

Conference Paper

A Development of Integrative Thematic Textbook with Problem-Based Learning to Improve the Critical-Thinking Ability of Elementary Students at Grade IV

Fita Rahmawati¹ and Ali Muhtadi²¹Elementary Education Program, Magister Program, Yogyakarta State University²Education Curriculum and Technology, Faculty of Education, Yogyakarta State University

Abstract

This research aimed (1) to produce an integrative thematic textbook with Problem-Based Learning that is appropriate to improve the critical-thinking ability of elementary students at grade IV and (2) to examine the effectiveness of the textbook. The design of the research was R&D by Borg and Gall. The product tests were limited test, expanded test, and operational test. The researches were conducted at *SDN Semanu II*, *SDN Karangrejek II*, and *SDN Gombang II* in *Gunungkidul* District. The subjects of the research were 110 students and 4 teachers of grade IV. The instruments of data collection were interview guidelines, observation sheets, and expert validation sheets, questionnaires of teachers' response, students' response scale, and test of critical-thinking ability. The effectiveness of the product was tested using quasi experiment. The data were analyzed descriptively qualitatively and quantitatively through the test of difference with significance level 0.05. The result of this research was in the form of appropriate textbook based on the assessment from media expert and material expert that categorized the textbook as "very good". The developed product was effective to improve the students' critical-thinking ability. The average post-test score proved it, in which experimental classes 1 and 2 gained 80.48 and 80.39. The average post-test score in control class was only 67.73. The difference of average scores was significant at calculated t score 5.579 and two-tails significance at 0.000 for the difference test between the post-test of experimental class 1 and the control class. Meanwhile, the difference of average scores was significant at calculated t score 5.845 and two-tails significance was at 0.000 for the difference test between the post-test of experimental class 2 and the control class.

Keywords: Integrative thematic textbook, Problem Based Learning, critical-thinking ability

Corresponding Author:

Fita Rahmawati

fita.rahmawati@student.uny.ac.id

Received: 2 May 2019

Accepted: 19 June 2019

Published: 3 July 2019

Publishing services provided by
Knowledge E

© Fita Rahmawati and Ali Muhtadi. This article is distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use and redistribution provided that the original author and source are credited.

Selection and Peer-review under the responsibility of the ICMEd Conference Committee.

 OPEN ACCESS

1. Introduction

Learning is a change of disposition or ability achieved by one through activities. One of the change in cognitive aspect is students' having critical-thinking ability. Students are expected to acquire critical-thinking ability after the learning process.

Critical thinking is an ability to think in-depth and thoroughly. The ability to think critically will result creative solution to solve certain problems. Stobaugh (2012: 2) stated “*critical thinking is deeply processing knowledge to identify connections across disciplines and find potential creative solutions to problems*”. [6] Yet, based on the interviews and observations, not all students in elementary school have high ability to think critically. The students faced difficulties in expressing their opinion and cannot really answer ‘why’ and ‘how’ questions. The lack of ability to think critically was caused by incomplete and in-depth textbook. When students cannot find any information needed in their textbook, some of them despair.

It is important for students to think critically and objectively about a problem. To process information, they need critical thinking ability. Elementary students have to be brave to ask questions, express opinion, and object the information they get.

Teachers state that the obstacles in implementing integrative thematic learning are: the lack of material in the textbook, complex assessment system, and the lack of time. It is important to develop integrative thematic textbook which can optimize the learning process and improve students’ ability.

The ability to think critically can be improved with Problem-Based Learning. Problem Based Learning was conducted by giving problems which must be solved with the best solution. The advantages of problem-based learning include challenging the students’ ability to find the new knowledge, enhancing the motivation, comprehend the problem in real life, training responsibility, develop critical-thinking, and helping students to acquire the concept to solve the problem in reality. It is important to develop integrative thematic textbook from government in order to develop students’ critical thinking skill at Grade IV. Therefore, this research is urgently needed.

The development of this textbook is limited for grade IV in the theme ‘My Dream’ sub-theme ‘My Big Dream’. The research was conducted only at SDN Semanu III, SDN Karangrejek II, and SDN Gombang II in Gunungkidul District. The research is limited at improving the students’ critical thinking ability.

