Conceptual understanding of pressure concept through problem based learning in junior high school grade 8th

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Abstract. Understanding of a concept can be said as the ability of learners in expressing and re-explaining the information that has been received each learner. The Conceptual understanding of students said good when given the problem, learners can solve the problem well. This study aims to see the improvement of students' concept understanding during science learning using Problem Based Learning for the concept of pressure in accordance with the curriculum of 2013. The research method used is a pre-experiment with the One Group Pre-test Post-test Design. This research was conducted in one of class 8th grade in junior high school in Sidayu-Gresik, East Java. Aspects of conceptual understanding limited a few aspects, namely translating, interpreting, and extrapolating. The result shows that there is an increase concept comprehension for each aspect of understanding the concept of pressure in accordance with the calculation of \( n \)-gain, i.e. the translate aspect is 0.52 with the medium category, the interpreting aspect is 0.62 with the medium category, and the extrapolation aspect is 0.47 in the medium category. Based on the results can be said Problem Based Learning can improve understanding the concept of pressure students Secondary high school class VIII.

1. Introduction
Science Subjects (Natural Science) is one of the most strategic subjects to improve human resources. The nature of science education according to Prihantoro [1] is to teach students to understand science, to develop an inquisitive attitude, to think analytically, creatively, and to be aware of the values that exist in society and to develop a positive attitude. Criticisms and highlights about low student learning outcomes by communities directed at educational institutions both directly and indirectly are often heard today. The low quality of this education is the responsibility of all parties who handle it, either from the government or from parties directly related to the teaching and learning process.

The low learning outcomes of learners are also influenced by the still not able to learners to think critically of a problem encountered. The main lessons that should be done for every subject at school, according to Dewey is a learning that stimulates the minds of students to acquire all nonscolastic (non-subject matter) learning skills. Science lessons by the Curriculum 2013, emphasizing that learners are encouraged to learn through active engagement with skills, concepts, and principles. Learners gain experience by conducting activities that enable them to find concepts and principles for themselves [2]. In addition, there are other things that are considered important and also very closely related in the
learning process of understanding students' concepts of material given. The concept of learning is very important for students to master. This is done by the teacher to avoid misconceptions. Dahar [3] says that allowing students to come forward with improper concepts can lead to future learning problems. This explains that it is so important a concept to be understood and mastered appropriately. Also in Dahar [3] also explains that conceptual understanding is the foundation for students in developing their knowledge. Based on this the role of teachers is very great how to improve students' concept of understanding to avoid misconception.

According to Johnson (2000) in Marlis [4], comprehension means an ability to explain something in words alone. Marlis [4] explains that conceptual understanding is a student's ability to not only remember, but can reexamine a definition, special character, essence, essence, and content by using his own words, but not altering the content of meaning information received. In the learning process, students need to understand the concept correctly, it is very closely related to the understanding of the physical meaning of the concepts studied and the application of these concepts in everyday life [5]. In this study, students are really required to be able to understand the concept well, all the problems that include or related concepts taught can be solved well, either the problems that are counted (mathematical) or the problems given in accordance with everyday life.

The process of understanding is one of the categories in the cognitive dimension of Bloom Revision which is the second level (C2) after remembering [6]. The main learning objective of understanding cognitive process is to cultivate transfer capability. Students can be said to understand if they are able to construct the meaning of learning messages, whether oral, written, or graphic, delivered through teaching, books, or computer screens. Students can understand when they can connect their new knowledge and old knowledge [6].

Based on the above, there is an innovative effort to solve the problem of how to improve students' concept understanding by using learning model which is suitable with the curriculum which can be used in learning to see how to improve students' concept understanding that is Problem Based Learning (PBL). Delisle states that Problem Based Learning is a learning model that helps teachers develop problem-solving skills in students as they study learning materials. In addition, according to Gallagher et al [7] in PBL, problems serve as a stimulus for student learning activities that will help students to understand why and for what they are learning. In addition, the final form of learning activities in the PBL is that students are asked to make an applied form of what they have learned, further learning tasks, homework, or other forms [8].

Therefore, to see the improvement of students' concept understanding about the concept of pressure, researchers try in learning activities using the PBL model in science teaching especially the concept of pressure in accordance with the curriculum of 2013 class VIII semester II. Problem Based Learning (PBL) or Problem Based Learning is recognized as an inquiry activity that is able to cultivate students' curiosity deeper into the problems encountered [9] in PBL activities, which is the starting point of learning is a problem that "ill-structured "that serves as a stimulus so that students are more motivated [10]. The role of teachers in PBLs is very important as being a facilitator, teachers should be able to direct or assist students to determine what is known, what is needed to be known and where they can find important information [11] so students are able to understand for what and why they should learn. The teaching and learning process in the PBL model also does not place the students just listen to the teacher's lectures or just play a role in the discussion, but the students are also required to spend time in the library, website or plunge in the community to find a supportive answer about the issues studied. Eggen and Kauchak [11] say that for young and inexperienced students, the effective issues are if the problem is clear, concrete and close to the student's daily life. Therefore, in the PBL model, the problem is used as a starting point of learning, then it will stimulate students to think critically to solve a problem and with the aim of students can understand really the concept that has been studied. In addition, with such learning process, the students will be able to form knowledge in itself so that it will also help improve understanding of the concept.

2. Methods
The research method used is a weak experiment with The One Group Pretest-Posttest Design. This design is used because researchers do not use the control group [12]. This research was conducted in one of class VIII Secondary high school in Gresik by using purposive sampling technique. The design is as follows Table 1.

