The Development of Lesson Plan Based on Backward Design to Improve Students' Critical Thinking at Elementary School

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ABSTRACT

This research and development aim to develop a Lesson Plan Based on Backward Design that is feasible to improve the critical thinking of elementary school students. Research and development refer to Borg & Gall's theory. The study population was fifth-grade educators at Elementary School Dr. Wahidin Husodo in Metro, Lampung. The sample was determined using a purposive sampling technique of seven educators from different elementary schools. Data was collected through a questionnaire, observation and test results. The results showed that the Lesson Plan that developed was feasible to use and showed that it could improve students' critical thinking. This is proved by the increase in student learning outcomes and students' critical thinking skills after using a backward design lesson plan.

CCS CONCEPTS

Human-centered computing → Collaborative and social computing design and evaluation methods

KEYWORDS

Lesson Plan, Backward Design, Critical Thinking

1. Introduction

Learning using the development of a Lesson Plan based on backward design is expected to be able to construct student knowledge and support students to actualize their academic potential, personality, and creativity to show proof that students are actualizing their potential, which is to bring out students' creativity and critical thinking abilities according to 21st century educational needs. Critical thinking is a way of reflective thinking that makes sense or that is based on logic focusing on determining what to believe and to do [1].

ICLIQE 2020, September 5, 2020, Surakarta, Indonesia

ACM ISBN 978-1-4503-7572-6/20/09…$15.00
https://doi.org/10.1145/3452144.3452153

Besides that, critical thinking skills involve identification and analysis of informational sources for credibility, indicating previous knowledge and making connections and deducing to conclusions [2]. Academically it is believed that critical thinking is generally owned by highly educated people. The capability to analyse, understand, evaluate, abridge, and generating new information are known as critical thinking [3].

Furthermore, critical thinking is the intellectually disciplined process of activity and skillfully conceptualizing, applying, analyzing, synthesizing and evaluating information [4]. This study also refers to some of the results of previous studies. Research conducted by Guner, in his research on Allosteric Learning Models in English Lesson: Teachers' Views, the Instructions of Curriculum and Course Book, A Sample of Daily Lesson Plan, which aims to present examples of lesson plans or daily lesson plan for using the AudioLingual Method principle in English lessons [5]. Furthermore, the research conducted about integrative thematic learning tools based on literature is feasible for fifth-grade elementary school students, which aims to determine the effectiveness of integrative thematic learning tools based on literature for fifth-grade elementary school students [6].

The results showed that integrative thematic learning tools based on literature development according to experts (expert judgment) categorized as "good". Research conducted shows that students, regardless of class level differences, generally have confidence in the ability to think critically and can identify activities in their assignments that demand critical thinking [7]. The findings of this study indicate that students are not only able to understand the concept of critical thinking but also have the capacity to think critically at all grade levels. The relevant research above has similarities and differences with the research to be carried out. The similarity between them is using learning tools as a means of implementing learning. in this study, the Lesson Plan that developed aims to improve students' critical thinking skills. The difference is a different subject matter, different research subjects at different levels. It is appropriate for teachers to solve and have skills in designing learning plans for their students, enabling teachers to create learning tools to assess according to certain rules.

Learning tools that are set according to prepared rules will produce valid and reliable tools. Thus it will produce data and information about student achievement levels that are valid and

accurate as well. This study of developing a Lesson Plan based on backward design contributes to knowledge and experience for teachers, as an alternative to improving students' critical thinking. In the point of view of backward design, teachers are designers. They should craft the curriculum and learning experiences to meet specified purposes. Teachers are also designers of assessments to recognize student needs to guide their teaching and to enable themselves and their students to determine whether they have achieved their goals[8]. Based on these problems, it is necessary to have research and development of the Lesson Plan based on backward design to improve the critical thinking skills of elementary school students.

2. Method

This type of research is Research and Development. The research and development used is the Borg & Gall design model which consists of ten steps: initial research and information gathering, planning, initial product format development, initial trials, product revisions, field trials, revisions products, operational field trials, final product revisions, implementation [9]. This study only carried out the first step to the seventh step, which is the initial research and information gathering stage to the field trial stage, due to the limitations of the researcher, both in terms of time and cost. The population in this study was the fifth-grade elementary school teacher at Dr. Wahidi Sudiro Husodo Metro, Lampung. While the sample is one of the elements of the population that will be used as an object of research. In this study, the sampling technique used is a purposive sampling technique that is included in nonprobability sampling, a sampling technique with certain considerations.

