A profile of students' conceptual understanding and self-efficacy of eleventh graders in vocational high schools

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Abstract. This study aims to explore a profile of students' conceptual understanding and self-efficacy of eleventh graders in vocational high schools in Bandung on the concept of dynamic electricity. Data on students' conceptual understanding and self-efficacy are needed to determine the treatment to be used in subsequent research. The sampling technique used in this research is purposive sampling. The acquisition of the conceptual understanding data through the test, while the self-efficacy through the attitude scale, both equipped with interviews. The conceptual understanding refers to the Bloom Taxonomy Revision, while self-efficacy refers to Baldwin's instrument. The results show that the percentage of students who have had the ability to understand for the interpreting aspects of 42%, exemplifying aspect of 45%, classifying aspect of 37%, summarizing aspect of 35%, inferring aspect of 38%, comparing aspect of 43%, and explaining aspect of 40%. This shows that the ability to understand only reaches 40% (low category). While the result of the attitude scale and the interview about the students' self-efficacy, there is uncertainty of their own ability, it shows that the students' self-efficacy is still low.

1. Introduction
The subject of physics is a vehicle for learners to learn about themselves and the environment, as well as the prospect of further development in applying it in everyday life. In the development of the modern world, physics plays an important role for all scientific applications and technological engineering [1]. For example in the field of renewable energy, health, architecture, disaster management to the defense of the State. The orientation of physics learning that developed not only the content is the main goal, but the learning that can help the students in constructing a meaningful conception between abstract ideas and application in real life [1].

Physics learning at the senior high school level and equivalent holds a strategic position in developing the ability and thinking skills of learners in solving problems related to the surrounding events, both qualitative and quantitative, as well as in developing skills and confidence [2].

One of the objectives of physics learning as stipulated in the Curriculum 2013 is to have skills in developing science and technology as well as confidence as a provision to compete in the world of work that they will be doing [2]. This is in accordance with the characteristics of the vocational school is to prepare students directly into the world of work and requires students have the expertise that is ready to use in the world of work. This learning objective will be maximally achieved if supported by adequate cognitive process capabilities [3].
The conceptual understanding is the ability to build knowledge into meaningful concepts. Students who already understand the learning materials, then studying in the classroom becomes more meaningful and fun to implement. The conceptual understanding that is not appropriate can make students have difficulty in the learning process. The ability of students in mastering the material can be seen from the conceptual understanding it has. The conceptual understanding a person can be identified based on aspects of interpreting, exemplifying, classifying, summarizing, inferring, comparing and explaining [4].

The pattern of learning during this tends to be an activity that burdens the students, so it is not surprising if the output is still weak in terms of ability to understand and ultimately the goal of physics learning is not achieved and the expected competence is not maximal. Presentation Physics in schools today more oriented to the material contained in the curriculum and textbooks. For students, learning physics seems to be for the sake of facing tests or tests, and apart from the problems of everyday life. Physics subject matter is felt as a burden that must be remembered, memorized, and understood and not perceived its meaning for their daily life [3].

For example, at school they have learned and mastered the subject matter of the series and parallel series of electric, Ohm's laws, and Kirchhoff’s laws, but they were unable to do anything when the electric fuse at his home broke up due to a short circuit (kortsliuiting). In the eyes of students, physics seems to exist only in the school corridor. Because the lack of meaningful science materials for students will lead to low interest and motivation of students in learning science [3].

Self-efficacy refers to the extent to which an individual believes that he can perform a specific task or achieve a specific goal [5]. Self-efficacy determines how one thinks, behaves, and motivate themselves [6]. As the self-regulation of learning self-efficacy may affect the extent to which students engage and persist in completing the task. Students who have high self-efficacy will be happy to be involved in dealing with challenging tasks and tougher though overshadowed by failure than students who have low self-efficacy [7].

In our daily lives self-efficacy led us to set goals that challenge and survive in the face of difficulties. When problems arise, the ability of self-efficacy would encourage people to remain calm and seek a solution through self-regulatory activities better than contemplating the inability [6].

Assuming that the conceptual understand students is always evolving, it will also be in line with the increase in student self-efficacy. The student’s conceptual understanding and self-efficacy on dynamic electrical materials is needed by students. Understanding the process of electrical occurrence allows students to explain the phenomenon of electricity in everyday life with a sense of confidence and confidence that they are able to apply it in everyday life.

This study aims to determine the profile of the student’s conceptual understanding and self-efficacy at vocational high school in Bandung. Information on understanding and self-efficacy is expected to provide new information for teachers to identify students' understanding and self-efficacy in physics learning. If we know this information, it is expected that teachers plan and conduct better learning process to develop students' understanding and self-efficacy.

2. Methods

2.1. Types of research
This research uses descriptive research to know the profile of students' conceptual understanding and self-efficacy. This study was conducted in one of the vocational high schools in Bandung in the academic year 2016/2017.

2.2. Subject / Research Subject
The population of this research is students of eleventh graders in vocational high schools in Bandung. Sampling technique used in this research is purposive sampling [1]. A 75 students from one vocational school in Bandung are involved in this research.
2.3. Procedure
The research procedures undertaken in the literature study relate to the focus of the study, interviews with some physics teachers and students on physics learning at school and provide research instruments.

