Problem based learning: the effect of real time data on the website to student independence

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Abstract. Learning science developed as an integrative science rather than disciplinary education, the reality of the nation character development has not been able to form a more creative and independent Indonesian man. Problem Based Learning based on real time data in the website is a learning method focuses on developing high-level thinking skills in problem-oriented situations by integrating technology in learning. The essence of this study is the presentation of authentic problems in the real time data situation in the website. The purpose of this research is to develop student independence through Problem Based Learning based on real time data in website. The type of this research is development research with implementation using purposive sampling technique. Based on the study there is an increase in student self-reliance, where the students in very high category is 47% and in the high category is 53%. This learning method can be said to be effective in improving students learning independence in problem-oriented situations.

1. Introduction

The learning process of science will be more meaningful if the learning is held interactively, inspiration, fun, challenging, motivate learners to participate actively, and give enough space for initiative, creativity, and independence according to their talents, interests, and physical and psychological development. The learning process emphasizes the provision of hands-on experience to develop competencies to explore and understand the natural world scientifically. Currently the problem of low quality of science learning is an obstacle for the government in preparing the "Rise of Indonesia Golden Generation" [1]. Therefore one of the efforts to overcome the problems in science learning is problem based learning (PBL) by using real time data in the website. PBL is, "its use in promoting higher-level thinking in problem-oriented situations, including learning how to learn". The characteristics of the PBL are: (1) the filing of a problem or question, the proposed problem must meet 5 criteria: (a) authentic, the problem is related to the student's real experience, (b) the problem is unclear, causing a question mark and some alternative answers from students, (c) meaningful to students, in accordance with their intellectual development, (d) broad enough, so as to provide opportunities for teachers to meet their instructional objectives; and (e) benefit students; (2) focus on interdisciplinary linkages science, problems raised in problem-based learning should link or involve multiple disciplines, so as to produce several alternative answers, (3) authentic inquiry, students undertake authentic investigations to find solutions to real problems. Students must analyze and define problems, develop hypotheses and make predictions, collect and analyze information, conduct experiments (if needed), make inferences, and
make conclusions; (4) produce real work and display it; students produce products in the form of real works representing solutions problems found. It can be a report, a physical model, a video, or a computer program. The work is displayed by students in front of their friends, and (5) collaboration, students work with other students, often in couples or small groups [2].

In short PBL begins with student orientation on issues, organizes students to learn, helps independent and group investigations, develops and presents the work / displays, and analyzes and evaluates the problem-solving process [3]. Given the learning process is generally implemented in the classroom, then the presentation of authentic problems can use real time data in the website. Various real time data can be collected through website addresses so that it is easily accessible to students who need it [4]. Based on the background and identification of the problem above, this study discusses about how the develop of Problem Based Learning using real time data in the website in science learning on student learning independence.

2. Methods
The type of this research is qualitative research with research and development (R & D) method which is aimed to develop learning that can improve student's learning independence. Implementation of this research was conducted on junior high school students which amounted to 36 students with purposive sampling technique. The activities in this study can be detailed in stages (1) reviewing some literature to study learning theories related to student learning independence. (2) to formulate learning method to tie student self-reliance based on student. (3) validating methods and learning tools through Focus Group Discussion (FGD) activities. (4) to implement the learning method to learn student self-reliance. Data collection using research instruments as follows: 1) Observation sheet; 2) Questionnaire independence of student learning.

There are two kinds of data analysis, that is data analysis result of observation of learning implementation and analysis of questionnaire result of student learning independence. The data analysis technique used in this study is adjusted to each data that has been obtained during the research phase. (1) data of observation result of learning implementation is analyzed with descriptive statistic. (2) data on the questionnaire of learning independence were analyzed by means of being categorized in the categorization table. Research is successful if more than 35% of learners have learning independence in very high category, and more than 65% of learners have motivation in high category. Furthermore, to analyze the learning outcomes used t-Test statistical analysis using analysis of variance.