Data collection tools for developing Lesson Plan based on backward design are material, media, and language validation. Material aspects include the suitability of the Lesson Plan based on backward design for critical thinking and the quality of the content. Media aspects The Lesson Plan meets didactical, construction, and technical requirements. The language aspect fulfills the writing requirements.

Learning outcomes are obtained from the results of the pre-test and post-test of learning using the Lesson Plan based on backward design, using valid and reliable test instruments, and considering the level of difficulty and the different power of the questions. The multiple-choice instrument is given a score of one for the correct answer and a score of zero for the wrong answer. The results of critical thinking skills use observation sheets. Data analysis techniques used to see the effectiveness between the use of Lesson Plan based on backward design learning tools in learning is done by analyzing the average value of the normalized gain with the n-Gain formula. The n-gain analysis that will be used in this study is based on the results of the pre-test and post-test.

3. Research Results And Discussion

3.1. Research Results Development of a Lesson Plan based on Backward Design to improve critical thinking of fifth-grade students of elementary school

Research Results Development of a Lesson Plan based on Backward Design to improve critical thinking of fifth-grade students of elementary school, the results are obtained:

3.1.1 Research and Information Collection

The collection of initial information is done through preliminary research by observing the learning process and collecting learning outcomes documents in the fifth grade of Elementary Schools in Metro, Lampung. The results of the preliminary research are used as a consideration and basis for the development of the Lesson Plan. This step needs to be done because this development research is testing a product in the form of a thematic Lesson Plan based on backward design to improve critical thinking. Its development is based on empirical data on the subject studied based on observations of students' critical thinking and analysis of learning outcomes and analysis of the needs of educators on September 6 and 7, 2019 in the fifth grade of Elementary School.

3.1.2 Planning (Planning)

Planning of developing a themed Lesson Plan based on backward design that is, initial preparation of the Lesson Plan to improve critical thinking, presenting indicators by basic competencies, learning objectives by indicators with character content, preparation of summative assessments by the objectives to be achieved, steps learning steps with memorable models and methods, planning evaluation tools, and preparing assessment instruments.

3.1.3 The Development of Initial Product Format

The first stage carried out by researchers is analyzing the curriculum and analyzing the contents of the Core Competencies and Basic Competencies, then compiling a draft of the Lesson Plan by the backward design model, that is, formulating indicators by the Basic Competencies, followed by formulating learning objectives by the provisions associated with indicators thinking critical, then conduct a formative assessment to see and know students' understanding of learning material by direct assessment, followed by carrying out the process of learning activities by student needs to be seen from the results of the previous formative assessment. The results of this product design are Thematic Lesson Plan based on backward design which is completed with questions and lattice assessment questions and observation instruments for students' critical thinking.

3.1.4 Preliminary Field Testing (Preliminary Field Testing)

The results of limited product trials are used to determine improved learning outcomes, critical thinking skills, and effective use of learning tools. This is the following results of the trial.

3.1.4.1 Learning Outcomes

Based on the hypothesis test, the N-Gain calculation result is 0.35 in the medium category and students reach the Minimum Mastery Criteria of 66% (6 students), then the Lesson Plan based on Backward Design is quite effective to be used in the field test.

Table 1. Limited Test Pre-test and Post-test Score

No.	Indicator	Test scores			Criteria
		Pre-test	Post-test	N-Gain	
1	The number of students	9	9	0,39	Medium
2	Amount of Values	518,70	642,74		
3	Average value	57,63	71,42		
4	Highest Scores	78,64	92,00		
5	Lowest score	36,08	47,42		
6	Completeness Level	33%	55%		

3.1.4.2 Critical Thinking Ability Test Results

The results of the critical thinking ability test were obtained from the observation of students while participating in learning in a limited trial class. The following is a recapitulation of the results of students' critical thinking in small groups.

Table 2. Recapitulation of the results of critical thinking skills of small group students

No.	Score	Category	Frequency	Percentage (%)
1	81-100	Very Good	1	11,1
2	66-80	Good	5	55,6
3	51-65	Enough	3	33,3
4	0-50	Less	0	0,0
Total			9	100,0

Based on the above table it can be described that the critical thinking skills of 9 students in a small group there is 1 student (11.1%) with a very good category, 5 students (55.6%) with a good category, and 3 students (33.3 %) with enough categories. It can be interpreted that the ability to think critically is marked by the emergence of aspects that show indicators of critical thinking are visible.

3.1.4.3 Practitioner test results

Learning tools of the Lesson Plan is conducted by a validation test by the practitioner/teacher, to assess the effectiveness of the Lesson Plan based on character. This validity test was carried out in the initial trials in the fifth grade of Public Elementary School in Metro, Lampung. These are the results.

