Analysis of Student’s Skills on the Concept Dynamic Electricity

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Abstract. Physics becomes one of the science lessons in schools that guide students to apply materials in everyday life and communicating the results natural phenomena. This study intended to figure out understanding skill and argumentation skill on the concept dynamic electricity. This study was descriptive research of senior high school students in South Tangerang. Technique of collecting data was done by test method and interview. The understanding skill refers to indicators of conceptual understanding in the cognitive process of Bloom’s Taxonomy Revision, which contains the indicators were explaining, interpreting, summarizing, comparing, classifying, and inferring. While the argumentation skill refers to Toulmin’s Argumentation Pattern (TAP) which contains the components of claim, evidence, warrant, and backing. The result showed that ability of explaining was higher and ability of comparing was lower. The component of claim was higher and backing was lower. Based on the result, it can be conclude that understanding skill and argumentation skill still less. They have been taught to student with innovation learning method.

1. Introduction

Physics becomes one of the science lessons in schools that guide students to be able to apply materials that have been studied in everyday life, so that the quality of human resources increases. In addition, physics learning examines students in concluding and communicating their research results from natural phenomena that have been studied. The initial understanding that has not been compatible can make the students have difficulty in doing the learning process [1]. Learning science to build arguments and active discussion can improve students’ conceptual understanding of the subject matter [2]. Therefore, it needs information about students' understanding ability and argumentation skills.

Based on interviews of teachers and students, in one public school in South Tangerang obtained information that physics learning more emphasis on the completion of physics problems, especially the calculation, the lack of delivery of physics concepts, the lack of examine the process of thinking students in discussions and argue scientific, learning activities that rarely construct Students through experimentation, and the lack of explanation of conceptual interrelation with applications as well as natural phenomena in everyday life. In the science classroom, teachers often lack the resources to challenge student statements, because of the argument becomes a monolog - a one-way conversation where the pupil cannot be involved in the original question about it. As a result, everything is judged right and wrong not because of scientific claims, warrant, and precise data [3]. Students with high-argument ability have few misconceptions on a concept compared with students lacking in argument, conceptual understanding is very important to be possessed by students [4].

The ability to understand the incompatible beginning can make the students have difficulty in learning process [5]. Thus, understanding students’ concepts becomes the basis for developing other abilities, including the ability of argumentation. In accordance with the results of Sadler and Zeidler (2005) studies that students who have a high understanding of a particular topic, they will have better analytical and decision-making skills to argue [6].

Understanding the concept makes it easier for students to submit their arguments appropriately. Improved students' understanding and argumentation skills are known when teachers know how much
they get it. So, it takes a figure of understanding ability and argumentation skills of students, especially the concept of physics.

Research on understanding electricity is focused on current, potential difference and especially brightness of bulbs in parallel or series DC circuits [7,8]. Beside that, to understand the concept of alternating current (AC) electric and direct current (DC) electric in everyday life. The ability to understand the relationship between electrical voltage, electrical resistance, and electricity, direct current electricity law, calculate power and direct current electric energy, is needed by students. Understanding of the process of electrical occurrence allows students to explain the phenomenon of electricity in everyday life. Therefore, it takes a figure of understanding ability and argumentation skill of student of dynamic electrical concept.

2. Experimental Method

This research was conducted on 80 students class XI in one of the public high school in South Tangerang academic year 2016/2017. This research uses descriptive research to find out the understanding ability and argumentation skill of student on dynamic electrical concept. In this research, the sampling technique is purposive sampling technique. The flow of research conducted in the study of literature relates to the focus of research, interviews with some physics teachers and students on physics learning in schools, and provides research instruments. The research instrument is a multiple choice question to measure the understanding ability and essays to measure argumentation skills. The instrument of understanding ability refers to the cognitive process of Bloom's Taxonomy Revision which is to interpreting, explaining, summarizing, comparing, classifying, and inferring [9]. Assessment of argumentation skills refers to Toulmin's Argumentation Pattern (TAP) which contains the components of claim, evidence, warrant, and backing [10].

Before this instrument was used in the research, first it tested the validation of experts to correct the problem that has not been in accordance with the measured indicator. Then test the reliability by test retest to see the level of the tested matter being tested with the same group and different time. The results of reliability test obtained at 0.9 with very high category. This means that the instruments of understanding ability and argumentation skills are worthy of use in this study.

