Problem Based Learning Assisted by Mobile Learning to Improve Conceptual Understanding of Primary School Students

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Article Info	Abstract
	Learning inside of classroom is only merely transferring knowledge or memorizing in nature. It has not had purpose to improve students' conceptual understandings. To make learning process capable in improving conceptual understanding, teachers should prepare innovative learning model and make their students able to determine solution by themselves from the given problems. This research aims to analyze improvement of students' conceptual understanding after being intervened by Problem Based Learning assisted by Mobile Learning. This quasi experimental research used nonequivalent control group design. It was done for V graders of Public Primary School 2 Ngeling and Public Primary School 3 Ngeling in Jepara municipality. Techniques of collecting data were documentation, observation, conceptual understanding test in the form of multiple choices. The data was analyzed by gain score test and t-test. The results showed there was significant difference of the students' conceptual understandings intervened by PBL assisted by mobile learning media. There was significant difference of conceptual understanding score between both groups with significant level 5% with N-gain of experimental group 0.61, categorized as moderate while the control group obtained 0.19, categorized as low. The independent test stated there was difference between both groups as shown by score of t_{count} 0.411 with significant level 0.000. It showed that problem based learning assisted by mobile learning media could improve the students of the primary schools' conceptual understandings.

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INTRODUCTION

Current curriculum determined by the government is 2013 curriculum. Learning within primary school 2013 curriculum is an integrated learning with scientific approach. It is in line with Heni (2015) that in thematic integrated learning, there should be sufficient and efficient scientific approach to use in learning. In the learning process, teacher has important roles. Mayasari (2016) and Nuri (2018) explained that in fast-growing 21st century development is entailed by sophisticated technology development. Teacher as facilitator should prepare his learners to have supportive skills in facing current era development. Thus, students could face various daily life problems. In learning, students should obtain conceptual understanding oriented skill to make their learning outcome maximum.

Conceptual understanding of students are still low due to various factors, such as lack of conceptual understanding implementation done by teachers for their students (Puspani, 2013: 352). If teachers regularly teach proper conceptual understandings, students will be habituated and will have proper conceptual understanding since it will have been internalized into their lives. Development and training of conceptual understanding should not be taught only for students with quickest learning understanding. However, it should be trained and taught to all students, included those whom have slow understandings. Teacher action in developing students' skills is an indication of a professional teacher. It should have been done by teachers to not only transfer the material but also to develop personality and understanding skill of students. In Indonesian Republic Constitution Number 14 Year 2005 about teachers and lecturers, article 1, sentence 10, competence is defined as instrument consisting of cognition, skill, and behavior which should be owned, understood, mastered by each teacher and lecturer in promoting their professionalisms. Teacher's roles in selecting and implementing appropriate learning model or method to students' needs and conditions are needed to reach the purpose of learning. Meanwhile, although teachers are the center to improve learning quality, they are not supposed to be the learning center. Instead, learning should be centered and emphasized on students' participations. It is due to notion that the more active students involved in learning, they will have greater chances to improve understanding about the learned materials.

Learning observation done at V graders of fostered school 1, Pecanganan district, found several factors: 1) in learning process, there was 40% of the students actively asked questions, 2) students had difficulties in answering questions which required analysis skill; 3) the answers about the given questions by teachers were not comprehensive and were merely book memorizations; 4) several students could not solve problems on same materials but with different models or examples; 5) in solving problems, students could never solve them alone, they needed teacher's assistance; 6) the use of applicative media based on technology advancement had not been given by the teacher. It showed that actually students had not been able to keeping up with the learning well. One of materials considered to be difficult was IV theme material - Indonesian language, Civics, and Social study. Characteristics of Indonesian language which is in the form of reading text made students feeling lazy to analyze the content of the reading text. In another hand, both Civics and Social study were only limited on memorization which made them burning out in the learning.

Several teachers of V graders in fostered 1 cluster, Pecangaaan district, stated that the learning process was still in the form of lecturing and there was no interesting medium provision for students. From several interview activities, it was found that the teacher was lack of various learning model implementation. There had no innovation existence on the used learning media. The teacher had difficulties to improve students' skills to ask question. Some students also had difficulties to repeat or describe (conclude) their learned lessons. Besides that, the teacher also had difficulties in improving conceptual

understanding skill. It was due to the students were frequently only answering exactly same question exercise although with different questions examples.

When it is correlated to interview results and observations of learning process, then the cause of uneven skills of the students was lack of learning model variations used by teachers. It made students feeling bored and caused low level of conceptual understanding in learning the lesson material. Therefore, there is a need of change to provide interesting learning so students will have confidence in keeping up with learning process. One of the efforts to improve such situation is by implementing joyful learning which could train students' conceptual understanding. A learning model which is capable of meeting such need is problem based learning assisted by mobile learning media.

Problem based learning model is a constructive learning model which is seen appropriate to develop students' conceptual understanding. In PBL, the learning process is carried out based on factual problems which must be solved through investigations. By having learning process purpose, the learning would be more meaningful and students could construct their own knowledge. PBL is a learning model which implement cognitive and constructive theories because constructing prior knowledge and skill existed in students could be done by having new information. It is done by solving problems and it suits to be implemented in primary education level with various disciplines (Zejnilagic et al, 2015).

