

Developing a problem-based learning module "Lingkungan Sahabat Kita" for thematic learning to improve fifth-grade students' critical thinking

Dian Wakhidiani^{1*}
Dwi Yulianti²
Sugeng Widodo³

¹⁻³Faculty of Teacher Training and Education, University of Lampung, Bandar Lampung, Indonesia

ABSTRACT

The aim of this study was to develop a thematic learning module for our friend's environment based on problem based learning that is valid, practical and effective in improving students' critical thinking. The type of research and development used refers to the R&D theory of Borg and Gall. The population of this research was Dewi Sartika Group, Bandar Mataram District, Central Lampung with the target of 6 class educators. The sample of this study was 24 students in class VA and 24 students in VB at SDN 1 Sriwijaya Sub-district who were selected through purposive sampling technique. Data collection techniques in the form of observation, questionnaires, and tests. Data analysis used quantitative descriptive and quantitative analysis. Then quantitative analysis with t test and proportion test to test the effectiveness. The results of this study indicated that thematic teaching materials based on problem based learning models developed using Borg and Gall's R&D steps of thematic learning for fifth graders of Elementary School. Theme 1 with sub-theme 2 were feasible and effective in improving students' critical thinking.

KEYWORDS

Modules; PBL; Critical Thinking

Received: 29 October 2022

Accepted: 17 November 2022

Published: 05 January 2023

Introduction

The curriculum is input software where the curriculum is a system that guides students to achieve graduation standards. The curriculum is a system in which there are several interrelated components in order to achieve educational goals. The curriculum component consists of: a component of objectives, a component of content and organization of teaching materials, a component of teaching-learning patterns and strategies, and an evaluation component. The curriculum is one of the most decisive components in an education system, thus, the curriculum is a tool to achieve educational goals and at the same time as a guide in the implementation of teaching at all types and levels of education (Subhi, 2016).

Learning Problem Based Learning is a learning model that provides contextual problems so then it can stimulate students to learn in solving real world problems. PBL is learning that uses real problems (authentic) that is not structured (ill-structured) and is open as a context for students to develop problem solving skills and critical thinking as well as building new knowledge (Hosnan, 2014). Critical thinking is an intellectual process and full of concepts of skills, namely (1) applying; (2) analyze; (3) synthesize; (4) evaluate from where an information is obtained; (5) or generalizing the results of the process of observation, experience, reflection, reasoning, or communication as a basis for believing and what to do (Nafiah, 2014).

Table 1. Analysis of Educator Needs

No.	Teaching Materials Used by Teachers	Description
1	Core competencies and basic competencies in each theme/sub theme	It has not specifically developed yet and it has referenced syntax of PBL
2	Development of indicators from core competencies and basic competencies in each theme and sub-theme	It has not specifically developed yet and it has referenced syntax of PBL
3	Development of learning objectives from core competencies and basic competencies in each theme and sub-theme	It has not yet fully developed yet and it has referenced syntax of PBL

No.	Teaching Materials Used by Teachers	Description
4	<i>Development of learning strategies / learning models</i> from core competencies and basic competencies in each theme and sub theme	It has not yet fully developed yet and it has referenced syntax of PBL
5	<i>Development of material content presented</i> from core competencies and basic competencies in each theme and sub theme	It has not yet fully developed yet and it has referenced syntax of PBL
6	<i>Development of learning media</i> from core competencies and basic competencies in each theme and sub theme	It has not yet fully developed yet and it has referenced syntax of PBL
7	<i>Development of an assessment system</i> from core competencies and basic competencies in each theme and sub-theme	It has not yet fully developed yet and it has referenced syntax of PBL
8	<i>Impact on students from each development</i> from core competencies and basic competencies in each theme and sub-theme	It has not yet fully developed yet and it has referenced syntax of PBL

Dealing with results of preliminary research needs analysis through a questionnaire regarding assessment instruments in problem based learning to measure teaching materials used on 20-24 January 2022 in Dewi Sartika Gugus, Bandar Mataram District, Central Lampung with a target of 6 fifth grade teachers which consisted of 2 teachers of SD Negeri 1 Sriwijaya, 1 teacher of SD Negeri 2 Sriwijaya, 1 teacher of SD Negeri 1 Mataram Udik, 1 teacher of SD Negeri 2 Mataram Udik and 1 teacher of SD Negeri 3 Mataram Udik. The results are in Table 1.

