps, namely: 1). Analysis, 2). Design, 3). Development, 4). Implementation, and 5). Evaluation.

The research data comes from the results of the validity questionnaire analysis. The validity questionnaire is related to the evaluation of the teaching materials that have been developed. Product assessments based on questionnaires that have been filled in by experts are analyzed to determine the validity of the product being developed. Validity analysis uses a Likert scale with the following steps:

- a. Give a score for each answer item strongly agree (4), agree (3), disagree (2), and strongly disagree (1).
- b. Add up the total score of each validator for all indicators.
- c. Giving validity values using the Aiken's V formula, namely:

$$V = \frac{\sum s}{[n(c-1)]} \quad (1)$$

Where $s = r - lo$, lo = the lowest number of validity assessments (in this case = 1), c = the highest number of validity (in this case = 4), and r = number given by the validator

The validity category can be seen in Table 1.

Table 1. Validity Category^[7]

Score	Category
$\geq 0,6$	Valid
$< 0,6$	Invalid

Based on Table 1, it can be seen the criteria of the validity agreement value obtained. This validity was carried out using the Aiken's V formula and categorized into two values, namely valid and invalid. The product developed can be said to be valid when the value obtained exceeds or is equal to 0,6.

The following is the validity instrument used in this study.

VALIDATION INSTRUMENT

TEACHING MATERIALS BASED ON INQUIRY-BASED LEARNING MODELS WITH THE CTL APPROACH TO IMPROVE STUDENT'S CREATIVE THINKING

1. Content Validity

a. Teaching Material Components

No	Rated aspect	Rating Score			
		4	3	2	1
1.	The title / identity of the teaching material refers to the basic competencies.				
2.	Learning instructions in teaching materials for teachers and students.				
3.	Learning objectives in accordance with basic competencies.				
4.	Learning material refers to the Basic Competencies to be achieved.				
5.	Teaching materials include an inquiry-based learning model.				

6.	Exercise and evaluation are in accordance with the learning material.				
7.	Assessment in teaching materials is carried out on the process and work results of students.				

b. Feasibility of Content of Teaching Materials

No	Rated aspect	Rating Score			
		4	3	2	1
1.	The material presented in the teaching materials is in accordance with the demands of Core Competencies, Basic Competencies, and formulated indicators.				
2.	The facts in presenting the problem given are in accordance with the topic in the material.				
3.	The facts presented can improve students' understanding.				
4.	The concept of teaching materials is in accordance with physics.				
5.	The concept presented does not create many interpretations.				
6.	Equations / formulas in teaching materials are in accordance with the Physics formula.				
7.	The phenomena presented in teaching materials are in accordance with everyday life.				
8.	The phenomena presented in teaching materials can increase students' understanding.				
9.	Activities in teaching materials encourage the curiosity of students.				

2. Construction of the Validity of Teaching Materials

No	Rated aspect	Rating Score			
		4	3	2	1
1.	The presentation is in accordance with the order of the standard teaching materials.				
2.	Phase 1. Orientation A phenomenon that provokes the curiosity of students to build knowledge and classify.				
3.	Phase 2. Conceptualization (Questions and Answers) Facilitating students to formulate problems based on the phenomena presented (asking questions).				
4.	Phase 2. Conceptualization (Hypothesis) facilitate students to build hypotheses (predict and formulate hypotheses).				
5.	Phase 3. Investigation (Experiment) Facilitating students to carry out investigations (planning experiments and using tools and materials).				
6.	Phase 3. Investigation (Data Interpretation) facilitate students to process data (interpret and apply concepts).				
7.	Phase 4. Conclusion Facilitating students to conclude the results of the investigation (interpreting and applying concepts).				
8.	Phase 5. Discussion (Communication) facilitate students to communicate the results of their investigations (communicate and ask questions).				
9.	Phase 5. Discussion (Communication)				

No	Rated aspect	Rating Score			
		4	3	2	1
	Facilitating students to understand the concept with friends (communicate and ask questions).				
10.	Phase 5. Discussion (Communication) Facilitating students to confirm understanding of the concept to the teacher				
11.	Phase 5. Discussion (Reflection) Facilitating teachers and students in carrying out learning reflection activities.				
12.	1. Construction Facilitating students to construct their knowledge.				
13.	2. Ask Facilitating students to ask questions.				
14.	3. Find / Questions Facilitating students to find their own knowledge.				
15.	4. Learning Society Facilitating students to carry out learning in study groups.				
16.	5. Modeling Facilitating students for modeling.				
17.	6. Reflection Facilitating students to conclude.				
18.	7. Authentic assessment Facilitating students to provide authentic.				
19.	Aspect 1. Think Fluently Facilitating students to be able to come up with many ideas, answers, problem solving or questions.				
20.	Aspect 2. Think flexible Facilitating students to be able to produce answers, answers or questions that vary.				

