

# Developing contextual teaching and learning-based worksheets to improve fifth grade students' critical thinking

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## ABSTRACT

The purpose of this study was to develop valid, practical, and effective context-based (CTL) worksheets for elementary school students in the fifth grade. We used the Borg and Gall's model for research and development. This study was conducted in an urban elementary school in Bandar Lampung city in Indonesia among teachers and fifth grade students. To collect data, we used a variety of research instruments, including tests and questionnaires. We also used expert judgment for validation. Both qualitative and quantitative analyses were performed on the collected data. Based on the results of expert validation and responses to the questionnaire distributed to the research participants, the findings suggest that the CTL-based worksheets we developed in this study were valid and practical with a significance value of  $<0.05$  obtained from the N-Gain test and paired sample t-test. This implies that the CTL-based teaching materials were effective in improving the critical thinking skills of fifth-grade elementary school students.

## KEYWORDS

Elementary education;  
worksheets; cti; critical thinking;  
school children

Received: 1 October 2022  
Accepted: 8 October 2022  
Published: 9 October 2022

## Introduction

Education can be interpreted as a conscious and systematic effort to achieve progress towards a better standard of living. Without education, students cannot live and develop in line with the ideals of progressing and living happily according to their respective life plans. According to Kamang et al (2019) education is a process to shape behavior, both physically, intellectually, emotionally, and morally in accordance with the values and knowledge that become the cultural foundations of society. Indirectly, the educational process can improve the quality of a nation.

To improve the quality of a nation, there is no other way except through improving the quality of education. Referring to this idea, the United Nations (UN) through the United Nations, Educational, Scientific and Cultural Organization (UNESCO) instituted four pillars of education both for the present and the future, namely: (1) learning to know, (2) learning to do (3) learning to be, and (4) learning to live together. Most indicators of modern education consider the development of critical thinking as a vital pedagogical element.

According to the National Research Council (1996), it states that critical thinking is at the heart of educational systems that produce research and scientific literacy.

The explanation explains that quality education indicators are those that produce knowledge and learning processes that depart from dynamic learning to support learning, evaluation, and analysis centers on the development of critical thinking.

Critical thinking is the ability to say something confidently. The goal of critical thinking is to achieve deep understanding. Understanding makes students understand the intent and meaning behind an event. Having the ability to think critically allows students to analyze their own thinking to ensure that they have made choices and draw smart conclusions. This is in accordance with Elder and Paul (Elder & Paul, 2021) critical thinking is best understood as the ability of thinkers to take charge of their own thinking. This requires that they develop sound criteria and standards for analyzing and assessing their own thinking and routinely use those criteria and standards to improve its quality. This means the best critical thinking is to understand their own thinking abilities. This requires them to develop standard criteria for analyzing and assessing their own thinking abilities and regularly use criteria standards to improve their quality.

Having the ability to think critically allows students to analyze their own thinking to ensure that they have made choices and draw smart conclusions. The ability to think critically is not innate in students but is taught and fostered formally and informally through learning practices that instill a critical and interactive perspective. More importantly, the development of critical thinking does not start from the learning process that moves from telling students what to think but rather develops students' critical thinking to dare to ask questions in the learning process

in which there are values in education, culture, politics, and religion. Students who cannot think critically cannot decide for themselves what to think, believe, and how to act.

This can cause students to passively imitate, adopt and accept other people's conclusions, therefore every student must have critical thinking skills. The potential of students will emerge if it is assisted by a number of teaching materials or tools that support the interaction process that is being carried out. One of the learning resources used by educators to support the learning process is the Student Worksheet (LKPD). According to Permasih et al. (2012), a student worksheet is printed teaching material in the form of sheets of paper containing material, summaries, and instructions for implementing learning tasks that must be carried out by students, which refers to the basic competencies that must be achieved.