Table 2. Results of Analysis of Student Module Teaching Materials on Initial Observation

No.	Available Module Teaching Materials	Description
1	Student's hand module teaching materials	The existing modules that have been used for student learning have not shown a clear learning syntax so that students find it difficult to achieve learning objectives
2	Teacher's hand module teaching materials	The existing modules that have been used by teachers as a guide are still general in nature but have not shown specificity in the learning objectives achieved, especially in developing the results of assessing students' critical thinking skills.

Regarding to Table 2, it can be explained that there has been no product development of printed module teaching materials, both modules from the teacher's hand and student modules which more specifically emphasize the syntax of problem based learning learning models to improve students' critical thinking skills. Thus, it can be concluded that the development of problem-based learning modules to improve students' critical thinking skills is really needed. The development of critical thinking skills can improve observation skills, thinking skills, decision-making skills, and analytical skills.

Teaching material with the form of module is one of the appropriate teaching materials to be used to improve students' critical thinking skills because they have several advantages. Propotype modules that deserve qualifications include being packaged systematically, building student independence, having specific learning objectives, containing practical and comprehensive learning materials, independent, it tends to be up to date, and makes it easier for students in learning activities (Alperi, 2020). Critical thinking skills can be empowered through Problem Based Learning that is implemented in an attractive way so as to increase students' interest and motivation to learn.

The results of the analysis of student needs, students are more interested in learning independently to explore their potential through problem solving according to real life. The background above is part of the results of the initial field study starting from this, this study aims to describe: "Development of the Thematic Learning Module for Our Friends Environment Based on Problem Based Learning to Improve Critical Thinking for Class V Students of SD Negeri 1 Sriwijaya, Central Lampung Regency. 2022/2023".

Methods

Research Type

The type of research method used was the Research and Development method, namely the development of Problem Based Learning-based modules on the material with the theme of Animal and Human Organs to improve the critical thinking skills of fifth grade students.

This research and development procedure is merely undertaken up to seven steps, due to time and cost constraints. The scheme of the stages of development of the Borg and Gall development model (Borg & Gall, 1983) is as follows:

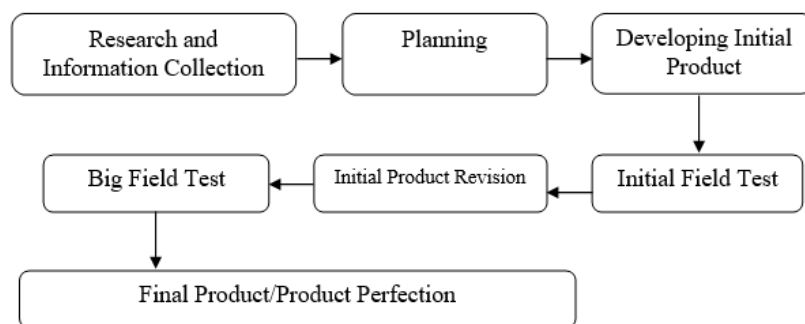


Figure 1. Schematic of development procedures according to Borg & Gall (2003)

The subjects in this study consisted of a team of experts and product users. The selected expert team has the following qualifications:

- 1) Material experts have a minimum educational background of S3 in their field of expertise.
- 2) Media experts who master educational technology have a minimum educational background of S3 in their field of expertise.
- 3) Linguists who master grammar with a minimum educational background of S3 in their field of expertise.
- 4) Test the effectiveness of the Problem Based Learning-based module that was developed on student learning achievement carried out in class VB as an experimental class named Class Module (class that used student modules based on Problem Based Learning with a sample of 24 students) and in class VA as a control class named Existing Class (a class that does not use the product developed with a sample of 24 students). The sampling technique used was the Cluster Random Sampling technique.

The types of data obtained were quantitative and qualitative data. Quantitative data was data from the results of student learning evaluations that use student modules based on Problem Based Learning which developed and data from student evaluations of learning outcomes that did not use student module development result. Qualitative data was data gained from student and teacher questionnaires in the form of module assessments, interviews about the learning process with students and teachers. The evaluation data of learning outcomes in the form of data on the results of the assessment of spiritual attitudes, social attitudes, self-assessments, assessments between friends, skills assessment data and teacher journals.