No	Rated aspect	Rating Score			
		4	3	2	1
21.	Aspect 3. Thinking Authenticity Facilitating students to be able to produce new and unique expressions.				
22.	Aspect 4. Detailed skills Facilitating students to be able to enrich the ideas that have been put forward in order to assess quality ideas.				

3. Validity of the Language of Teaching Materials

No	Rated aspect	Rating Score			
		4	3	2	1
1.	The language used is in accordance with the level of development of students.				
2.	The language used is in accordance with the emotional maturity level of students.				
3.	Messages or information are conveyed in communicative language.				
4.	The language in teaching materials encourages students to be actively involved in learning activities.				
5.	The conjunctions used in teaching materials are in accordance with the rules.				
6.	Sentences presented in effective teaching materials.				
7.	The terms used in the teaching materials are consistent.				
8.	The spelling used refers to the General Guidelines for Indonesian Spelling				

4. The Validity of the Graphics of Teaching Materials

No	Rated aspect	Rating Score			
		4	3	2	1
1.	Teaching materials use clear and legible fonts.				
2.	Teaching materials have an orderly layout.				
3.	The placement of image captions in teaching materials is correct.				
4.	The illustrations presented in the teaching materials can build students' understanding.				

III. RESULT AND DISCUSSION

The results obtained in the analysis will be realized in this discussion and the constraints faced, as well as some possible solutions that can be used to resolve these limitations. The findings of this study were in the form of inquiry-based learning-based teaching materials with the CTL approach to enhance the creative thinking abilities of students and the outcomes of the validity of learning materials based on inquiry-based models with the CTL approach to enhance the creative thinking abilities of students. This teaching material is managed by expert lecturers in teaching materials. Lecturer who assess this teaching material are Dr. Fatni Mufit, S.Pd, M.Si, Dr. Tressyalina, M.Pd, dan Dr. Ramli, M.Si. Teaching materials were assessed starting from content validity, construct validity, language validity and graphic validity. It is important to pay attention to the colors that are appropriate for use, the type of letters used, when designing teaching materials so that the teaching materials can be read clearly. Blue and pink dominate the colours used in instructional materials. As for the chosen typeface, Times New Roman. The following is the cover of teaching materials based on inquiry-based learning models with the CTL approach to improve students' creative thinking skills that have been made.



Figure 1. Cover of teaching materials

The results of the validity of teaching materials based on the inquiry learning model with the CTL approach are as follows.

VALIDATION ANALYSIS TEACHING MATERIALS BASED ON INQUIRY- BASED LEARNING MODELS WITH THE CTL APPROACH TO IMPROVE STUDENT'S CREATIVE THINKING

1. Content Validity

a. Teaching Material Components

Table 2. Results of the validity of teaching material components

INDICATOR	VALIDATOR ASSESSMENT			Σ s	VALIDITY VALUE	AVERAGE
	1	2	3			
1.	4	4	4	9	1	0,921
2.	4	4	4	9	1	
3.	4	4	4	9	1	
4.	4	4	4	9	1	
5.	4	4	3	8	0,889	
6.	3	4	3	7	0,778	
7.	3	4	3	7	0,778	

b. Feasibility of Content of Teaching Materials

Table 3. Results of the validity of the content of teaching materials

INDICATOR	VALIDATOR ASSESSMENT			Σ s	VALIDITY VALUE	AVERAGE
	1	2	3			
1.	4	4	4	9	1	0,840
2.	4	4	3	8	0,889	
3.	3	4	3	7	0,778	
4.	4	4	3	8	0,889	
5.	4	4	3	8	0,889	
6.	3	4	3	7	0,778	
7.	4	3	3	7	0,778	
8.	3	4	3	7	0,778	
9.	3	4	3	7	0,778	

3. Construction of the Validity of Teaching Materials

Table 4. The results of the validity of the construction of teaching materials

INDICATOR	VALIDATOR ASSESSMENT			Σ s	VALIDITY VALUE	AVERAGE
	1	2	3			
1.	4	4	3	8	0,889	0,798
2.	4	4	3	8	0,889	
3.	3	4	3	7	0,778	
4.	3	4	3	7	0,778	
5.	4	4	3	8	0,889	
6.	3	4	3	7	0,778	
7.	3	4	3	7	0,778	
8.	3	4	3	7	0,778	
9.	3	4	3	7	0,778	
10.	3	4	3	7	0,778	
11.	3	4	3	7	0,778	
12.	3	4	3	7	0,778	
13.	3	4	3	7	0,778	
14.	3	4	3	7	0,778	
15.	4	4	3	8	0,889	
16.	3	4	3	7	0,778	
17.	3	4	3	7	0,778	
18.	3	4	3	7	0,778	
19.	3	4	3	7	0,778	
20.	3	4	3	7	0,778	
21.	3	4	3	7	0,778	
22.	3	4	3	7	0,778	

