Correlation among science process skill, concept comprehension, and scientific attitude on regulation system materials

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Abstract. The aim of this research was to analyze the correlation between science process skill and concept comprehension as well as scientific attitude. The research method was a descriptive correlational. The research population consisted of all students in class XI in one of senior high school in West Sumatra with a total population of 100 students. The sample consisted of 26 students which were taken by a cluster random sampling. The instrument consisted of a science process skills test, concept comprehension test, and scientific attitude scale. The data were analyzed using linear regression test. The results showed that there was a significant correlation between science process skill and concept comprehension. In addition, there was a significant correlation between concept comprehension and scientific attitude. Nevertheless, there was not a significant correlation between science process skill and scientific attitude.

1. Introduction

Science is basically a process of discovery. This is consistent with the background of the importance of science in the Ministry of Education [1] which stated that the Natural Sciences deals with how to find out (inquiry) about the systematic nature. Therefore, science is not just a mastery of knowledge in the form of a collection of facts, concepts or principles, but also a process of discovery.

Learning science should be more emphasis on the process, where students are active during learning to build knowledge through a series of learning activities that are meaningful to students. Biology as one of the areas of science provides a variety of learning experiences to understand the concepts and processes of science.

Science process skill is basic abilities which are needed for use and understanding of science [2]. Furthermore, according to German [3] there are two skills that are used in the world of science. Firstly, basic science process skills that related to the ability to conduct empirical - inductive reasoning as well as providing basic skills in conducting scientific investigations. Secondly, integrated science process skills that associated with ability to perform the hypothetic-deductive reasoning. These skills are used to solve problems or conducting experiments. Science process skills cannot be separated in practice understanding of the concepts involved in a study and application of science especially biology.

Moreover, according to Rooser [2] concept is an abstract that represents objects, events, activities, and relationships which have similar attributes. A concept is a mental abstraction that represents level of stimulus. Concept comprehension could be measured by multiple choice test of concept comprehension. A set of test was made suitable to new Bloom Taxonomy. There are six levels of
cognitive domain that appropriate with new Bloom taxonomy. They are remembering, understanding, applying, analyzing, evaluating, and creating.

In addition, science learning is also expected to build students' scientific attitude. According to Baharudin [4] scientific attitude is basically the attitude shown by scientists as they perform activities as a scientist. If a good scientific attitude has been embedded in a student then it is expected this attitude will also remain inherent in everyday life. Scientific attitude is needed in order to build the character of the nation as one of the efforts in overcoming various problems facing the nation, such as student brawl, corruption and so on.

All this time, the research that aimed to reveal the relationship between science process skills, concept comprehensions and scientific attitudes of students were still rare. Therefore, the researcher wanted to analyse these aspects. Whether the student who has a high science process skill showed a high concept comprehension and scientific attitude and vice versa. Furthermore, whether student who has a high concept comprehension showed a high scientific attitude and vice versa.

2. Methods
The research method was a descriptive correlational to see the correlation between science process skill and concept comprehension as well as scientific attitude of regulation system materials.

![Diagram of correlation]

Explanation:
X₁ : science process skill
X₂ : scientific attitude
Y : concept comprehension

The research population consisted of all students in class XI in one of senior high school in West Sumatra with a total population of 100 students. The sample consisted of 26 students which were taken by a cluster random sampling.

3. Results and Discussion
The data was analysed using linear regression test. The result of the test can be seen in Table 1.

| Variable                                      | Pearson Correlation | Spearman Correlation | Criteria of significance level | Conclusion                      |
|-----------------------------------------------|---------------------|----------------------|--------------------------------|---------------------------------|
| Science process skill and concept comprehension | 0.007               | 0.03                 | 0.05                           | There is a significant correlation |
| Scientific attitude and concept comprehension  | 0.012               | 0.014                | 0.05                           | There is a significant correlation |
| Science process skill and scientific attitude | 0.052               | 0.1                  | 0.05                           | There is no significant correlation |
For each variable that has significant correlation, the regression equation could be searched as shown in the table below.

**Table 2. The Correlation Coefficient, Determination Coefficient and Regression Equation of Science Process Skill, Scientific Attitude and Concept Comprehension**

| Variable | Correlation Coefficient (r) | Determination Coefficient (R²) | Regression Equation |
|----------|----------------------------|------------------------------|--------------------|
| Science process skill (X₁) and Concept comprehension (Y) | 0.475 | 0.226 | Y = 0.567X₁ |
| Scientific attitude (X₂) and Concept comprehension (Y) | 0.442 | 0.196 | Y = 0.771X₂ |

Based on analyzing of correlation between science process skill (X₁) and scientific attitude (X₂) and concept comprehension (Y), we could see there was a significant correlation between science process skill and concept comprehension, moreover, there was a significant correlation between concept comprehension and scientific attitude. Meanwhile, there was no significant correlation between science process skill and scientific attitude.

The science process skill affected concept comprehension. It meant that if the science process skill was high, then the concept comprehension also increased. This was suitable for the opinion of Rustaman, et al. [5] which stated that student could learn a concept as a science learning goal learning through a scientific process approach. Thus, science process skill also supported concept comprehension on regulation system materials.

Moreover, it can be seen that correlation coefficient (r) was 0.475 and determination coefficient (R²) was 0.226. It meant that 22.6% of concept comprehension was affected by science process skill. Meanwhile, the remaining 77.4% was influenced by other factors such as motivation, interest in student learning and the ability of teacher for explaining a concept.

Moreover, scientific attitude influenced concept comprehension. It meant that if the scientific attitude was high, then the concept comprehension also increased. This was in line with Sukaesih's opinion [6] which stated that scientific attitude was affected by the level of student information mastery.

According to Slameto [7], other factors that affected student learning outcomes was the attitude. Attitude is something that is learned, and attitude determines how individuals react to situations and determine what individuals search for their life.

Lack of student positive attitude in learning could lead to low student learning outcome. Scientific attitude strongly supported student learning activities in a positive direction. Therefore, it could be concluded that student scientific attitude influenced student learning outcome which in this case was the concept comprehension of regulation system.

Furthermore, it can be seen that correlation coefficient (r) was 0.442 and determination coefficient (R²) was 0.196. It meant that 19.6% of concept comprehension was affected by scientific attitude and 80.4% was affected by other factors such as student age, student background, and student learning motivation.

According to the data, there was no significant between science process skill and scientific attitude. This was not suitable with the result of Zeidan [8] that revealed where there was a significant positive correlation between science process skills and attitudes toward science among Palestinian secondary school students has been found. The difference of this result might be caused by the number of samples that used was low. Therefore, this result could not be generalized.
4. Conclusion

Based on the research that has been done can be concluded that there was a significant correlation between science process skill and concept comprehension. In addition, there was a significant correlation between concept comprehension and scientific attitude. Nevertheless, there was not a significant correlation between science process skill and scientific attitude. Based on the conclusions that have been drawn, the researchers gave the following recommendations. First, teachers should develop learning that can improve the science process skill, because science process skill has a correlation with the students’ conceptual understanding. Second, the number of participants for correlation research should be larger.

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