2.4. Data, Instruments, and Data Collection Techniques
The research instrument is a multiple-choice form test for measuring the comprehension and attitude scale to measure student self-efficacy. The ability to understand refers to the Bloom Taxonomy Revision which consists of the aspects of interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining. While self-efficacy refers to the instrument used Baldwin consisting of three aspects, including cognitive, psychomotor, and aspects of the application of concepts and skills [8].

2.5. Data analysis technique

2.5.1. Ability to Understand. The data has been collected and then performed an assessment for each question that has a score of one. After printing, the next step is to do a percentage of each aspect of the ability to understand, the percentage of the process is done by using the formula as follows:

\[
\% = \frac{\text{score of every aspect}}{\text{the total score of each aspect}} \times 100\%
\]  

(1)

After that is done categorization for each indicator, that is grouping score obtained by student in very high category, high, fair, low and very low. This categorization is adapted to the categorization ability according to Arikunto [9]. Guidelines for the categorization of students' ability to understand as in Table 1 below.

| Table 1. The percentage of students’ ability |
|---------------------------------------------|
| Percentage score (%) | Category |
|-----------------------|----------|
| 81-100                | Very high|
| 61 - 80               | High     |
| 41 - 60               | Medium   |
| 21 - 40               | Low      |
| 0 - 20                | Very low |

Student data and percentage will be used by the researcher to perform descriptive analysis. Descriptive analysis is done to provide a general overview and obtain complete information related to the ability to understand profile.

2.5.2. Self-efficacy. Statement of the attitude of self-efficacy scale based on the guidelines of the instrument that is used if Baldwin [8]. In this experiment, the response format scale of self-efficacy refers to the scale of the response proposed by Bandura [5] which is a 100-point scale simplified to:

| Yes | Not Confident | Confident | Very Confident |
|-----|---------------|-----------|----------------|
| No  | 1             | 2         | 3              |
|     | 4             | 5         | 6              |
|     | 7             | 8         | 9              |
|     | 10            |           |                |

Figure 1. Sel-efficacy scale
In the response scale format, the "no" option has a zero value. Researchers chose the response format because zeros to ten are better known to give an idea of the value of something in a vocational student environment.

3. Results and Discussion
The Figure 2 below shows the percentage of students' understanding.

![Figure 2: Percentage of Conceptual Understanding](image)

Based on figure 2 above, the interpreting aspect is 42%, exemplifying aspect of 45% and comparing aspect of 43% including the moderate category. The classifying aspect is 37%, summarizing aspect of 35%, inferring aspect of 38%, and explaining aspect of 40% included in the low category. Based on the above percentage, it can be seen that the ability to understand the students is in the low category (the average percentage of 40%), meaning that students have not been able to construct the meaning of learning materials/messages including what is said, written, and drawn or graphically by the teacher.

The results of the conceptual understanding test shows that students are not able to solve the problems of physics, both covering basic concepts or development, so that student learning outcomes on aspects of the conceptual understanding students are in the low category. This is because the physics learning process that is implemented has not entirely touched on the objectives of physics learning itself. Most teachers use the lecture method by interrupting the use of question and answer methods, and discussion methods. During the learning process the teacher does not present the phenomena that can bring cognitive conflict to the students. Students tend to be passive during the learning process because students only focus on formulas rather than understanding basic concepts, either in the form of hands-on activity or minds-on.

Based on the results of interviews with some students found the fact that most students say that physics lessons are very difficult and not contextual. They do not see any clear connection between the knowledge they gain in the classroom and the real life they experience outside the classroom. The knowledge they receive is limited to the formula and knowledge of isolated facts. As a result students are less introduced to what the teacher is informing with the existing real conditions, so that when students encounter problems related to it, they can't solve the problem, because they have no practical experience. The pattern of learning during this tends to be an activity that burdens the students, so it is
not surprising if the output is still weak in terms of ability to understand and ultimately the goal of physics learning is not achieved and the expected competence is not maximal.

Based on the result of attitude scale and student interview about self-efficacy shows that the learning process is less considering the psychological aspect of students especially self-efficacy. Most of them stated that the difficulties they experienced in physics learning caused them to not know what to do to get it done. After further investigation most of them know what to do, but they are unsure of their abilities. The lack of confidence in students' abilities indicates that student self-efficacy is still low [5].

Based on the above explanation, there must be a solution that can improve students' understanding and self-efficacy. The solution is expected to improve the quality of better learning in schools, so that students' understanding and self-efficacy will improve.

4. Conclusion
The conclusions obtained based on the results of research, show that the ability to understand and self-efficacy of students is still low. This is evidenced by the aspects of interpreting 42%, exemplifying of 45%, classifying of 37%, summarizing of 35%, inferring of 38%, comparing of 43%, and explaining of 40%. Most of them know what to do, confident with the abilities they have. The uncertainty of their own abilities indicate that student self-efficacy is still low. These findings will form the basis for further research on innovative learning models and strategies that can improve students' understanding and self-efficacy.

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