Gallagher, (2013: 112) stated that *problem based learning* suits for primary school students. The learning model could reveal academic potency, skill, and improve learning motivation as well as attract students. Then, study by Haji (2010) stated that implementation of PBL learning method could improve learning independence and students' conceptual understandings. Eko (2012) added that problem based learning method implementation should be entailed by discussion. It is in line with PBL as a direct learning to solve problems through group discussion. Then, PBL could develop conceptual understanding, problem solving, and group skills to identify problems, create hypothesis, search data, experiment, formulate solution, and determine the best solution for certain condition of problems. He added that PBL model could provide opportunities for teachers to see academic potency of their students (Hartati, 2016).

Problem solving process in PBL trains students to construct their experience into knowledge and motivate students to manage their learning so they will be more responsible. The responsibility of students is expected to develop consistently to conceptual understanding skill improvement. It is important because in 2013 curriculum learning, students are required to have proper conceptual understanding because of *integrated remark* learning (2013 curriculum). The curriculum combines all learnings into each learning. Thus, conceptual understanding plays important roles in understanding lesson concepts.

Besides using more various and impressive models, teachers should develop thinking patterns of students through interesting learning media. Mobile technology development has grown rapidly. One of the most common mobile instruments is cellular phone. With increasing numbers of students using and owning mobile phone, there is greater opportunity of the uses in educational world. Learning media using cellular phone technology is called by *mobile learning.* It is an alternative learning medium development. The existence of *mobile learning* which is addressed as learning complementary provides opportunity for students to learn materials which they are not mastered yet anywhere and anytime (Wirawan, 2011). Mobile learning allows students to access materials, directions, learning information anytime and anywhere without being space and time limited. Mobile learning could also solve time allotment limitation of certain materials.

METHOD

This quasi experimental research used *nonequivalent control group* design. The population of this research consisted of all fifth graders students in fostered cluster 1, Pecangaan district, Japara municipality in 2019/2020. The sample was taken by purposive sampling based on several considerations so there were obtained fifth graders of Public Primary School 2 Ngeling, consisting of 27 students as experimental group and fifth graders of Public Primary School 3 Ngeling, consisting of 28 students as control group. The data collection techniques were test and non-test. The instruments of collecting data were *pretest* and *post test* questions in the form of multiple choices, observational sheet, and documentation. Techniques of analyzing the qualitative data were requirement and hypothesis tests. The requirement test consisted of validity, reliability, difficulty level, and discrimination power. The hypothesis analysis test was used to describe the average variances of the students both in pre- and post-intervention done by using normalized gain test.

Before the learning, students joined conceptual understanding *pretest.* The initial test functioned to find out conceptual understanding of the students before being intervened by *problem based learning* assisted by *mobile learning.* The learning activity on theme IV, Sub-theme 1, on Indonesian language, civics, and social study were done within three meetings.

The learning conducted in the class was done by considering PBL syntaxes and assistance of *mobile learning* on theme IV, sub theme 1, on Indonesian language, Civics, and Social study. The learning activity involved five PBL components. They are orienting students on problems, organizing them to learn, supporting independent and group investigation, developing and presenting artifacts and displaying them, and analyzing and evaluating problem solving process.

The other test after the third meeting was *post test* of conceptual understanding to provide description of learning outcomes by using the model and media. *Post test* also functioned as comparison to review initial and final situation of the students' conceptual understandings. Based on the research data, the learning outcome was discussed descriptively.

FINDINGS AND DISCUSSION

Fitrah (2017: 2) defined that conceptual understanding is a skill of students to master series learning materials. It does not only deal with memorization of several concepts but also it deals with capability to re-explain the concepts in different patterns and implement them into concepts which match to cognitive structures of the students. The purpose of conceptual understanding is to allow students explaining or defining the concepts or principles of a lesson again and to have dissimilar sentence pattern to the given concepts but it still has same intention. Indicators of conceptual understanding according to Bloom as quoted by Kuswana (2012) consist of defining, giving example, classifying, concluding, hypothesizing, comparing, and explaining.

Students' conceptual understanding skill in this research was measured by multiple choice test with 20 question items and by using 4 indicators of conceptual understanding consisting of (1) giving example, (2) classifying, (3) concluding, and (4) explaining.

The conceptual understanding test instrument trial was examined at pilot study class at Public Primary School 1 Ngeling. The multiple choice questions consisting of 40 question items was examined. The result showed that 26 questions of the multiple choice were valid and reliable. Then 20 questions of them were taken as *pretest* and *post test* questions. Normality test was done by using *Kolmogorov Smirnov* SPSS. The result is *sig* 0.200 > 0.05. It meant H_0 was accepted and the data was normally distributed. Homogeneity test was assisted by SPSS by using *Levene's Test.* It obtained sig score 0.529. Since the score was 0.529 > 0.05 (5%), thus H_0 was accepted. Based on the analysis of the sample, it was known that the data was homogeneous.