The research method was test, questionnaire and observation. Analysis of the data used in the field trials were descriptive analysis techniques, descriptive quantitative and quantitative analysis. Quantitative descriptive analysis technique was used to analyze the implementation of the syntax of the Problem Based Learning-based module. Quantitative descriptive analysis was also used to analyze the sheets of spiritual attitudes, social attitudes, skills, self-assessments, peer-to-peer assessments, teachers and module assessments by students. Furthermore, the quantitative descriptive, spiritual values, social attitude values and skill values as a result of observations were also analyzed using the formula:

$$Skor\ akhir = \frac{Jumlah\ perolehan\ skor}{Skor\ maksimal} \times 4$$

Maximum score: final score

The category of student scores is based on Permendikbud Number 23 of 2016 namely:

Very Good (SB): if you get a Final Score: 3.33 < Final Score 4.00

Good (B): if you get a Final Score: 2.33 < Final Score 3.33

Enough (C): if you get a Final Score: 1.33 < Final Score 2.33

Less (K): if you get Final Score: Final Score 1.33

Descriptive analysis technique was used to analyze the results of interviews with students and teachers after learning activities. Quantitative analysis techniques were used to test the effectiveness of Problem Based Learning-based modules in thematic learning with the theme of Animal and Human Organs on the aspect of knowledge. The quantitative analysis technique used to calculate the effectiveness of the module (cognitive value) was a two-sample independent t-test using the SPSS 20 program. Prior to data analysis, prerequisite tests were undertaken, namely normality test and data homogeneity test. Normality test was used to find out whether the data obtained is normally distributed or not. The test used was the Kolmogorov Smirnof test with the correction test being the Liliefors test. The homogeneity test was conducted to determine whether there was a difference in variance between the groups being tested.

The test used was Levene's test. The test was continued to the Independent Sample Test on the post-test scores of the control class and the experimental class through parametric tests. The purpose of the parametric test was to find out whether there is a difference in the average between two pairs of sample groups. The test criteria used are if $t \text{ count} < t \text{ table}$ or $t \text{ count} > t \text{ table}$ then H_0 is rejected. Thus, it implies means that there is a difference in the average post-test scores between the module class and the existing class.

Results

Research and Information Collecting

The initial stage of the research is a preliminary study through field studies and literature studies. Field studies are carried out by conducting a needs analysis. While the literature study is carried out by reviewing books and sources relevant to the research to be carried out. The results of observations, interviews, questionnaires on needs in the field and specific literature studies have been explained in the background of the problem.

Planning

The product is a problem based learning model-based module that is used in thematic learning for grade 5 on theme 1 "Moving Organs of Animals and Humans" sub-theme 2 "Humans and the Environment". So that the product is made according to the characteristics of grade V elementary school children.

Develop Preliminary form of Product

Modules are arranged based on the goals and objectives that have been previously planned. Product development is carried out in accordance with the module framework that has been prepared with the initial product draft as follows: Cover Page (Cover), Pre-Word, Table of Contents, KD Mapping, Learning Objectives and Preparation of Module Contents.

Preliminary Field Testing

Preliminary field testing is carried out after the product has been compiled by reviewing the product by validating material experts, media experts, and linguists. The validation results show that the instrument is feasible to be tested on educators and students for aspects of attractiveness, convenience, and usefulness.

Expert judgments are used as the basis for revising and perfecting the prototype. Expert assessment is carried out by submitting a product module based on Problem Based Learning for student motivation. Then the expert was asked to assess the suitability of the instrument with the indicators on the validation sheet. Aspects that were assessed during this initial field trial included expert validation by Lecturers of the Teacher Training and Education Faculty with the latest education is S3 (materials, media, language experts), and the responses of educators and students in small group trials. The summary results of expert validators' suggestions can be seen in table 6.

Table 3. Summary of Contributed Advice from Expert Practitioners

Expert Validation	Validator	Revision Note
Theory	Dr. Pramudiyanti, M.Si	Overall, the material is in accordance with the basic competencies and indicators. There are several wrong words and not neat in writing.
Media	Dr. Ryzal Perdana, M.Pd	Every image must have a source and in writing the source must be clear. Reference images according to the guidelines and writing fonts must be consistent. Seeing from the linguistic aspect, the draft of this module needs to be improved on aspects of the assessment of
Language	Dr. Siti Samhati, M.Pd	straightforwardness, interactiveness, coherence and the integration of the flow of thinking. After improving the systematics and language, this module can be used in the thesis and in the implementation of the following learning process.

Table 4. Expert Validation Results

No.	Validator	Score (%)
1.	Material	84,09%
2.	Media	79,54%
3.	Language	86,66%

Average	83,43%
Criteria	Excellent

Source: Research Result

Dealing with Table 4. shows that the results of validation by experts who assess the product development design of problem-based learning modules for students' critical thinking skills, have met the criteria with an average score of 83.43 with very good criteria.

