The development of thematic materials using project based learning for elementary school

M Yuliana¹*, S A Wiryawan² and Riyadi³
¹,²,³Post Graduate, Sebelas Maret University, Jl. Ir. Sutami 36A, Surakarta 57126, Indonesia

*Corresponding email: mitayuliana234@yahoo.co.id

Abstract. Teaching materials is one of the important factors in supporting on learning process. This paper discussed about developing thematic materials using project based learning. Thematic materials are designed to make students to be active, creative, cooperative, easy in thinking to solve the problem. The purpose of the research was to develop thematic material using project based learning which used valid variables. The method of research which used in this research was four stages of research and development proposed by Thiagarajan consisting of 4 stages, namely: (1) definition stage, (2) design stage, (3) development stage, and (4) stage of dissemination. The first stage was research and information collection, it was in form of need analysis with questionnaire, observation, interview, and document analysis. Design stage was based on the competencies and indicator. The third was development stage, this stage was used to product validation from expert. The validity of research development involved media validator, material validator, and linguistic validator. The result from the validation of thematic material by expert showed that the overall result had a very good rating which ranged from 1 to 5 likert scale, media validation showed a mean score 4,83, the material validation showed mean score 4,68, and the mean of linguistic validation was e 4,74. It showed that the thematic material using project based learning was valid and feasible to be implemented in the context thematic learning.

1. Introduction
The improvement of quality of education in Indonesia belongs to one of the educational systems that has function to increase the quality of human resources. Schools are considered as formal institutions and a part of plans which made by the government in educational area with the curriculum as the grown operation. Curriculum as one of important components in education and became the main attention of the government. The curriculum in Indonesia had some changes. The latest change of curriculum was the change from KTSP to the 2013 curriculum that contained of thematic learning. Based on the Constitution No. 20 Year 2016 about national educational system, the education in Indonesian would develop educated human who and pious to the Almighty, had noble characteristic, healthy, learnt, capable, creative, autonomous, and became democratic citizen with their responsibility. Thus, national education should have function in the optimum state as the first mode in building the nation and characters. It refers to the order of the 2013 curriculum that put forward the establishment of students’ characteristics.

The 2013 curriculum which implemented in elementary schools used thematic learning with scientific approach. Thematic learning as one of the curriculum implementation models that was being
recommended to be implemented in the elementary grade. Having the same opinion thematic approach was one of the teaching strategy that used themes towards creating an active, interesting and meaningful learning [1]. Thematic learning is one integrated learning model which is part of learning system that enables students, individually or in groups, to be active and find scientific principles in a holistic, accented and authentic [2]. Thematic learning accommodate students to be able to comprehend the main concepts and to be able to connect between concepts in thematic learning.

The implementation of the 2013 curriculum in Indonesia also had some challenges. Abidin (2016:24) explained that one of the challenges faced by the teachers in implementing the 2013 curriculum was learning sources [4]. Learning sources considered as important components for the teachers and students in the learning process. Learning sources could be defined as information, tools and/or lesson needed by the teachers to plan and review the learning implementation [5]. The 2013 curriculum learning sources used by the teachers nowadays, it refers to the teacher’s book and students’ textbook provided by the government.

In practice, the government’s textbooks used by the teacher and students in the learning process seem to have some weaknesses both in their content and materials. The current teacher’s and students’ textbooks used in elementary schools only contain few students’ worksheets in which the materials coverage were not complete and less wide. Thus, it makes both teacher and students should find other learning sources by themselves or additional materials that can be used in the teaching and learning process. The problematic about the minimum materials of learning sources used by the teacher and students were proved from the results of observation conducted to 14 elementary school teachers who had been approved to implement 2013 curriculum in Wirosari City. Based on the results of conducted interview, 10 of 14 teachers complained that the lack of leaning sources materials for them. They also felt the difficulty in implementing the 2013 curriculum if they just relied on the learning sources provided by the government. Teachers needed thematic learning sources which were more complete in term of content and had wider material coverage in order teacher and students could use them as materials or learning sources in the teaching and learning process.