2. Literature Review

Integrative thematic learning consists of various disciplines or subjects. Fogarty (2009: 92) says what was meant by integrative thematic “the integrated curricular model represents a cross-disciplinary approach similar to the shared model” [7]. An integrative curriculum model is simultaneous cross-disciplinary learning. Other integrative thematic

advantages are presented by Ellis (Bennet, 2010: 18), namely (1) the integrated curriculum has the potential to improve higher-order thinking skills, (2) can have real-world applicability, thus allowing for transfer of knowledge, (3) can also increase student motivation [14]. Integrative thematic has the potential to develop high-level thinking skills. Material applications in the real world are clearer. Transfer of knowledge is more easily understood and practiced by students. Students' learning motivation increases with integrative thematic learning.

The developed product in this study is a textbook. Prastowo (2014: 244) explained "textbooks are books based on written materials in the form of paper bound and given leather (covers) that provide knowledge that is systematically compiled by the author" [8]. Textbooks have an important role in learning. This was stated by Asghar (2015: 59) "As the text book is very important in teaching the genre. So, it is an important part of the genre to fulfill the need for teachers and students to have access to knowledge of this genre. Such studies can be helpful in developing academic reading and skills of learners" [1]. According to Asghar, teaching books are very important in teaching.

Torp & Sage (2002: 15) revealed "Problem-based learning is focused, experiential learning (minds-on) organized around the investigation and resolution of messy, real-world problems" [9]. Problem-Based Learning develops problem solving skills, critical thinking, self-direction, self-regulation, and collaborative skills (Davidson & Major, 2014: 27) [2].

Leicester & Taylor (2010: 2) convey "critical thinking can be thought of as a toolbox for enabling children to think about what they believe about what they should do" [10]. Leicester & Taylor (2010: 7-80) mention five aspects of critical thinking: asking questions, points of view, being rational, finding out, and analyzing [10]

The research conducted by Drake & Long (2009) in elementary school fourth grade students resulted the conclusion saying that the application of Problem-Based Learning is effective in increasing mastery of knowledge content (knowledge of content), self-image as scientist (stereotypical image of scientists), effective use of time (time-on-task), and skill of transfer problem - solving [3]. Thus, Problem-Based Learning can be an effective approach to improve students' critical thinking skills.

3. Material & Methodology

The research and development model applied was Borg and Gall design (1983: 775-776) which consist of 10 (ten) steps. They are (1) *research and informing collecting*, (2) *planning*, (3) *developing preliminary form of product*, (4) *preliminary field testing*, (5)

main product revision, (6) main field testing, (7) operational product revision, (8) operational field, (9) final product revision, and (10) dissemination and implementation [11]. Quasi-experimental research was conducted with nonequivalent control group design. The effectiveness of instruments for problem-based integrative thematic learning was determined by comparing the students' ability before and after the application of product on experimental groups and control group.

The technique of data collection was obtained through interview, observation, expert validation, questionnaire, scale, and tests. The instruments used to collect those data are (a) interview guidelines, (b) observation sheets, (c) product validation sheets, (d) questionnaire, (e) scale sheets, and (f) test instruments. Expert validators validated all instruments (except test instruments). Only few needs to be revised. Meanwhile the validation of test instruments were seen through the constructive validation and content validation. Constructive validation was determined through testing 31 students' critical thinking at Grade IV SDN Gombang II. Content validation was analyzed with Aiken index formula as follows.

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

(Retnawati, 2016: 18)[12]

Explanation: V= Aiken validity coefficient; s = rater score– lowest score; n = amount of raters; c = amount of category.

Reliability of instruments for testing the critical thinking was analyzed using coefficient Alpha Cronbach through SPSS 23. The index of difficulties and distinctive feature of questions was analyzed using Microsoft Excel.

The data obtained in the research is qualitative data and quantitative data. The qualitative data were in the form of interview results; observation of students and teachers; suggestions from experts, teachers, and students. Quantitative data are in the form of score from expert validator; teachers' response questionnaire; students' response scale, and the results of testing their critical thinking. The observation of critical thinking was counted with the following formula.

$$M = \frac{fx}{N}$$

(Azwar, 2002: 33)[13]

Explanation: M = each student's average; fx = each student's total score; N = days of observation.