Small Group Trial

The trial was undertaken after expert validation, this stage was a small group trial to find out the practicality of the problem based learning module product for critical thinking skills of fifth grade students of SD Negeri 1 Sriwijaya. The practitioner test in this small group consisted of 2 educator respondents, one educator for class VA and one educator for class VB. Meanwhile, the number of student respondents is 10 students of class V.

The results of the small group trial can be seen from the aspects assessed by educators, namely aspects of attractiveness, convenience, and usefulness. Each statement item on the usability or practicality sheet has a maximum score of 4, while the minimum score is 1. The results of the student response questionnaire are as follows:

Table 5. Student Response Results

No.	Assessed Aspect	Percentage per aspect	Criteria
1.	Attractiveness	94,16%	Strongly Attractive
2.	Benefit	87,50%	Strongly Beneficial
3.	Ease	86,66%	Strongly Easy
Percentage Average		88%	
Criteria		Strongly Practical	

Source: Result of Processing the primary data

In accordance with Table 5, it shows that the results of the student response test for small group trials for the practicality test of students, the average value of 10 students with a percentage of 88% is included in the very practical criteria.

Educator Response Test

Large group trials can be seen from the aspects assessed by educators, namely aspects of attractiveness, convenience, and usefulness. The results of the educator response questionnaire are as follows:

Table 6. Educator Response Results

No.	Assessed Aspect	Percentage Aspect	Per	Criteria
1.	Attractiveness	89,6%		Strongly Attractive
2.	Ease	85,5%		Strongly Easy
3.	Benefit	87,5%		Strongly Beneficial
Percentage Average		89%		
Criteria		Strongly Practical		

Source: Result of Processing Primary Data

Dealing with Table 6, it indicates that the results of the large group test educator response test for the practicality test from educators, the average value of educators with a percentage of 89% is included in the very practical criteria.

Main Product Revision

Product revisions are carried out after the product has been assessed by educators and students through small group trials. The revised aspects were based on suggestions and input from the trial subjects, because there were no suggestions and inputs by practitioners, they were continued for field trials. After the revision, the validity and reliability of the instrument test were then tested before the main field trial was undertaken.

Validity test

A validity test was conducted in order to determine the validity of the instrument. The data were analyzed using Rasch analysis to measure the critical thinking skills of students. The validity test of critical thinking skills

consists of 20 items taken from item fit order, item fit order about the level of suitability of items used to explain whether items function normally in measuring with the following classification:

- 1) The outfit mean square (MNSQ) value received is 0.5 to 1.5
- 2) Accepted Z-standard outfit values (ZTSD) are -2.0 to +2.0
- 3) The value of point measure correlation (Pt Measure corr) received is 0.4 to 0.85.

If one of the items whose MNSQ and PT Measure values do not meet the criteria but the ZTSD value meets the criteria is found, the item is still considered fit, which means that the item can be maintained.

Reliability Test

A reliability test was conducted in order to determine the level of determination or consistency of an instrument to measure what should be measured. The data were analyzed by Cronbach's alpha (KR-20) with Winstep Rasch. The data reliability test on the critical thinking instrument obtained a value of 0.94. According to Sujarweni (2014) if Cronbach's Alpha value is > 0.88 then the questionnaire is declared reliable or consistent. Therefore, it can be concluded that critical thinking instruments to improve critical thinking skills are reliable or consistent.

Main Field Testing

The main field testing (large group) was carried out at the State Elementary School 1 of Sriwijaya, Bandar Mataram Sub-district, Central Lampung Regency, with 2 educators, and all students in class VA as the experimental class and class VB as the control class. In this main field testing, treatment was given to the experimental class to determine the practicality of student worksheets and their effectiveness to be tested by measuring students' critical thinking in problem-based learning.

Feasibility test

The feasibility test for developing Problem Based Learning-based modules was carried out using validation sheets of material experts, media experts, and linguists as well as educators as users. The data obtained were measured using a Likert scale. The score obtained from material expert validation is 84.06%, media expert validation is 79.54%, linguist validation is 86.66%, students' responses are 87.77% and educators' responses are 88.88 % with feasible category.

Effectiveness Test

The results of the module design that have been feasible are then tested on students in the learning process, then pre-test and post-test data are taken about critical thinking with teaching materials in the form of developed modules. The data were analyzed by using the N-gain score formula and t-test, the requirement for the t-test was to first test for normality and homogeneity.