The low quality of learning is caused by various indicators, one of which is unprofessional educators, starting from planning, implementing processes, and assessing learning. This means that educators are not capable enough to prepare proper learning media and appropriate implementation of learning. It is necessary to improve the process that is supported by various learning tools (student worksheets, textbooks, media, tools, and other supports). Although schools have used the 2013 curriculum with a scientific approach and defined learning model, the learning process in the classroom tends to use lecture and assignment methods. Students are not actively involved in constructing learning materials thus they tend to quickly forget it, students' answers are still limited to memory and understanding, and it has not shown analytical answers to educator questions such as how and why. The low average percentage of students' completeness in achieving minimum completeness criteria (KKM) in thematic subjects is assumed to be due to the application of teacher-centered approaches in which educators are the only source of information for students, thus learning tends to be conventional. There is no interaction built between educators and students, thus students do not have the opportunity to explore the knowledge they have. The learning carried out by educators is oriented only to completing the material in the book and is less related to the experiences experienced by students directly.

As a result, students critical thinking skills are not developed optimally. Thus, students are less prepared to face a world full of dynamics and critical thinking skills. Based on the explanation above, it is necessary to conduct research and development with the title "The Development of Student Worksheets based on Contextual Teaching and Learning to Improve Critical Thinking Skills For V-Grade Elementary School Students".

## **Methods**

### ***Research Type***

The research method used in this research is development research which refers to the Borg and Gall development research method. According to Borg and Gall (Borg et al., 2007), there are 10 steps in carrying out development research, as follows:

1) research and information collecting, 2) planning, 3) develop a preliminary form of product, 4) desk evaluation, 5) primary product revision, 6) main field testing, 7) operational product revision, 8) operational field testing, 9) final product revision, and 10) dissemination and implementation. Based on the development research steps above, the researchers took research steps from step 1 to step 7. Steps 8 to 10 were not implemented due to time constraints and they required high costs for research product development. It was also carried out in accordance with the research standards of the thesis requirements. Based on these reasons, the researchers adjusted the goals and actual conditions in the field.

### ***Data Analysis Techniques***

### ***Participants***

The population in this study was the Ahmad Yani Cluster, Sukabumi District consisting of State Elementary School of 1 Campang Raya, State Elementary School of 2 Campang Raya, State Elementary School of 3 Campang Raya, State Elementary School of 1 Sukabumi, State Elementary School of 2 Sukabumi, State Elementary School of 1 Way Gubak, State Elementary School of 2 Way Gubak. This study considered the determination of the sample based on the results of the questionnaire in the preliminary study. The sample for the small group testing in this study was conducted on 12 students and 6 elementary school educators in Sukabumi District. Meanwhile, the sample for the large group testing in this study was conducted in class V of State Elementary School of 2 Campang Raya with a total of 30 students.

### ***Data analysis***

The type of data collected in this development research was data that used quantitative analysis and qualitative analysis. Data collection techniques used in this development research included: documentation, observation, expert validation sheets, and tests. Documentation was used to obtain secondary data. This data was in the form of the number of students and matters relating to the learning outcomes of students and the state of the school. Observations were made to see students' critical thinking skills. The expert validation sheet in this study was addressed to experts where it aimed to validate student worksheet development products based on the CTL model.

The validation sheet was addressed to media, material, and language experts. The data obtained through the questionnaire was in the form of quantitative data.

The test was used to determine the improvement of students' critical thinking skills before the product was applied (pre-test) and after the implementation of the student worksheets development product (post-test).

The **validity test** includes validation questionnaire data from material experts, construct media experts, and language experts. This expert validation analysis was carried out by descriptive analysis of the percentage with the formula:

$$\sum \frac{\text{response score}}{\text{Maximum score}} \times 100\%$$

Source: (Ridwan & Sunarto, 2012)

**Table 1.** Questionnaire Scoring Criteria

No	Final Score	Criteria
1	81 - 100%	Very feasible /valid, very complete, usable
2	61 - 80 %	Quite feasible /valid, quite effective, can be used with minor improvements
3	41 - 60%	Less valid, less effective, less complete, unusable
4	21 - 40%	Invalid, ineffective, incomplete, unusable
5	0 - 20%	Very invalid, very ineffective, very incomplete, unusable.