TABLE 1: Content Validity, Reliability, Index Difficulties and Power Dissipation Student Critical Thinking Ability Test.

Item	Content Validity		Index Difficulties		Power Dissipation	
	V	Criteria	Index	Interpretation	V	Criteria
1	0.875	Very valid	0.763	Easy	0.739	Very good
2	0.875	Very valid	0.527	Medium	0.537	Good
3	1.000	Very valid	0.806	Easy	0.550	Good
4	1.000	Very valid	0.570	Medium	0.609	Good
5	1.000	Very valid	0.688	Medium	0.426	Good
6	1.000	Very valid	0.591	Medium	0.421	Good
7	1.000	Very valid	0.538	Medium	0.761	Very good
8	1.000	Very valid	0.688	Medium	0.785	Very good
9	1.000	Very valid	0.591	Medium	0.805	Very good
10	1.000	Very valid	0.495	Medium	0.558	Good
11	1.000	Very valid	0.516	Medium	0.564	Good
12	1.000	Very valid	0.237	Hard	0.516	Good
13	1.000	Very valid	0.505	Medium	0.514	Good
14	1.000	Very valid	0.452	Medium	0.827	Very good
15	1.000	Very valid	0.247	Hard	0.624	Good
Cronbach's Alpha				0.885		

The experts' validation score, teachers' response questionnaire, and students' response scale were converted into qualitative data with the formula in table 2 as follows.

TABLE 2: Conversion Average Score Interval Becomes Criteria.

Score	Interval score	Category
A	$X > X_i + 1,8 S_{bi}$	Very good
B	$X_i + 0,6 S_{bi} < X \leq X_i + 1,8 S_{bi}$	Good
C	$X_i - 0,6 S_{bi} < X \leq X_i + 0,6 S_{bi}$	Good enough
D	$X_i - 1,8 S_{bi} < X \leq X_i - 0,6 S_{bi}$	Poor
E	$X \leq X_i - 1,8 S_{bi}$	Not good

Explanation: X_i : Mean / ideal score score = $\frac{1}{2}$ (maximum score + minimum score); S_{bi} : Ideal Standard deviation = $\frac{1}{6}$ (maximum score - minimum score); X : Scores obtained

The results of students' ability to think critically were analyzed using t-test by applying SPSS 23 software. Before, normality test (One Sample Kolmogorov Smirnov) and homogeneity (Levene test) were conducted.

4. Results and Discussion

Analysis of needs was conducted through observation of learning activities, interviews, and literature studies. It is important to develop PBL integrative textbooks to improve students' critical thinking according to the needs of SDN Semanu III, SDN Karangrejek II, and SDN Gombang II. Students' critical thinking skills are still lacking. Problem Based Learning has not been implemented by the teacher. The material substance of textbooks from government is not complete. The developed product is in the form of textbook. The material developed is Theme 7: My Dream, Sub-Theme 2: What My Big Dream. The selection of theme and sub-theme is due to the large amount of material in them that can be taught using Problem-Based Learning. The content consists of Civics, *Bahasa Indonesia*, Math, Science, Social Science, PE, and Cultural Art & Craft.

Product validation is conducted to determine the feasibility of product being developed. The research involved material experts and media experts. The result of textbook validation by material expert was a total score 96 with A category "very good". The result of textbook validation by media expert was a total score 138 with A category "very good".

The result of product trial consisted of initial field trials, main field trials, and operational trials. Data from initial field trials and main field trials were in the form of teacher responses and student responses toward the textbook being developed. The product got 'positive' and "very positive" responses from teachers and students.

The result of test of critical thinking skills was the average score of the experimental class post-test was higher than the control class. The average score of experimental class 1 was 80.48; experimental class 2 was 80.39; and the average score of control class was 67.73. The significance of t-test was 0,000 for both experimental classes. It means there are significant differences in critical thinking skills between the experimental class and the control class.