1) Homogeneity Test

The homogeneity test was used to determine whether several population variants were the same or not, calculated using SPSS 20. The results of the homogeneity test analysis of the post-test data of students in the experimental class and control class were 0.258. Thus, it can be concluded that the sample data comes from a homogeneous population because of the value of Sig. > 0.05 .

2) Normality test

The normality test was conducted to determine whether the data obtained came from a population with a normal distribution or not. The results of the normality test carried out using Kolmogrov Smirnov's normality test were then analyzed using SPSS 20. The normality test of critical thinking skills data consisted of 20 items showing a significance value of $0.020 > 0.05$, thus it can be concluded that the instrument on teaching materials based on Problem Based Learning for measuring critical thinking skills is normally distributed.

3) Test No gain (N-Gain)

Normalized gain (N-Gain) is a data analysis test that aims to determine the effectiveness of using Problem Based Learning-based modules to improve students' critical thinking. The results of the N-gain analysis obtained based on the results of the pretest-posttest conducted in this study can be seen in the following table.

Table 7. Results of Average N-Gain

No.	Class	N-Gain (%)	Classification
-----	-------	------------	----------------

1.	Class A (Control)	17,23	Not Effective
2.	Class B (Experiment)	54,19	Quite Effective

Source: Result of Processing the primary data

Based on the table above, the percentage of N-gain in the experimental class is 54.19% which is included in the quite effective category, while the percentage of n-gain in the control class is 17.23%, which is included in the ineffective category. Thus, it can be concluded that the use of Problem Based Learning-based modules is quite effective to improve students' critical thinking in thematic learning.

The product effectiveness test was carried out to see a significant difference in the improvement of students' critical thinking seen from the aspect of the students' critical thinking indicators using a test sheet that had been tested for validity with 20 valid items. The achievement of the Pretest and Posttest results can be seen in the following table.

a. Critical Thinking Achievements

The achievement of students' critical thinking from learning outcomes using problem-based learning-based teaching materials can be seen in the following table.

Table 8. Results of the Experimental Class Post-test

Indicator	Score of Per Learning					
	1	2	3	4	5	6
Analyzing skill	65	70	79	80	88	85
Synthesizing skill	62	75	79	82	89	90
Making conclusion	62	77	81	88	80	90
Managing strategy and tactics	60	70	85	88	87	86
Total Score	249	292	324	338	344	351
Score Percentage	62.25	73	81	84.5	86	87.75
Percentage averaga	79,13					
Criteria	Excelece					

Source: Result of processing primary data

Table 9. Results of the Control Class Post-test

Indicator	Score of Per Learning					
	1	2	3	4	5	6
Analyzing skill	38	44	53	59	60	68
Synthesizing skill	40	48	56	62	68	62
Making conclusion	39	42	50	57	63	65
Managing strategy and tactics	41	47	52	59	62	65
Total Score	158	181	211	237	253	260
Score Percentage	39.5	45.25	52.75	59.25	63.25	65
Percentage Average	54.27					
Criteria	Fair					

Source: Result of Processing the primary data

Tables 8 and 9 show that critical thinking skills have increased from learning 1 to learning 6, so it can be concluded that from the first to sixth learning there is an increase in critical thinking skills by using Problem Based Learning-based modules.

b. The proportion of Increase in Critical Thinking Indicator

The critical thinking achievement of students in the experimental class got an average score of 79.13% with good criteria, while in the control class the average score was 54.27% with sufficient criteria, thus it showed that there was an increase of 24.86% between classes that use problem-based learning modules and classes that do not use problem-based learning modules. Increased critical thinking in students occurs because of stimuli from outside the students themselves, thus students are encouraged to accept when learning is about to begin.

Completion of Tested Products (Operational Product Revision)

This final product is carried out based on the results of the problem-based learning module testing to improve critical thinking and the findings in the field. The research product is in the form of a problem-based learning module to improve critical thinking skills with steps consisting of Core Competency and Basic Competency analysis, Basic Competency target analysis, formulation of Competency Achievement Indicators, formulation of learning objectives, development of learning designs, and assessments that have met the feasibility to increase the learning motivation of fifth-grade elementary school students.

The results of the module test showed that the module was valid, reliable, normally distributed, and effective in measuring students' critical thinking. Thus, the product of Problem Based Learning-based teaching materials to improve the students' critical thinking that was developed was not revised and deserved to be implemented.