3. Results and Discussion
The result of observation of the implementation of learning using Problem Based Learning using real time data in the website in science learning obtained that the implementation of teachers and students obtained scores such as Table 1.

| Criteria of success indicators | Performance Teacher | Performance Student |
|--------------------------------|---------------------|---------------------|
| ≥ 85%                          | 85%                 | 90%                 |
|                                 | 90%                 | 90%                 |

Based on the table of implementation of learning implementing Problem Based Learning using real time data in the website has met the success indicator is ≥ 85%. Further data questionnaire student learning independence is obtained as Table 2.
### Table 2. Student Learning Independence

| Score (X) | Category  | Before | After |
|-----------|-----------|--------|-------|
|           | Number of Students | %      | Number of Students | %      |
| X > 100   | 13        | 36     | 17    | 47     |
| 83 ≤ X ≤ 100 | 18      | 50     | 19    | 53     |
| 80 ≤ X < 83 | 5       | 14     | -     | 0      |
| 67 < X < 80 | -       | 0      | -     | 0      |

Based on the table, there is an increase in student learning independence with the implementation of Problem Based Learning using real time data in the website in the science lesson. Percentage of result of questionnaire student's independence of learning have fulfilled target / criterion indicator of success, that is student study independence in very high category is 47% and in high category is 53% [5]. Next analyze the value of test results basil learning used statistical analysis t-Test using analysis of variance obtained as Table 3.

### Table 3. Improved student learning outcomes

| Observation | Before | After |
|-------------|--------|-------|
| Mean        | 86,421 | 92,657|
| Significance of two tailed | 0.03   |       |
| Analysis    | 0.03<0.05 |     |
| Description | There is Influence |      |

Based on the table it is known that the difference of mean before and after learning is 6,236. The sig count is 0.03. The sig count is <0.05 so it can be stated that there is difference of science learning result of student before applying problem based learning and after applying Problem Based Learning using real time data and website.

The learning process emphasizes the provision of hands-on experience through inquiry to develop competencies to explore and understand the natural surroundings scientifically. The PBL in this study is supported by Dewey's theory which describes the class as a laboratory for real life investigation and problem solving, Piaget on his cognitive development theory, Vigotsky on the influence of biological forces and social (cultural) forces on students' intellectual growth and proximal development zone concept, and Bruner emphasizes the importance of learning through problem solving and scaffolding [2]. In addition, PBLs can help students develop flexible knowledge that can be a problem space in investigation [6], as well as creativity in problem solving depending on the effective implementation of complex cognitive processes, while effective processes depend on strategies and knowledge used in problem solving [7]. PBL using real time data in the website can be applied to various characteristics of students by considering the effectiveness of the strategies applied by the teacher to provide scaffolding according to the student's closest development zone in problem solving.

Before implementing PBL using real time data in website there are some things that need to be prepared by developing a website based environment for student participation in PBL. The website developed consists of four menus: (a) the menu shows the problem in the form of real time data, (b) the
menu displays a list of sites that provide real time data; (c) the menu shows how to upload the solution of each student, and (d) menu for discussion of other student explanations. In the real-time data menu, is a collection of website addresses that provide real-time data on the internet. The following syntax presented PBL using real time data in the website according to the characteristics of students.

Table 4. PBL used real time data in the website

| Phase | Teacher Activity |
|-------|------------------|
| 1. Orienting students to problems | Inform learning objectives, present real time data (http://www.marsapunksscience.com), and motivate students to engage in problem-solving activities. |
| 2. Organize students to learn | Assist students in determining and managing learning tasks, distributing worksheet (LKS), and explaining the necessary logistics. |
| 3. Assist in independent and group investigations | Encourage students to collect the necessary information (for example: reading books, browsing, searching for explanations and solutions, in http://www.marsapunksscience.com) |
| 4. Develop and present the work and display it | Assist students in planning and preparing the work of reports, recordings and helping to present them in front of the class. |
| 5. Analyze and evaluate the problem-solving process | Help students reflect on the investigations and processes they use. |

Independence is the personality character of a person formed by the internalization of the goodness that is believed and used as the basis for the worldview, thinking, acting and acting. PBLs using real time data in this website are very effectively used to characterize characters, because PBLs focus on solving real-life problems that require various solution alternatives [2]. Character can be said as the key of PBL using real time data in website, because this PBL in science learning must be taught by using scientific approach that is method and attitude of scientific with characteristic: objective, methodical, systematic, universal, and tentative [8]. It shows that if PBL using real time data in website applied well then very effective to improve character of student independence.

4. Conclusion
Implementation of Problem Based Learning using real time data in the website in science learning can be done by integrating learning using PBL learning steps but in the use of authentic problems based on real time data in the website. This method of learning can improve students' learning independence in problem-oriented situations. Student independence through PBL using real time data in the website in learning science is a collaboration of the results of a learning process. Student independence in this lesson emphasizes the provision of direct experience through inquiry to develop competence to explore and understand the natural world scientifically.

5. References
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