Besides that, based on the result of observation on direct observation at schools and deep interview to the teachers of Wirosari City elementary schools who taught fourth grade students in seven elementary schools in Wirosari City, it was found some facts including: 1) there was no sufficient learning sources which supported the 2013 curriculum, thus it was needed for learning sources as learning materials; 2) the schools needed the provided learning sources which appropriate with the 2013 curriculum sufficiently in the form of print out, since it was known that the material in current learning sources was not complete; 3) in the learning sources, it was needed to be inserted various and innovative learning models, in expecting the students to be motivated and learning process can be considered as successful process.

Its implementation in the elementary schools, the learning sources going to be developed bad on the 2013 curriculum and the learning activity was based on scientific approach. It is in line with Permentdikbud No. 65 about Standard Process which stated that in order to strengthen scientific approach and integrated theme, the discovery learning model needed to be implemented. In the effort to encourage students to produce contextual works both individually and in group, it was advised that the learning process should use project based learning [3]. Thus, one of the solutions conducted in completing the lack of current learning sources is the development of learning sources in the form of Project Based Learning. The reason why the researcher choose Project Based Learning model because it can help students to be more active in thinking, solving problems, be more creative, and be able to work together with peers. It is in line with Abidin (2016:167) who says that Project Based Learning model is a learning model that directly involve the students in the learning process by observation activity to do and finish a certain learning project [4]. One of the strengths of this model is Project Based Learning considered as one of the learning model which was very good in developing various basic skills that should be mastered by the students including thinking skill, decision making skill, creativity skill, problem solving skill, and it also was viewed as effective method in developing students’ confidence and self-management.
Some researchers have proved the effectiveness of project based learning model. The research result conducted by Aziz, et.al (2013) showed that project based learning can attract the students to involve well in their learning processes [6]. Project based learning also help them to improve their reasoning skill in learning. In addition, the research results of Woro Sumarni (2015) showed that the strength of project based learning implementation as a learning model by using scientific approach would accustom the students to conduct research process in which it was believed it could improve the quality of education [7]. In this research, it emphasized that implementing the project based learning from constructive approach, it will activate students centre learning, and thus it will ease them to transfer their knowledge to the real world situation innovatively and creatively.

Based on the result of the observation about learning sources used by the teacher and students, it was found out that there was no inserted learning models that triggering students’ activity in the learning process. Thus, learning books based on Project Based Learning that will be developed as a learning source potentially toward cognitive aspect. With the use of arranged to be learning book that use learning model based on daily life problems can sharpen students’ knowledge towards something new. The connection with the real life problem faced by the students can help them to ease in absorbing the knowledge. Learning book as learning source potentially effect towards affective aspect. With the use of the learning book, students’ behaviour in daily activities can be implemented through practice and group discussion. Learning book as learning source potentially effect towards psychomotoric aspect. With the use learning book can train students’ skill that focuses on their work in doing practice or observation, through problem based learning, the connection between problem and learning teach them to find the solution through practice or observation. Based on the explanation above, this research and development proposes the title of “The Development of Thematic Materials Using Project Based Learning for Elementary School”.

2. Methodology
This research belongs to research and development method (R & D research). The model used as the basic to develop the thematic learning source in the term of Project Based Learning, and it related with the result of the adaptation of Four-D model [8]. The development of thematic learning source in the term of Project Based Learning was conducted using Four-D modification models that consisted of 4 stages, namely: define, design, develop, and disseminate.

Dealing with this R & D research, one of the step in research and development is development stage, this stage to product validation from expert toward thematic materials using project based learning for fourth grade students of elementary school that will be validated by 9 experts who consisted of 3 media experts, 3 material experts, and 3 linguists experts before the initial field trial. The data collecting technique was experts’ validation. The judgment scale employed here was Likert scale with 5 point scale, namely 5=very relevant, 4=relevant, 3=less relevant, 2=not relevant, 1=very not relevant. After getting the results validation of thematic materials using project based learning, then it is interpreted based on the table below:

| Table 1. The Criteria of Each Component Average Score [9] |
|-----------------|-----------------|-----------------|
| Category | Score | Criteria |
| A     | 4.20-5.00 | Very Good |
| B     | 3.40-4.19 | Good |
| C     | 2.60-3.39 | Enough |
| D     | 1.80-2.59 | Less Good |
| E     | 1.00-1.79 | Very Less Good |

It applied the value of feasibility of thematic materials using project based learning at least get "B” with the criteria of "Good". Thus, if the results of the expert of learning media, learning material, and
linguist were "B" or "Good" then the developed product was feasible to be used as instructional material of learning.