Discussion

Development of Appropriate Problem Based Learning–Based Thematic Teaching Materials

Educational Research: An Introduction The results showed that there was an increase in students' thinking, indicated by the difference between the experimental and control classes. The development of Problem Based Learning-based teaching materials to improve students' critical thinking in Theme 1 Sub-theme 2 in grade V Elementary School adapts the R&D steps from Borg and Gall from 10 steps to 7 steps which can be described as follows:

The first step is research and initial information gathering. Researchers conducted preliminary research to find problems in the field faced by educators and students, especially those related to students' critical thinking. Next, the second step is planning. The researcher developed product development plans in the form of Problem Based Learning-based teaching materials to improve students' critical thinking in Theme 1 Sub-theme 2.

In the third step, the researcher develops the initial product format. At this stage, the researcher compiled product drafts, systematics, and steps for developing Problem Based Learning-based teaching materials to improve critical thinking. The fourth stage is the initial trial. This stage is the validation stage by experts. Experts were experts from Lampung University lecturers. The product developed by the researcher was revised according to the input of experts consisting of material experts, media experts, and linguists. This validation aims to determine the feasibility of whether the research product developed is feasible to be tested in the field. The results of the validation obtained from the experts can be described as follows:

Material Expert

Suggestions from material experts are: Overall the material is in accordance with the Basic Competencies and Indicators. In addition, in terms of writing, there are some words that are wrong and less organized.

Media expert

Suggestions from material experts are: Overall, the teaching materials are quite good. However, it should be noted that the use of images, if there are still ones from the internet, please review the source of the image, it is better to have personal documentation to avoid plagiarism.

The use of letters should pay attention to the consistency of the size as needed, and there are still some marker components that are still blurry. The design is quite good, but it is necessary to add color gradations so that the image can be seen clearly.

Linguist

The suggestions of linguists include: Overall, the use of the language used is in accordance with the writing of good and correct Indonesian language rules, and is easy to understand, but there are still some writings that are not consistent with the size of the letters and the consistency of the use of terms and symbols.

After the product is assessed by experts and revised based on suggestions and input from experts. The product is tested on practitioners, namely elementary school (SD) educators who have masters or bachelor degrees and who are competent in their fields. After asking for an assessment from practitioners, at this stage, an assessment will be continued to students through small group testing.

The fifth step, the main product revision, is a revision that is carried out after the product is assessed by practitioners and students through small-group testing. The revised aspects are based on suggestions and input from the test subjects. In the initial product testing, the validity and reliability of the items were also tested through pre-test and post-test activities in the class being studied.

The sixth step, main product testing. At this stage, the researcher conducted product testing in the control class and the experimental class in class V as research subjects. The results showed an increase in students' critical thinking skills between the control and experimental classes. Furthermore, an effectiveness test was conducted to prove that the research product developed was effective in improving students' critical thinking.

The seventh step is the final product or product refinement. At this stage, the developed product is improved again based on the findings and obstacles encountered during field trials to be refined. The form of research product is in the form of Problem Based Learning-based teaching materials which can be briefly described as follows; (a) front cover, containing the product title, lesson content, author's name, and supporting images regarding the information on the content of teaching materials; (b) preface, containing the researcher's thoughts; (c) table of contents, containing information to help users find the information they want to go to/read; (d) Basic competencies and indicators, in the form of descriptions and details of competency targets and materials on Basic Competencies; (e) presentation of the contents of the material, (f) summary, (g) evaluation, (h) glossary, (i) list of references, and (j) back cover.

Based on the results of observations regarding learning resources, the educators said that they had never tried to compile teaching materials for thematic learning. Although sometimes educators compile printed teaching materials for students to use in thematic learning, the prepared printed teaching materials have not been able to increase students' learning motivation. In addition, the educators said that there were also teaching materials that were deliberately purchased from the printing press but had not been able to be used to increase students' learning motivation because the teaching materials were not always in accordance with the characteristics of students. Therefore, it is necessary to have teaching materials that improve students' critical thinking in the learning process. In line with opinion Susanto (2014), the application of Problem Based Learning is very important thus it requires students to work hard individually and in groups, develop all their thinking skills, and utilize existing resources around them to achieve the expected learning outcomes.