This research was done by implementing PBL assisted by Mobile Learning on theme IV, sub theme 1, for Indonesian language, Civics, and Social study done at Public Primary School 2 Ngeling, Jepara municipality, as the experimental group and Public Primary School 3 Ngeling, Jepara municipality, as control group. The experimental group was intervened by PBL assisted by *mobile learning* media. Meanwhile, in control group, it was intervened by conventional model assisted by video. The researcher acted as observer during the learning. The learning was carried out by each teacher with 28 students of experimental group and 27 students of control group. The learning was conducted within three meeting on theme IV, sub theme 1, covering social study, civics, and Indonesian language.

PBL model was implemented to measure the students' conceptual understanding. The conceptual understanding skill of the students was measured by *pretest* in the form of multiple choice. Then, the students were intervened by PBL assisted by *mobile learning.* In the end of the lesson, the students were given *post-test* to find out the improvement after being intervened by *problem based learning* assisted by *mobile learning* and its gain score during the learning. It was obtained average score of *posttest* result for experimental group taught by the model assited by mobile learning media with 84.51. Meanwhile, the control group taught by expository obly obtained average score 70.53.

Thus, PBL assisted by *mobile learning* was better than conventional learning as seen from the average score achievements. It was due to PBL implementation seemed to provide more problem presentation. Thus, students could learn independently in solving and discussing them with their peers as well as to present their works (Barett: 2010). It is in line with Bunge (2014) stating that *problem based learning model* could improve student learning outcome with several stages: 1) basic concept, 2) problem definition, 3) independent learning, 4) group learning, and 5) research.

Then, after being intervened by the model assisted by *mobile learning* media, the experimental group experienced significant improvement on their conceptual understanding. Meanwhile, the control group which was taught conventionally only experienced slightly improvement. It was found that control group's *pretest* average score was 52.83 while the posttest average score was 69.64. It meant there was improvement about 16.83.

The experimental group was found to have *pre-test average score* about 82.03. It meant there was improvement about 32.41. It indicated that experimental group experienced greater improvement.

The independent test stated there was difference between both groups as shown by score of t_{count} 0.411 with significant level 0.000. Independent T-test between *posttest* scores of both groups showed greater t_{count} than t_{tabel} or significant level. Therefore, the t-test result showed that there was difference of conceptual understanding between both groups in which experimental group was better. Then, N-gain test was done to find out improvement of the students' conceptual understanding in both groups after the intervention. The results are presented in Table 1.

Table 1. Calculation Result of Experimental and Control Groups' N-Gain

Class	Pretest Average Score	Post-test Average Score	N Gain Score	Gain Factor Criteria
Experimental	49.62	82.03	0.61	Moderate
Control	52.83	69.64	0.19	Low

Based on table 2, the data shows improvement of experimental group is in moderate category with 0.61. Meanwhile, the control group is in low category with 0.19.

In PBL model, students seemed more active in the learning. The teacher task was as a coach during learning process. Students were asked to find out the concepts on their own through the given problems. It is in line with Eka (2017) that PBL model is a learning started

and centered on the problems. During PBL model implementation, the students' conceptual understanding skill could be developed into questions on the beginning of learning. Students were asked to mention various interaction through given authentic problems. Besides that, the existence of discussion in the class made students motivated to share notions or ideas. The use of LKPD given for each student also influenced the learning process. Each group was being responsible to complete questions on LKPD and present it in front of the class. The presentation activity could train students to be braver speaking in front of other people and to develop orally to explain the discussion results as well as to respond others' works. With another word, students could understand the concepts through their owned conceptual understanding. Fadhila (2016) stated that learning outcome after implementing PBL with multi cultural education content was better than those taught by learning materials. This conceptual understanding improvement was also proven by Fariana's study (2017: 32), based on her findings, it could be known that conceptual understanding could improve by using PBL.

It meant there was direct positive correlation of PBL or PBL assisted by *mobile learning* media to students' conceptual understanding. Thus, H_a was accepted and H_0 was denied. Thus, the hypothesis stated that PBL assisted by *mobile learning* media influenced the students' conceptual understanding and it could be accepted. It was strengthened by Irwanuddin & Dwikoranto (2017: 217) stating that PBL implementation to improve students' understanding could last based on the syntax. It was strengthened by Dwi (2013) stating that there was significant difference in conceptual understanding given by using PBL based ICT and PBL. After being intervened by PBL, there was improvement of conceptual understanding of both groups. It was obtained very excellent scores of the students.

CONCLUSION

There was improvement of the students' conceptual understanding in this research. It was proven by *pretest* and *posttest* results between pre- and post- intervention, proven by hypothesis test, and N-gain score. The t-test showed there was difference of conceptual understanding on both groups in which experimental group was better. The N-gain of experimental group was categorized moderate. It meant it was higher than N-gain score of control group which considered low. Based on the results, it could be concluded that *problem based learning* assisted by *mobile learning* could improve critical thinking skill and the students' conceptual understanding.

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