(Akbar, 2017)

**Product Practicality**

$$P = \frac{\sum X}{N} \times 100\%$$

Description: P = Percentage score, Σ X = Total score obtained, N = Maximum score

**Table 2.** Practicality Test Criteria

Criteria	Practicality Level
85,01% - 100,00%	Strongly Practical
75,01% - 85,00%	Practical
60,01% - 75,00%	Quite Practical
50,01% - 60,00%	Less Practical
<50,00%	Strongly Less Practical

Source: (Irsalina & Dwiningsih, 2018)

**Data of Product Effectiveness**

Product effectiveness data analysis was carried out by analyzing using the SPSS 25 program according to the results of the individual achievement levels of students. Before analyzing the effectiveness of the product, the first thing to carry out is to test for normality and homogeneity. Followed by the T-Test (Paired Sample T-test, Normalized Gain (N-Gain) with the formula:

$$N \text{ Gain} = \frac{\text{Posttest Score} - \text{Pretest Score}}{\text{Ideal Score} - \text{Pretest Score}}$$

Description: :

G: Gain, Post-score: Final critical thinking skill score, Pre-score: Initial critical thinking skill score, Max-score: Maximum score

The calculation results were interpreted using the gain index as follows.

**Table 3.** Normalized gain index value

Gain Index	Classification
(g) ≥ 0,70	High
0,30 ≤ (g) ≤ 0,70	Medium
(g) < 0,30	Low
s	

## Results

### *Research and Information Collecting*

1. The teaching materials used by students are still limited and they are not in accordance with the needs of students,
2. The teaching materials used are publisher products, not the result of the development by educators
3. The teaching materials used are not in accordance with the characteristics of students and the material is minimal to present the actual situation
4. Students' critical thinking skills are still low, namely in the aspect of asking questions and making conclusions
5. CTL-based teaching materials can strengthen critical thinking skills
6. Teaching materials in the form of student worksheets can be used by students independently thus they are suitable for pandemic conditions

Based on the results of preliminary research, it is necessary to develop CTL-based Student Worksheets on thematic learning used by educators in class V of State Elementary School of 2 Campang Raya, Ahmad Yani Cluster to improve students' critical thinking skills.

### *Planning*

The planning carried out by the researchers is: Formulating the purpose of using teaching materials, Curriculum Analysis, and Determination of Themes, as well as Determination of Basic Competencies and Indicators.

### *Develop Preliminary form of Product*

**Table 4.** Results of Experts validation

No	Validator	Score
1	Material Expert	97
2	Media Expert	94
3	Language Expert	90
<b>Average</b>		<b>93,67</b>
<b>Criteria</b>		<b>Strongly Valid</b>

Source: Research results

### *Preliminary Field Testing*

**Table 5.** Results of Educator Responses

No	Assessed Aspect	Educators					
		1	2	3	4	5	6
1	Attractiveness	17	16	18	17	18	18
2	Easiness	16	17	17	17	17	16
3	Usability	10	10	11	11	11	10
<b>Total Score</b>		43	43	46	45	46	44
<b>Maximal Score</b>		52	52	52	52	52	52
<b>Score Percentage</b>		82,69%	82,69%	88,46%	86,53%	88,46%	84,61%
<b>Percentage Average</b>		85,57%					
<b>Criteria</b>		<b>Strongly Practical</b>					

Sources: Primary data processing

**Table 6.** Results of Student Responses in Preliminary Field Testing

No	Assessed Aspect	Percentage Per Aspect	Criteria
1	Attractiveness	90,62%	Strongly Practical
2	Easiness	88,89%	Strongly Practical
3	Usability	91,67%	Strongly Practical
<b>Percentage Average</b>		90,39%	

Source: Primary data processing

Furthermore, a product revision was carried out after the preliminary field testing, next:

## Main Field Testing

**Table 7.** Results of Student Responses in the Main Field Testing

No	Assessed Aspect	Percentage Per Aspect	Criteria
1	Attractiveness	92.08%	Strongly Practical
2	Easiness	89.72%	Strongly Practical
3	Usability	90.83%	Strongly Practical
<b>Percentage Average</b>		90,87%	