4. Validity of the Language of Teaching Materials

Table 5. Results of the validity of the language of teaching materials

INDICATOR	VALIDATOR ASSESSMENT			Σs	VALIDITY VALUE	AVERAGE
	1	2	3			
1.	4	4	3	8	0,889	0,819
2.	3	4	3	7	0,778	
3.	4	4	3	8	0,889	
4.	4	4	3	8	0,889	
5.	3	3	3	6	0,667	
6.	3	4	3	7	0,778	
7.	4	4	3	8	0,889	
8.	4	3	3	7	0,778	

5. The Validity of the Graphics of Teaching Materials

Table 6. Results of the validity of the graphic teaching materials

INDICATOR	VALIDATOR ASSESSMENT			Σs	VALIDITY VALUE	AVERAGE
	1	2	3			
1.	4	4	3	8	0,889	0,806
2.	4	4	3	8	0,889	
3.	3	3	3	6	0,667	
4.	3	4	3	7	0,778	

1.

Based on the analysis of the validation results in Table 2, it can be seen that the total average value of the validity of the teaching material components is 0.921 with valid criteria. This shows that the teaching materials made already have a teaching material title that refers to basic competencies. Instructions for service teaching materials for teachers and students. Learning objectives in accordance with basic competencies. Furthermore, training and evaluation in accordance with the learning material. Based on the analysis of the validation results in Table 3, it can be seen that the total average value of the validity of the content of teaching materials is 0.840. This shows that the material presented in the teaching material is in accordance with the instructions for Core Competencies, Basic Competencies, and formulated indicators. Facts in the presentation of the problem given are in accordance with the topic in the material. The concept of teaching materials is in accordance with physics. Equations/formulas in teaching materials are in accordance with the Physics formula. Activities in teaching materials encourage the curiosity of students.

Based on the review of the validation results in Table 4 it can be said shows that with valid parameters the average value of the construction validity of teaching materials is 0.798. This shows that the presentation is in accordance with the order of the standard teaching materials. The teaching materials contain an inquiry based learning model well. This can be seen in each measure containing an adequate statement of each step of the learning model based on the investigation. The CTL approach has been well used for teaching materials are focused on research-based learning models. This can be seen in each indicator containing statements from each aspect of the CTL strategy. Teaching resources have been developed to promote the innovative thinking of students as well. In each measure that includes statements from every element of the ability to think creatively, this can be seen. The statements presented can help guide students in building their own knowledge. This is consistent with the expert's statement that the problem is designed to help students apply the knowledge they have built^[8].

Based on the analysis of the validation results in Table 5, it can be seen that the total average value of the validity of the language of teaching materials is 0.819 with valid criteria. This shows that the language used is in accordance with the development of the cognitive level of students. The language in teaching materials encourages students to be actively involved in learning activities. And the spelling used refers to the General Guidelines for Spelling in Indonesian. Based on the analysis of the validation results in Table 6, it can be seen that the total mean value of the validity of the teaching materials graphic is 0.806 with valid criteria. This shows that the teaching material uses clear and legible fonts. Teaching materials already have an orderly layout. And the illustrations presented in teaching materials can build students' understanding.

After analyzing the value given by the lecturer to teaching materials based on the inquiry-based learning model with the CTL approach, the mean value of the validity of the teaching materials was 0.837 with valid criteria. This shows that the teaching material has met the good criteria of an appropriate teaching material. This is in accordance with the principles of the development of teaching materials, namely 1) starting from easy to understand difficult, 2) repetition will increase understanding, 3) positive feedback will provide reinforcement of students' understanding; 4) high learning motivation is one of the determining factors for learning; 5) reaching the goal is like climbing a ladder, gradually, eventually reaching a height; and 6) seeing the results that have been achieved will encourage students to achieve

goals^[9]. So, overall, teaching materials based on the development of inquiry-based learning models have met the principles of teaching materials. This teaching material is ready to be carried out to the next test stage, namely practicality and strength testing.

IV. CONCLUSION

On the basis of the problem's formulation, two conclusions can be drawn from the results of research and discussion of the validation of teaching materials based on the inquiry-based learning model using the CTL method to enhance the critical thinking skills of students that have been mentioned previously. First, it has produced teaching materials based on the inquiry based learning model with the CTL approach to improve students' creative thinking skills. Second, teaching materials based on the inquiry-based learning model with the CTL approach to improve students' creative thinking skills that have been developed have valid validity in terms of content validity, construction validity, language validity and graphic validity so that the teaching materials developed can be used in learning activities for help students understand learning material, build and find knowledge according to the concept of the inquiry based learning model and improve students' creative thinking. This validity is viewed from the results of studies by experts with an average validity level of 0.837 with valid criteria. Teaching materials are ready to be used in the learning process.

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