3. Result and Discussion

3.1 Figure the Profile Understanding ability of Student

The ability to understand concepts becomes the basis of students' ability to apply science better and achieve learning goals. Students easily inform, interpret, integrate, and construct existing knowledge. It allows students to understand the concept. Learning science requires students to understand both theoretical and application concepts in solving the problems encountered. The problems in everyday life require students to understand the concept of science more deeply. It allows students to understand the concept. The result of the students' ability to understand assessment on the cognitive process of taxonomy Bloom revision on dynamic electric concept is presented as follows:
Figure 1 shows the ability to understand students who are still low. This ability is less examined by teachers, so the achievement of physical values is still low. It is known that the understanding indicator on the aspect explaining is 42%, interpreting is 36%, summarizing is 32%, comparing is 26%, classifying is 28%, and inferring is 38%.

Based on the above percentage, it can be seen that students' ability in explaining aspects is still lacking, meaning that students have not been able to build and use a concept on causal model. The interpretive aspect of students is still lacking, meaning that students have not been able to change the information from one form to another, for example from graph to verbal, table to graph, and others. This is because the lack of examined by teachers to translate information, students only focus on the matter of calculation only. Aspects summarize is still lacking, meaning that students have not been able to put forward a sentence representing the information of an existing problem. Students only see general information only, without considering the implicit information contained in the problem. The comparing aspect is still lacking, meaning students have not been able to see the similarities and differences between two or more objects, events, and problems. The classification aspect is still lacking, meaning the students have not been able to group the characteristics or patterns that fit in accordance with certain concepts. Aspects of drawing conclusions are still lacking, meaning students have not been able to summarize a concept from a series of events and then drawn relationships according to the characteristics of the series of events. This is in line with previous research that Learning and understanding helps students to process information, interpret, integrate with old knowledge, and manage the memory location of the information [11].

The ability to understand the lowest is to classify. Students have not been able to classify and characterize cases in dynamic electricity. For example, grouping the magnitude of electric current flowing in the carrier with different types of barriers.

Based on the explanation, there should be a solution that can improve and increase students' understanding ability. Therefore, the ability to understand this profile is expected to improve the quality of better learning in schools.

3.2 Figure the Profile argumentation skills of student

The argumentation skills measured in this study refer to Toulmin's Argumentation Pattern (TAP). The result of the research is the percentage of student argument on claim, evidence, warrant, and backing component. The result of students' argumentation skill assessment on dynamic electric concept is presented as follows:
Figure 2. Profile of students’ argumentation skills to class XI of Dynamic Electric Concepts

Figure 2 shows that argumentation skills student is low. Students still have difficulty in arguing scientifically. It is known that the argumentation component claims is 32%, evidence is 21%, warrant is 16%, and rebuttal is 12%.

Students’ argumentation skills in claim are still less accurate to answer the problem or phenomenon. Students argue briefly, without explaining the intent of the answer. Then the student in providing the evidence that does not support the claim that has been filed, so the data does not provide appropriate evidence to justify the claim. Then the data presented there is no analysis that supports the claim, so the data is just writing to answer questions. Students can only provide non-theory-oriented data, then the student must have other alternative evidence to justify the claim. But students are accustomed to theory and then look for evidence [12]. The student in filing a justification or warrant does not adequately explain the exact relationship between data and claims. The warrant does not support the claim, so the data becomes incorrect. Then backing does not underlie warrant and thus does not support the claim. The proposed support is not based on the facts or theories applicable, so it is the same as the claim already delivered.

Therefore students' scientific argumentation skills have not been correct, so it is still low. Following up on this argumentation skill profile is expected to improve the quality of better learning in schools.

4. Conclusion
The conclusions obtained based on the results of the study, showed that students' understanding ability and argumentation skills are still low. This is evidenced by 42% an explanation, an interpretation of 36%, summarizes by 32%, compares by 26%, classifies by 28%, and infer by 38%. While the argumentation claim score of 32%, evidence of 21%, warrant of 16%, and rebuttal 12%. These findings will serve as a basis for further research on innovative learning models and strategies that can improve students’ comprehension and argumentation skills.

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