Source: Primary data processing

**Table 8.** Pre-test Results

Indicator	Score Per-Learning						Average
	1	2	3	4	5	6	
Interpretation	68	61	58	69	62	62	63,3
Analysis	68	58	61	64	60	63	62,3
Evaluation	57	58	63	53	71	67	61,5
Inference	58	64	50	51	55	56	55,6
Explanation	60	56	61	61	63	57	50,2
Self Regulation	60	65	56	61	53	72	61,2
<b>Total Score</b>	371	362	349	359	364	377	
<b>Percentase</b>	61.8%	60.3%	58.1%	59.8%	60.6%	62.8%	
<b>Average %</b>	60.5 %						
<b>Criteria</b>	Medium						

Source: Results of primary data processing

**Table 9.** Post-test Results

Indicator	Score Per-Learning						Average
	1	2	3	4	5	6	
Interpretation	85	76	75	83	80	75	79
Analysis	86	67	72	82	75	73	75,8
Evalaution	75	96	68	76	77	75	77,8
Inference	72	85	70	78	76	80	76,8
Explanation	70	90	67	76	70	71	74
Self Regulation	70	73	74	82	72	90	76,8
<b>Total</b>	458	487	426	477	452	453	
<b>Percentage</b>	76.3%	81,2%	71%	79.5%	75.3%	75.5%	
<b>Average %</b>	76.5 %						
<b>Criteria</b>	High						

Source: Results of primary data processing

## Discussion

The product results in this study are CTL-based worksheets to improve critical thinking skills. This research is a development-research with seven steps of Borg and Gall's R&D research model (Borg & Gall, 1989) and it answers the three problem formulations in this study, namely teaching materials that are valid, practical, and effective. According to Plomp & Nieveen (2013) a high quality namely, validity, practicality, and effectiveness, in other words, good teaching materials must meet three criteria, namely valid, practical, and effective.

Based on the results of the validation assessment from the six experts, this assessment instrument is theoretically feasible because it obtains an average value of 88.67 in very valid criteria and is feasible to be used in this study. The results of the research by Taherdoost (2018) state that the product is said to be valid if it meets the criteria of the quality of teaching materials based on the results of the validators' questionnaire which shows that the teaching materials developed in the study have good validity in terms of material, media, and language aspects and can be used in research. Suniasih (2019) argues if it has been validated by experts both content validation or empirical with good categories. The results of this study indicate that the teaching materials developed have an average of 4.55 or are in the very good category thus they can be used in research.

The practicality of the CTL-based LKPD to improve critical thinking skills can be seen from the results of small group testing using a practicality response questionnaire by educators of 85.57% and the response of students in the preliminary field testing of 90.39% while the response of students in the main field testing of 90.87% which consists

of aspects of attractiveness, convenience, and usefulness. These three aspects are said to be very practical because the product of contextual-based teaching materials to improve critical thinking skills is based on the stages of preparing good teaching materials and it has clear instructions for use starting from the learning process based on basic competencies and formulated by indicators, thus learning is in accordance with critical thinking indicators, then also rubric instructions that have value criteria from one to four, to guidelines for scoring the value of students' critical thinking skills.

Research conducted by Ni Wayan Suniasih (Suniasih, 2019) explains that teaching materials are said to be practical if the responses of students show the ease of use of teaching materials for students and the media used in learning are easy to obtain and easy to use in the learning process. Meanwhile, practicality according to Kurniasih & Rahayu (2017) can be seen from the questionnaire analysis of student responses to learning media including responses to use, material, appearance, and language. In addition, teaching materials that are practically used by educators and students according to Plomp & Nieveen (2013), are seen from whether educators and students can use these teaching materials easily, where the research results show that these teaching materials meet the needs and are in accordance with learning objectives.