Table 3. Results of expert validation

No.	The practitioner	Value	Category
1	Practitioner 1	79,5	Very Good
2	Practitioner 2	80,6	Very Good
3	Practitioner 3	80,6	Very Good
Total		240,7	
Average		80,2	

3.1.5 Main Product Revision

It shows that there is a significant increase in learning outcomes and critical thinking skills and practitioner tests, so the product does not need revision, and is worth testing in large groups.

3.1.6 Main Field Testing

There are differences in learning outcomes before and after using a Problem Based Learning Worksheet. Improvements that occur before and after learning are calculated by the N-Gain formula, as follows.

Table 4. Expanded Pretest and Posttest Test Scores

No.	Indicator	Test scores			Criteria
		Pre-test	Post-test	N-Gain	
1	The number of students	21	21	0,41	Medium
2	Amount of Values	1208,64	1980		
3	Average value	57,55	73,3		
4	Highest Scores	78,64	90		
5	Lowest score	36,08	60		
6	Completeness Level	43%	81%		

Based on the hypothesis test, the N-Gain calculation result is 0.41 in the medium category and students reach the Minimum Mastery Criteria of 81% (17 students). An increase in learning outcomes before and after using the Lesson Plan based on Backward Design in large group trials. While the results of critical thinking skills test results obtained from student observations while participating in learning in the classroom trial class. The following is a recapitulation of the results of students' critical thinking skills in large groups.

Table 5. Observation of students critical thinking

No.	Score	Category	Frequency	Percentage (%)
1	81-100	Very Good	2	9,5
2	66-80	Good	14	66,7
3	51-65	Enough	5	23,8
4	0-50	Less	0	0,0
Total			21	100,0

Based on the table above it can be described that the critical thinking skills of 21 students in a large group there are 2 students (9.5%) with a very good category, 14 students (66.7%) with a good category, 5 students (23.8%) with enough categories, and no students with less categories. It can be understood that students are said to be able to think critically marked by the emergence of aspects that show indicators of critical thinking, the results of the analysis of each aspect of critical thinking as follows.

Table 6. Analysis of the Critical Thinking Aspects

No	Indicator	Percentage	Category
1	Ability to analyze	71,4 %	High
2	The ability to interpret answers	80,9 %	High
3	Ability to evaluate	76,2 %	High
4	The ability to conclude	66,6 %	Medium

While the practitioner test on a large trial was conducted on 7 teachers from the Public Elementary School in the Dr. Wahidin Husodo in Metro, Lampung. The test results can be seen in the following table.

Table 7. large group trials by practitioners

No.	The Practitioner	Value	Category
1	Practitioner 1	87,5	Very Good
2	Practitioner 2	86,3	Very Good
3	Practitioner 3	89,7	Very Good
4	Practitioner 4	80,6	Very Good
5	Practitioner 5	90,9	Very Good
6	Practitioner 6	75,0	Very Good
7	Practitioner 7	86,3	Very Good
Total		596,3	
Average		85,2	

3.1.7 Operational Product Revision

This revision was made after the analysis of the main field trials to improve the product, taking into account comments and suggestions during previous trials.

3.2. Effectiveness of Lesson Plan based on Backward Design for improving critical thinking

The product effectiveness test was conducted to see a significant increase in students' critical thinking skills seen from student learning outcomes before and after learning using thematic learning tools. The average pretest learning outcomes of students in grade 5 were 57.55 and posttest results increased to 73.30 with an average N-Gain of 0.41 (medium category). Besides, the effectiveness of the Lesson Plan is also seen from the practitioner test which shows a very good category with an average value of 85.2.

3.3. Discussion

3.3.1 Development of Lesson Plan based on Backward Design to improve critical thinking

This research is a development study, the development is carried out by analyzing the observational data. In the initial field study, information was obtained that (1) the quality of the learning process was still low. (2) The ability to think critically in low category students. (3), the teacher has not yet made a Lesson Plan that is integrated with 21st Century skills including 4C, Literacy and High Order Thinking Skills (4) The Lesson Plan does not yet contain points that lead to the character-building of learners, (5) The unavailability of learning tools in the form Lesson Plan based on Backward Design for Public Elementary Schools in Metro, Lampung. Therefore, the authors developed a Lesson Plan based on Backward Design in fifth grade for elementary schools.