Table 1. The One-Group Pretest-Posttest Design

|   | O | X | O |
|---|---|---|---|
| Pretest |   | Treatment | Posttest |

The data source of this research is from 32 students of class VIII-B Secondary high school 3 Sidayu Gresik Regency. The data collection technique used is by using multiple choice test consisting of 20 problems in accordance with aspects of understanding of the concept according to Bloom who trained to students, namely aspects of translating, interpreting, and extrapolating.

3. Result and Discussion

Increased understanding of student concepts is assessed from pretest answers and posttests after learning. Percentage of average score achievement of pretest, posttest, and n-gain students' concept of understanding ability can be seen on graph as follows in Figure 1. Based on the graph, it is seen that the value of students' concept of understanding can be classically said to increase from pretest to post test results. The mean value of posttest is classical as 72.92. In addition, also indicated by the average n-gain of 0.59 with the category of moderate. Based on these results, the aspects of conceptual understanding in this study can be described each of the respective aspects, namely: (1) translating; (2) interpret; and (3) extrapolate.

3.1 Aspects of Translating

The translation aspect in this study was measured through multiple choice tests contained in questions 1, 8, 10, 12, and 13. Each indicator to be achieved was represented in each of these questions by the aspect to be measured about how the students could translating abstract conception into a symbolic model or vice versa in various forms of concepts that must be understood by students so as to facilitate students in learning. Based on the results of this study, it can be represented in Figure 2 of the pie chart along with the translation aspect.
Learning with the PBL model can affect the aspects of translating students in understanding the concept of students. The ability to translate is an early stage of understanding a concept [6]. Abilities contained in the translate stage such as; translating an abstraction against another abstraction, translating the shape of the symbol into a question, or vice versa. This ability is an ability that relates to the mental picture of the student. The results that have been obtained are in line with Johnson's (2000) opinion in Marlis [4], which states that the ability to understand in this case translates means an ability to explain something by one's own technique. Marlis [4] explains that conceptual understanding is the ability of a student to not only remember, but can reinterpret a definition, special character, essence, essence, and content by using his own words, but not alter the content of the meaning of the information received.

3.2 Aspects of Interpreting
The interpretive aspect in this study was measured through multiple choice tests contained in question numbers 3, 4, 5, 9 and 14. Each indicator to be achieved was represented in each of these questions by the aspect to be measured about how students could interpret a concept in different forms. Based on the results of this study and in accordance with the classical increase graph, the increase of n-gain can be represented in Figure 3 following pie chart.

Based on the diagram in figure 3 it can be seen the difference of increase for each category of n-gain. In the experimental class diagram can be shown that the increase in students with high category that is equal to 34%. In addition, in this aspect no students are categorized as low so the percentage is 0%. This suggests that there is an increased understanding of concepts for interpretive aspects during learning using PBL. Learning with the PBL model can influence the interpretive aspects of students in understanding the concept. This is in accordance with the theory that the ability to interpret can be said the ability to recognize and understand the main idea of a communication. In interpreting, there are
several abilities used in the interpreting stage, such as; the ability to understand the various readings clearly and deeply, the ability to distinguish the justification of a conclusion illustrated by a data, and the ability to qualify data, which also fit into the learning activities of the PBL [6].

3.3 Aspect of Extrapolating

The extrapolation aspect in this study is measured through multiple choice tests contained in question numbers 2, 6, 7, 11 and 15. Each indicator to be achieved is already represented in each of these questions with aspects to be measured about how students can extrapolate a concept in different forms. Based on the results of this study, and in accordance with the classical increase graph in the table, the n-gain category is represented in Figure 4 of the circle diagram as follows.

Learning with the PBL model can affect the aspects of extrapolating students in understanding the concept. This is consistent with the theory that the ability to extrapolate has the highest level compared to translating and interpreting. Because this capability demands higher intellectual abilities, including; the ability to draw conclusions from an explicit statement, the ability to describe conclusions and express them effectively, the ability to insert data in a set of data, the ability to forecast consequences and a form of communication described, the ability to be sensitive to factors that can make predictions inaccurate, the ability to discern the value of consideration and a prediction [6]. In addition, the capabilities in extrapolating aspects are skills that are trained at the learning by using the PBL model.

Based on the results of research and classical discussion and each aspect of understanding of the concept trained to the students, proving that the PBL model can improve students' concept understanding of the concept of pressure in accordance with the curriculum of 2013 class VIII, 2nd semester. Based on the calculation, the average of n-gain calculation of each aspect can be summarized as shown in the following Table 2.

| Aspects of Understanding Concept | Average Pretest | Average Posttest | n-gain |
|----------------------------------|-----------------|------------------|--------|
| Translate                        | 26,25           | 63,48            | 0,52   |
| Interpreting                     | 42,50           | 78,13            | 0,62   |
| Extrapolate                      | 31,88           | 64,38            | 0,47   |

Based on the results obtained in table 1, can be categorized all aspects in the category of improvement is in accordance with Hake [13].

4. Conclusion

Improved understanding of student’s concepts with learning using problem-based learning can be said to increase in classical as well as every aspect of conceptual understanding is also said to increase with the category of n-gain is. The recommendation given may be that other researchers may use other learning models to be used to improve students' understanding of concepts. In addition, it may also be
done on the control class so that it can be seen clearly the difference results. The weakness in this study only uses one class only so there is no comparison.

5. References
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