The results of research and development of CTL-based student worksheets are effectively used in improving students' critical thinking skills, this is indicated by the results of the N-gain acquisition of 0.53 in the medium classification, which means, the level of effectiveness is in the effective category. Based on the results of the pre-test and post-test, the indicators of critical thinking skills measured by interpretation increased by 15.7; analysis increased by 13.5; evaluation increased by 16.3; inference increased by 21.2; explanation increased by 23.8, and self-regulation increased by 15.6.

Based on the results of the Paired samples test output, it is found that the value of Sig. (2tailed) is  $0.000 < 0.05$ , then  $H_0$  is rejected and  $H_a$  is accepted. Thus, it can be concluded that there is an average difference between pre-test and post-test learning outcomes, and there is effectiveness in the use of CTL-based student worksheets used to improve students' critical thinking. The test is a means of exploring critical thinking skills, through the test means developing a thinking process that can produce the right answers to the questions.

According to Sudjana (2009), the effectiveness of the learning process is related to the paths, efforts, techniques, and strategies used in achieving goals optimally, precisely, and quickly. An approach can be said to be effective if the desired learning achievement can be achieved by using an appropriate approach, one of which is the CTL approach. This is in accordance with the research that has been carried out, that developing CTL teaching materials can produce more effective learning, as evidenced by the results of the pre-test and post-test which have increased so that the learning objectives can be achieved

Likewise, based on previous research by Widodo (2017) the teaching materials developed showed effectiveness with the results of the t-test showing  $0.012 < 0.05$  which means there is a significant difference. The results of data analysis showed that the teaching materials developed were very effective for use in thematic learning. The results of the research by (Grishchenko et al., 2021) showed that the effective learning tools developed were seen from the results of the percentage of students' test completion rates of 75%.

Research by (Sarwinda et al., 2020) found that the learning process with the CTL approach was able to increase students' motivation and critical thinking skills. In line with the results of Haerazi et al (2019) research on Contextual Teaching and Learning concluded that the CTL approach can improve students' critical thinking skills and students' motivation. This is supported by the opinion of Sukinah et al (2017) that the development of the ability of students to solve problems and make decisions objectively and rationally by using the CTL learning model. Besides, CTL learning is also able to develop critical, logical, and analytical thinking skills. Likewise, the opinion of Novitasari (2015) states that the process of seeking and finding information and connecting it with Contextual Teaching and Learning can train students to optimally develop critical thinking skills.

## Conclusion

The conclusions that can be drawn from this development research are as follows:

- (1) Contextual-based teaching materials were valid for improving students' critical thinking skills in the thematic learning of theme 1 sub-theme 1 of grade V elementary school. The product of this research had been validated by material experts, media experts and linguists, with a successive validation score of 97% by material experts, 94% by media experts, and 90% from linguists.
- (2) Contextual-based teaching materials developed were practical for improving students' critical thinking in the thematic learning of theme 1 sub-theme 1 of grade V elementary school. This was evidenced by conducting a limited-scale preliminary testing with 6 educators and 12 students in the Ahmad Yani Cluster through practical responses, namely in terms of attractiveness, convenience, and usefulness for educators and students in very practical criteria.
- (3) Contextual-based teaching materials developed were effective to improve critical thinking in learning. This was evidenced by the results of the effectiveness test with N-Gain obtained by 0.53 in the medium

classification or effectively in the thematic learning of theme 1 sub-theme 1 of grade V elementary school at State Elementary School of 2 Campang Raya, Ahmad Yani Cluster, then this was also proven by the results of the value of the significance level of the paired samples t-test that was  $0.000 < 0.005$  then  $H_a$  was accepted or there was a significant increase.

The implications of this research and development are:

- (1) CTL-based student worksheets teaching materials to improve critical thinking skills developed can motivate and help educators to provide innovations to develop teaching materials in thematic learning.
- (2) CTL-based teaching materials to improve critical thinking skills make educators and students better understand what integrated learning is, the cooperation of all groups, the importance of problem-solving, and fun learning
- (3) CTL-based teaching materials to improve critical thinking skills developed can be a reference for further research in developing teaching materials, especially at the elementary school level.

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