3. Result and Discussion

3.1 Results

The results of this study was to produce a thematic materials using project based learning for grade IV elementary school. The results of media, material experts and linguists’ validation obtained as follow:

| Aspects       | Average Score | Criteria  | Judgement |
|---------------|---------------|-----------|-----------|
| Media experts | 4.83          | Very good | Worthy    |
| Material experts | 4.68        | Very good | Worthy    |
| Linguist expert | 4.74        | Very good | Worthy    |

Based on the experts judgments and it was viewed from media aspect, the score was 4.83. The conversion data which belongs to the category of “very good”. Based on the data conversion above viewed from media aspect, the thematic materials based on the project based learning, it was feasible to be used. Based on the experts judgments’ and viewed from the material aspects, the score was 4.68. The conversion data belong to the category of “very good”. Based on the data conversion above viewed from the point of material aspect, the thematic material which based on project based learning sentence was feasible to be used. Based on the experts judgments’ viewed from linguistic aspect, the score was 4.74. The conversion data belong to the category of “very good”. Based on the data conversion above viewed from the linguistic aspect, the thematic materials which based on project based learning, the sentences were feasible to be used.

3.2 Discussion

Based on the figure, it can be concluded that the average media validation score was 4.83 included in category A which means that it has a very good predicate. In developing this learning source, the media experts gave some suggestions such as: (1) There should be given instruction for each activity; (2) The decrease of writing activity and ask the students to be more active; (3) The choice of colors should be appropriate with color gradation; (4) The removing of upper header since it was too full. Besides that, another revision toward the media aspect, it was the pictures in the learning material and they were not big enough. Pictures were considered as visual media which used in delivering information. Shabiralyani, et.al (2015) explained that visual aids must be visible to the whole class [10]. All calligraphy and illustration must be large adequate to be seen easily by the students farthest from the aids. As for the elementary school students, pictures were really needed since they tend to be more attracted if they saw many pictures. In the process of learning material, good pictures’ compositions would give effect to attract the students in learning.

The material experts provided some suggestions among the following: 1) the addition to some parts of the materials as complementary to related material, thus the material became broader and more complete; 2) to combine scientific approach with project based learning; 3) the material or activity which triggers the students to be active in bringing up unseen questions; 4) the project of based learning activities were less challenging and less motivating the students to be more active; 5) some difficult words were hard to be understood by the students and it would be better to simplify those words.

One of the revisions from the material aspect was material or activity that encouraged the students to be active in bringing up the unseen questions. Bringing up the questions was considered as one of the activities in scientific approach process. Trilling and Fadel (2009: 91) stated that the scientists observed the world through questions, while the discoverers were motivated by challenging problems [11]. In the step of bringing up the questions, the students conducted observation toward certain
object. Based on their observation, they built a question which should be answered through doing research activity. After sending the question, they verified the question, made hypothesis, did the experiment, analyzed the data and made the conclusion.

The revision from the aspect of materials, it was needed to be done for the learning material based on project based learning in the learning activities. Learning activities in the learning materials which based on the project based learning needed to be combined with scientific approach. In'am and Hajar (2017) stated that the steps of scientific approach were as follow observing, asking question, reasoning, attempting, and presenting [12]. The steps of implementing the project-based learning included six stages as follows: starting with the essential question, designing a plan for the project, creating a schedule, monitoring the student and the progress of the project, assessing the outcome, evaluating the experience (National Science Foundation, 2012; Thomas, 2002): Six steps of the project based learning and five steps of scientific approach which were being integrated could produce learning activities [13]. The following table showed the combination of project based learning and scientific approach in learning material based on project based learning which has been developed.