The form of the Lesson Plan that developed in this study is similar to the backward design model. The backward design model that is centered on students is done by identifying the objectives, conducting assessments before the learning process takes place (formative), planning learning experiences and learning, and finally, the final learning assessment (summative) is final. Furthermore, according to the Minister of Education and Culture Regulations No. 22 of 2016 concerning the standard process, the preparation of the Lesson Plan should consider the following principles:

1. Individual differences, including initial abilities, intellectual level, talents, interests, and potential, learning motivation, social abilities, emotions, learning styles, special needs, learning speed, cultural background, norms, values, the environment of students.
2. Active participation of students
3. Student-centered, to encourage enthusiasm for learning, motivation, interest, creativity, initiative, inspiration, innovation and independence.

This study refers to the results of Fauziah & Jailani's research which shows that the effectiveness of the Lesson Plan must go through student learning processes in groups, discuss, and develop skills based on understanding that can make students actively build and discover their knowledge so that the process of understanding concepts is more easily internalized into real-world contexts [10]. This study uses a Lesson Plan based on Backward Design that leads to indicators of critical thinking.

3.3.2 The Effectiveness of Lesson Plan based on Backward Design Tools to improve critical thinking

The effectiveness of teaching material in learning is seen from whether or not the student's learning outcomes increase after using the teaching material. To determine the effectiveness of the use of Lesson plans based on Backward Design by looking at the level of learning outcomes obtained by students before and after participating in learning using these tools. The effectiveness test is used to see the ability to think critically, and student learning outcomes, as well as practice tests.

Calculation results based on 4 aspects of critical thinking analyzed to have a high category in general. It is seen that 3 out of 4 aspects of critical thinking analyzed have an average percentage in the high category. Thus that there is an increase in student learning outcomes and critical thinking skills before and after using Lesson Plan based on Backward Design in the fifth grade of Public Elementary School in Metro, Lampung. Furthermore, the effectiveness of the Lesson Plan is also seen based on the practitioner test which shows a very good category with an average value of 85.2 out of 7 practitioners. This finding is supported by research conducted that the learning tools of the Lesson Plan can facilitate teachers in teaching and be able to form honest, disciplined, and responsible characters, increase student achievement and are relevant in developing analytical skills and build knowledge by [10].

3.3.3 Advantages of Product Development

Lesson Plan based on Backward Design is a product of development that has the following advantages.

1. The Lesson Plan that developed is a thematic Learning Lesson Plan that is by the Curriculum 2013.
2. The Lesson Plan is presented in clear, straightforward language, and contains instructions that describe activities that are easy to understand.
3. Lesson Plan contains the character of the learning objectives, to the end of the description of activities that can be used to familiarize students to behave well by the expected character.
4. The Lesson Plan contains questions that have been validated theoretically and empirically and there is a breakdown of learning material that is consistent with the theme being taught.
5. Product Development Limitations
6. In addition to the advantages of developing a Lesson Plan based on backward design, the product of the Lesson Plan that developed also has some weaknesses or limitations, which are as follows.
7. The preparation of the Lesson Plan product is only tested once, allowing for errors and shortcomings in the preparation
8. The Lesson Plan product is only developed in 1 learning sub-theme.
9. There are still multiple sentence meanings in the description of the learning activities description
10. The directions for familiarizing social behavior are not reaffirmed in the contents of the Lesson Plan which is integrated with the Problem Based Learning model.

4. Conclusion

Based on data analysis of research and development results with the title "The Development of Lesson Plan Based on Backward Design to Improve Students' Critical Thinking at Elementary School" can be concluded that.

Lesson Plan for Thematic Learning based on backward design to foster critical thinking that is developed theoretically and empirically is suitable for use in fifth-grade elementary schools. This is proved through the assessment of experts that are material experts, media experts, language experts who state that the Lesson Plan that developed in the category is very good. Besides, the Lesson Plan based on Character is also equipped with questions that meet the proper criteria in the validity, reliability, difficulty level, and difference power test. Thematic Lesson Plan based on character and backward design are carried out in the small group trial and large group trials.

Lesson Plan that developed theoretically and empirically effective for critical thinking fifth-grade elementary school students. This is proved through the increase in student learning outcomes from the use of the Lesson Plan that developed. Besides, the Lesson Plan based on Backward Design to improve critical thinking is also used in learning accompanied by observing students' critical thinking processes to see the effectiveness of the product being developed.

ACKNOWLEDGMENTS

The author would like to acknowledge the Elementary School in Lampung, specially in Metro for supporting the research. The Lesson Plan based on Backward Design can be a guide and aids in implementing the learning process in elementary school.

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