Integrative thematic textbook with Problem-Based Learning with theme 7 My Dream sub-theme My Big Dream for students in fourth grade of elementary school can be used as an alternative teaching material in 2013 learning curriculum-based seen from its feasibility and effectiveness. It is supported by the research results conducted by Liu & Wang (2010: 25) stating that the successful learning implementation with thematic materials is influenced by how far the learning is planned in accordance with the condition and students' potential [4].

Problem-Based Learning can improve the students' critical thinking skills according to the research conducted by Rehmat (2015: 117). It states that the students who are taught with Problem-Based Learning show that there is significant improvement critical

thinking skill compared to the control class students [5]. The research was conducted on students in fourth grade of elementary school. The presented authentic problem can encourage students to think critically.

Integrative thematic textbook based on Problem-Based Learning is not always good if applied in other sub-themes. The products may not necessarily improve the ability of other students besides their critical thinking. The improvement of students' critical thinking skill is not optimal as expected because it is conducted in six subjects in limited time of research.

5. Conclusion

Thematic integrative textbooks with Problem-Based Learning properly can be used for learning activities. It can improve the students' critical thinking skill in fourth grade of elementary school. The textbooks, according to material and media experts, are categorized "very good".

Thematic integrative textbook with Problem-Based Learning is effective to improve the ability of students' critical thinking skill. It is proved with the differences of average score of the critical thinking skill test between the experimental class and the control class. The experimental class' average score was 80.48; experimental class 2's average score was 80.39; and control class' average score was 67.73. The significance of t-test was 0,000 for both experimental classes with a confidence level at 95%.

The products need to be disseminated to expand product use, introduce and broaden the teachers' insight about the knowledge and product development process. Dissemination can be conducted through *KKG*. Further product development can be targeted on other sub-themes in fourth grade and other grades. However, what needs to consider is the chosen sub-theme which is relevant with Problem-Based Learning implementation.

References

- [1] Asghar, Zobina Muhammad (2014). A genre analysis of preface sections of textbook. *Journal of Education and Practice*, 6, 58-63.
- [2] Davidson, N., & Major, C. H. (2014). Boundary crossings: cooperative learning, collaborative learning, and problem-based learning. *Journal on Excellence in College Teaching*, 25(3&4), 7-55.

- [3] Drake, K. N. & D. Long. (2009). Rebecca's in the Dark: A Comparative Study of Problem-Based Learning and Direct Instruction/Experiential Learning in Two 4th-Grade Classrooms. *Journal of Elementary Science Education*, Vol. 21, No. 1 (Winter 2009), pp. 1-16.
- [4] Liu, M.C. & Wang, J.Y. (2010). Investigating knowledge integration in web-based thematic learning using. *Journal of International Forum of Educational Technology & Society (IFETS)*, 13, 25-39.
- [5] Rehmat, A.P. (2015). Engineering the path to higher order thinking in elementary education: a problem based learning approach for stem integration. *UNLV Dissertation Publishing*, 1-203.
- [6] Stobaugh, R. (2012). *Assessing Critical Thinking in Middle and High Schools*. New York: Routledge.
- [7] Fogarty, R. (2009). *How to Integrate the Curricula*. Thousand Oaks: Corwin
- [8] Prastowo, A. (2014). *Pengembangan Bahan Ajar Tematik Tinjauan Teoretis dan Praktik*. Jakarta: Kencana Prenadamedia Group.
- [9] Torp, L. & S. Sage. (2002). *Problem as Possibilities, Problem-Based Learning for K-16 Education (2nd edition)*. Alexandria: Association for Supervision and Curriculum Development (ASCD).
- [10] Leicester & Taylor. (2010). *Critical Thinking Across the Curriculum*. New York: Mc Graw Hill.
- [11] Borg, W.R. & Gall, M.D. (1983). *Educational Research: an Introduction (4th ed)*. New York & London: Longman Inc.
- [12] Retnawati, H. (2016). *Analisis Kuantitatif Instrumen Penelitian*. Yogyakarta: Parama Publishing.
- [13] Azwar, S. (2002). *Tes Prestasi*. Yogyakarta: Pustaka Pelajar
- [14] Bennett, H.M. (2010). Integrating curriculum: a teacher inquiry approach to creating an integrated secular judaic unit. *UMI Dissertation Publishing*, 1-202.