| Steps of a scientific approach | Steps of project based learning | Scientific steps approach combined with project based learning |
|-------------------------------|---------------------------------|-------------------------------------------------------------|
| 1. Observing                  | a. Start With the Essential Question | 1a Let’s observe                                           |
| 2. Asking question            | b. Design a Plan for the Project | 2b Let’s plan                                              |
| 3. Reasoning                  | c. Create a Schedule             | 3c Let’s practice                                          |
| 4. Attempting                 | d. Monitor the Student and the Progress of the Project | 4d Let’s monitor                                       |
| 5. Presenting                 | e. Assess the Outcome            | 4e Let’s judge                                             |
|                               | f. Evaluate the Experience       | 5f Let’s reflect                                            |

Based on the revision of the aspect of materials about the combination between scientific approach and project based learning, it could be said that in the process of project based learning there was an activity where the students solved certain problem in a group. It is in line with the main point of scientific approach that it was directed to build students’ ability in solving the problem, in which it is in line with the objective of project based learning. Drew (Lowe, 2007: 4) explained that research is a process conducted to solve the problem and to extend the knowledge [13]. In simply, Lowe (2007: 4-5) says that research is a third way for us to understand the world around us [14]. Based on the scientific approach process, if it is related and combined with project based learning, it will be very suitable to be implemented in elementary school.

Besides that, in the learning process with scientific approach combination and project based learning, it was needed an evaluation that could be used to measure the weakness and the effectiveness of the learning method and learning material used, to give feedback to the students, and to revise learning process. Gronlund and Gullo (2005) said that evaluation as a process of making decision about achievement, score, the success of educational program, the success of project, material quality, or the advantage of certain technique [15]. Thus, the position of evaluation was very important to draw the decision in learning process.

The arranged learning materials should be suited with the learning objectives. The learning objectives considered as a foundation for dialogue, curriculum planning, and assessment [16]. The learning material in this research was learning material based on project based learning. In order to acquire the learning objectives in the maximum state, thus the revision of learning material being conducted should follow the learning steps which are the result from the combination of scientific approach and project based learning.
The evaluation by the linguistics experts tend to advice some points, namely: 1) improving the effectiveness of grammar and vocabulary since elementary school students need simple and short linguistic; 2) some errors in EYD, punctuation, and letters needed to be paid attention; 3) the use of linguistics in the project making activity needed to use simple linguistic. One of the revisions in the linguistics aspects was improving the effectiveness of grammar and vocabulary since elementary school students needed simple and short linguistics pattern. Reading is considered a cognitive enterprise that entails three components including reader, text and activity [17].

One of the components in reading is text. A good and easily understood text is a text which uses vocabulary which is appropriate with students’ development growth. Cooper (1984) described vocabulary as being the key ingredient to reach successful reading while other researchers argued that “no text comprehension is possible, either in one’s native linguistic or in a foreign linguistic, without understanding the text’s vocabulary” [18]. In comprehending a text, it was needed vocabulary that appropriate with students’ development. As for elementary school students, it was needed vocabulary which easily understood by them. If the vocabulary was easily understood by the students, of course the material and knowledge would be received well. The importance of vocabulary in reading comprehension was needed in order that the students got no difficulty in comprehending the text. Yorio (1971) surveyed second type of students, who stated that vocabulary was their most important problem in reading comprehension [19].

Based on the three experts’ validation, it could be obtained results that the average validation score of the development of thematic materials using project based learning for elementary school as a whole was 4.75 which included in the category of Very Good and declared eligible to be used in grade IV of elementary school in learning and teaching process.

4. Conclusions
A thematic materials using project based learning for elementary school in grade IV primary school learning had received a proper statement from the media experts, material experts, and linguists that with a minimum worth of "B" with the "Good" criteria. Based on the results and discussion, it was known that the thematic book had been declared eligible by the experts where the media experts showed the score 4.83 of scale 5 included in the category of very good, the material experts gave 4.68 from scale 5 so that it categorized very well, and also it had been declared feasible with a score of 4.74 from a scale of 5 that it also belong to very good category. The researcher gave suggestion such as for grade 4 primary school teachers and students. For the teachers, they were expected to be able to use thematic materials using project based learning in learning to support the content of thematic learning. For students, they could use thematic materials using project based learning according to the directions and in order to make them enjoy the learning process well.