In addition, the Problem Based Learning approach is easy to apply in learning thus it is considered to be able to facilitate students to be active in doing various tasks/learning activities that lead to the achievement of learning objectives. Learning materials/materials in the form of modules arranged in accordance with the Problem Based Learning model present learning materials that emphasize active learning that can be carried out independently or in groups. This is in line with the opinion of Hsu et al (2016) which explains that Problem Based Learning places the main emphasis on active learning. Through teamwork, students collect, interpret, and analyze data collectively as they search for answers and build their own meaningful knowledge systems. Problem Based Learning moves beyond knowledge-oriented teaching by emphasizing competency-oriented teaching with the aim of enhancing independent learning skills, teamwork, and integration of knowledge as well as problem-solving skills, critical thinking, and lifelong learning capacities. The optimal application of Problem Based Learning-based learning will help students to build broad and flexible knowledge, develop as individuals and apply their knowledge in various problem situations. In addition, students can develop effective problem-solving skills according to their level of development. This statement is also supported by the opinion of Hirça (2011) which explains that Problem Based Learning is designed to help students build broad and flexible knowledge, develop as individuals who apply their knowledge in various problem situations, develop effective problem-solving skills including the ability to apply appropriate meta-cognitive strategies and reasoning and develop independent, lifelong learning skills; be an effective collaborator who knows how to function properly as part of a team so that it shows that the teaching materials in the form of the developed module are suitable for use in research. In line with the results of previous research conducted by Leonda & Budi (2015), it shows that the developed Problem Based Learning-based media/teaching materials are suitable for use as learning materials.

The learning process uses student-centered Problem Based Learning-based teaching materials so that students actively participate in constructing concepts, directing students to find problems and find solutions to problems, and supporting critical and analytical thinking skills that can be done through collaboration or individual hypothesis submission, then the teaching materials in the form of modules that have been developed are designed in accordance with the steps in the Problem Based Learning learning model, especially the material for theme 1 sub-theme 2.

Based on the explanation, in the form of expert and practitioner validation test results, evidenced by the quality of teaching materials, relevant theories, and research which are the basis for references in product development, an assessment of the feasibility of teaching materials is obtained with appropriate criteria or can be used in research and development.

The Effectiveness of Thematic Teaching Materials Based on the Problem-Based Learning Model Improves Critical Thinking

One aspect that is measured in this study is the effectiveness of increasing students' critical thinking on thematic subject matter after learning using teaching materials based on Problem Based Learning.

Measurement of initial critical thinking is carried out before learning, then the measurement of final critical thinking is carried out after learning by using teaching materials based on Problem Based Learning for the experimental class and conventional learning in the control class. The test of the effectiveness of students' critical thinking was analyzed using N-gain on SPSS 20, and the average N-Gain results for the experimental and control classes were obtained.

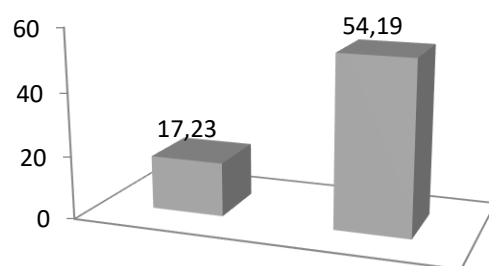


Figure 3. Results of the Percentage of N-Gain experimental class and control class

Based on Figure 3, the percentage of N-gain in the experimental class is 54.19%, which is included in the effective category, while the percentage of N-gain in the control class is 17.23%, which is included in the less effective category. This means that in the experimental class that uses teaching materials based on problem-based learning in thematic learning, it is effective in increasing critical thinking on students' external factors.

Based on the results of the Independent samples test output, it was found that the value of Sig.(2tailed) was $0.000 < 0.05$, then H_0 was rejected and H_a was accepted. Thus, it can be concluded that there is an average difference in critical thinking between the pre-test and post-test of the experimental and control classes, there is effectiveness in the use of Problem Based Learning-based teaching materials to improve students' critical thinking skills. Increased critical thinking in students occurs because of stimuli from outside the students themselves, thus students are encouraged to accept when learning is about to begin.

In line with the results of research Hsu et al (2016), the results showed that student learning outcomes through PBL (experimental group) were superior to the control group. Students in the experimental group showed that PBL encourages independent learning, and improves their ability to think critically and learn independently. opinion Susanto (2014) states that the application of PBL is very important so that it requires students to work hard individually and in groups, develop all their thinking abilities and utilize existing resources around them to achieve the expected learning outcomes. Thus, the Problem Based Learning learning model is suitable to be applied in thematic learning because it can overcome the learning difficulties of individual students to understand the concept because it is more widely used for problem-solving.