5. References
[1] Chon Min, Rashi and Nazri 2012 Teachers' Understanding and Practice towards Thematic Approach in Teaching Integrated Living Skills (ILS) in Malaysia. International Journal of Humanities and Social Science p 273
[2] Rusman 2013 Model-Model Pembelajaran Jakarta: PT Raja grafindo Persada
[3] Kemendikbud 2013 Permenkubud No. 65 tentang Standar Proses Jakarta: Kementrian Pendidikan dan Kebudayaan
[4] Yunus Abidin 2016 Desain Sistem Pembelajaran Dalam Konteks Kurikulum 201 Bandung: PT Refika Aditama
[5] Hamdani 2011 StrategiBelajarMengajar Bandung: PustakaSetia
[6] Aziz Z, Shamsuri S M and Damayanti L 2013 Project Based Learning to Pose Reasoning Skills for Year 1 Pupil Journal of Primary Education Canadian And Center Science Of Education 5(4) 82-87
[7] Sumarni Woro 2015The Strengths and Weaknesses of the Implementation of Project Based Learning: A Review Intl. J. of Sci. and Res. (IJSR) 4(3) 478-84
[8] Thiagarajan Sivasailam, dkk 1974 Instructional Development for Training Teachers of Exceptional Children Washington DC: National Center for Improvement Educational System

[9] Sudjana Nana 2005 Dasar-Dasar Proses Belajar Mengajar. Bandung: Sinar Baru Algesindo

[10] Shabiralyani, Ghulam et al 2015 Impact of Visual Aids in Enhancing the Learning Process Case Research: District Dera Ghazi Khan J. of Edu. and Pract 6(19)

[11] Trilling B and Fadel C 2009 Problems as Possibilities: Problem Based Learning for K-16 Education Alexandria: ASCD

[12] In’am, Akhsanul and SitiHajar 2017 Learning Geometry through Project based learning Using a Scientific Approach International Journal of Instruction 10 (1) pp 55-70

[13] National Science Foundation 2012 Project-based Learning and Universal Design for Learning Retrieved June 21 2014 from National Center for Supply Chain Technology Education

[14] Lowe M 2007 Beginning Research: a Guide for Foundation Degree Students London: Routledge

[15] Gronlund N E 1993 How to Make Achievement Test and Assessment Boston: Allyn and Bacon

[16] Austin Zubin 2016 How to design and use learning objectives in clinical learning The Pharmaceutical Journal 296 7885

[17] Snow C 2002 Reading for Understanding: Toward an R&D Program in Reading Comprehension Santa Monica: The RAND Corporation

[18] Cooper P 1984 The Assessment of Writing Ability: A Review of Research. Princeton. NJ: Educational Testing Services

[19] Yorio C 1971 Some Sources of Reading Problems for Foreign Linguisitic Learners. Linguistic Learning 21 107-115

[20] Depdiknas 2006 Kurikulum Tingkat Satuan Pendidikan Jakarta: Depdiknas

[21] Kemendikbud 2013 Kurikulum 2013 Jakarta Kementerian Pendidikan dan Kebudayaan

[22] Thomas J W 2000 A Review of Research on Project-based Learning San Rafael California: The Autodesk Foundation

Acknowledgments
The acknowledgment is special dedicated to Prof. Dr. Sri Anitah Wiryawan, M. Pd and Dr. Riyadi, M. Si as the researcher’s supervisor who had provided guidance and review. The researcher also would like to say thanks to some experts, namely Dr. Suharno, M.Pd and Dr.Roemintoyo, M.Pd, and Dr. Rukayah, M. Hum, furthermore thanks a lot to ICOSMEE which had organized an international seminar and gave me opportunity to publish this article.