Research Advantages and Limitations

Advantages of Products Developed in Research

- a) The problem-based learning model-based teaching materials that were developed compared to the existing teaching materials were more practical and feasible in applying them because they had been arranged systematically.
- b) Teaching materials based on problem-based learning models that were developed were effective to improve students' critical thinking skills

Limitations

- a. Product Limitations
 - 1) The research product developed only covers thematic subjects in theme 3 Sub-theme 3.
 - 2) This research product only implements 7 steps from 10 steps due to time and cost limitations.
 - 3) In this study, the assessment analysis carried out only focused on the realm of knowledge.
- b. Research Limitations
 - 1) The research instrument was only tested once, so there was still the possibility that the test results were not as expected.
 - 2) The effectiveness test was only carried out in one school, so there was still the possibility of different results if it was carried out in other classes or schools.
 - 3) Potentials and problems only focused on class V and one subject, namely theme 3, sub-theme 3.

Conclusion

Conclusion

Based on the results of research and discussion, the following conclusions can be obtained:

1. Thematic teaching materials based on problem-based learning models developed using the Borg and Gall R&D steps in thematic learning for class V Elementary School Theme 1 sub-theme 2 are feasible for use in research. This is evidenced by the results of expert validation with an average score of 83.43 and practitioners' responses of 88%, students' responses amounting to 89% with the category very feasible for use in learning.
2. Thematic teaching materials based on problem-based learning models developed are effective in improving students' critical thinking skills. This is evidenced by the difference in the acquisition of N-gain scores obtained by students through the pretest and posttest before and after the learning process using problem-based learning module teaching materials. The increase in students' critical thinking can be shown from the results of an average increase of 24% after the posttest with the N-gain obtained by 53.17% in the quite effective category.

Implications

The implications of this research and development are:

- 1) First, the characteristics of module teaching materials are in accordance with Problem Based Learning to improve critical thinking, namely Problem Based Learning module-based teaching materials that are suitable for use in the learning process to improve students' critical thinking and can be used in the thematic learning process for fifth-grade elementary school and serve as a reference and guidelines for future teachers in developing teaching materials.
- 2) Problem Based Learning-based teaching materials make it easier for teachers and students to carry out learning, thus learning objectives can be achieved optimally. In addition, it familiarizes students to be critical of the material obtained thus it can help them in solving problems. In terms of effectiveness, Problem Based Learning-based module teaching materials are effectively used in the learning process, especially in thematic learning.

In accordance with the results of this research and development, there is an increase in improved students' critical thinking from external factors as evidenced by an increase after using Problem Based Learning-based module teaching materials in the learning process in class V of State Elementary School 1 of Sriwijaya and it can realize an active, creative and fun learning process.

References

- Alperi, M. (2020). Peran Bahan Ajar Digital Sigil Dalam Mempersiapkan Kemandirian Belajar Peserta Didik. *Jurnal Teknodik*, 99-110, 99-110. <https://doi.org/10.32550/teknodik.v0i1.479>
- Borg, W. ., & Gall, M. D. (1983). *Educational Research, An Introduction (4 th Ed)* (th). Longman Inc.
- Borg, W. ., & Gall, M. D. (2003). *Educational Research: An Introduction (4th Editio)*. Longman Inc.
- Hırça, N. (2011). Impact of problem-based learning to students and teachers. *Asia-Pacific Forum on Science Learning and Teaching*, 12(1), 3.
- Hosnan, M. (2014). Pendekatan Saintifik dan Kontekstual dalam Pembelajaran Abad 21: Kunci Sukses Implementasi Kurikulum 2013. In *Bogor*. Ghalia Indonesia.
- Hsu, C., Yen, S., & Lai, W. (2016). The Effect of Problem-Based Learning on Learning Outcomes of Accounting Students. *Asian Journal of Finance & Accounting*, 8(2), 135. <https://doi.org/10.5296/ajfa.v8i2.9917>
- Leonda, M. A., & Budi, A. S. (2015). Pengembangan Modul Berbasis Problem Based Learning untuk Materi Usaha dan Energi di SMA (Sesuai Kurikulum 2013). *Prosiding Seminar Nasional Fisika (E-Journal)*, IV, 119-124.
- Nafiah, Y. N. (2014). Penerapan Model Problem-Based Learning Untuk Meningkatkan Keterampilan Berpikir Kritis Dan the Application of the Problem-Based Learning Model To Improve the Students Critical Thinking. *Jurnal Pendidikan Vokasi*, 4(1), 125-143.
- Subhi, A. (2016). Konsep Dasar, Komponen Dan Filosofi Kurikulum PAI. *Jurnal Qathruna*, 3(1), 117-134.
- Susanto, A. (2014). *Pengembangan Pembelajaran IPS di Sekolah Dasar* (1st editio). Prenadamedia Group.