An Analysis of University Students' Conceptual Understanding and Retention on Science Basic Concepts

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Abstract

Understanding on concept and retention is one of the achievement indicators in learning. This research attempts to describe the profile of concept and students' retention understanding of Primary Teacher Education of PGRI University of Semarang in the year of 2014/2015. The method of this research was a survey using essay test instrument of concept understanding and retention. Cluster random sampling method was used to take sample from 231 students in class 1A, 1C, 1E, 1F, and 1H. The overall result of the concept understanding value was dominated in high category at 57.6%. The highest indicator of concept understanding was in memorizing indicator (C1) at 83.6% and the lowest one was in the creating indicator (C6) at 50.3%. The overall retention mark was dominated in poor category at 50.3%. The conclusion was the high concept understanding was not followed with high students' memory.

Keywords: Concept Understanding, Retention

1. INTRODUCTION

Education is a means of developing potential owned by someone for the needs of himself, society, nation, and state. The mandate of Republic of Indonesia Act No 20 Year 2003 stated that the purpose of education is to develop students' potential so that they can become human beings with belief in one God, a good attitude, healthy, scholarly, capable, creative, independent, democratic, and responsible.

The effort to achieve the purpose of education can be trained and developed through a natural science basic concept subject which is the main course in Primary Teacher Education. Science basic concept course accommodate the science basic concepts that consists of biology, chemistry, and physics. Science is related to fact, concept, principal, and law that tested. Developing of thinking ability can be a practical means of forming good human resource and ready to work (Mugiono&Setiawan, 2014). One of thinking ability and the purpose of science teaching is to teach for concept (Konicek, et al., 2015) so that the concept understanding and science principal is the requirement of students' learning succeed. The concept understanding is also used to solve the problem in daily life.

Concept understanding is one of competence indicator that should be achieved after doing learning activity or as a reference in deciding students learning achievement. Learning achievement in general relates to aspects of knowledge (Arifin, 2009). Concept understanding is the ability to catch the meaning of material studied (Puspani, 2013), reveal and explain again the accepted information by using own words without changing the meaning (Marlis, 2015).

Concept understanding is related to someone's cognitive process. The level of revised Bloom's Taxonomy are memorizing (C1), understanding (C2), applying (C3), Analyzing (C4), Evaluating (C5), and creating (C6) (Krathwohl, 2002:215). Every student has the different concept understanding in what they learnt. Some students are able to understand overall materials and some of them cannot understand what they learn. They only know about the material they learn.

Understanding is divided into three categories. The first level or the lowest level is translation understanding in a real meaning. The second level is interpretation understanding that is combining past knowledge and current knowledge or combining the parts of graphic with activity and differentiates the essential and non-essential things. The third level or the highest level is extrapolation understanding which is expected to see behind the written, able to make a prediction about consequence or enlarge the perception of time, dimension, case, or problem (Sudjana, 2010:22).

Small problems that are related to the concept cannot be solved without concept understanding (Marlis, 2015). Hence, it is very important for students to have the concept understanding. Concept understanding is a very basic knowledge to make the students able to solve more complexes problems in their life. The fact of concept understanding based on the mid test mark of science basic concept course in the year of 2014/2015. It showed that students' concept understanding in medium level is 42, 5% and in low level is 4, 4%. The observation showed that the students have difficulty in connecting the concepts they learn. Consequently, students face the barriers in completing the given task. It indicates that learning outcomes which is achieved is not so optimal. Misunderstanding or lack of concept understanding will obstruct the learning so that the result is less than maximum (Hakim, et al., 2012).

The success indicator of learning can be seen from the length of the concepts studied remain in one's memory that is required to assist the next process of learning. Retention is the activity of keeping the concept of the knowledge in long time memory and can be revealed in the specified time. Maesyarrah, et al, (2015) stated that retention is related to cognitive structure that remains in the brain and can be recalled if necessary.

Retention is the activity of keeping the concept in the memory that have less attention. The result of interview with lecturer of science basic concept course explained that the lecturer give less attention to students' retention. However, actually retention can be one of indicator in deciding the successful learning or the quality of learning (Lubis&Manurung, 2010). Someone's retention can be measured in two weeks or fourteen days after someone get the certain knowledge (Putri, et al., 2013). Students who have low retention will influence the learning process and have the impact in achievement of learning objectives.

Related to that case, concept understanding and retention are necessary to be paid attention in learning process so that the learning objectives can be achieved optimally. Learning process is related to strategy and learning model that applied in teaching-learning process. Strategy and learning model influence the concept mastery and students' retention (Smarabawa et al., 2013). Learning process which can improve the concept understanding and students' retention should be able to make students active in learning. Moreover, it should make students involve in discussion with daily theme, train students to give their argumentation (Venville&Dawson, 2009), and notice the idea based on the facts (Jojo, et al., 2013).

Based on the background above, the main subject to be analyzed is the profile of concept process and students' retention of Primary Teacher Education in PGRI University Semarang in science basic concept course. Specifically, this research is to find the factual description of concept understanding and students' retention.

2. RESEARCH METHOD

This research was survey research. The purpose of this research was to gather the information about concept understanding and students' retention profile. This research was done in undergraduate program of Primary Teacher Education in PGRI University Semarang in the

year of 2014/2015. The population on this research was the students on the first semester who attended the science basic concept learning. There were nine classes that consist of 419 students. Cluster random sampling method was used to take sample from 231 students in class 1A, 1C, 1E, 1F, and 1H.

The instrument that used was seven number of essay test instrument about concept understanding and retention. The reliability instrument that used in advance has tested by using Alpha Cronbach formula. The result of reliability test is 0,844.

3. RESULT AND DISCUSSION

The research was conducted from 21 November to 21 December 2014 in Undergraduate program of Primary Teacher Education in PGRI University Semarang in the year of 2014/2015. The explanation of the result is described in order (1) the description of concept understanding; and (2) the description of students' retention.

The description of students' concept understanding was obtained from essay test. Descriptive quantitative was used to analyze the result of essay test. The purpose of analyzing is to get the general description about students' concept understanding. The percentage of students' concept understanding can be seen in Figure 1.

Figure 1. The Percentage of Students' Concept Understanding

Figure 1 explained that mark category of students' concept understanding has not fully reached the high and very high qualification. Some of the students are still in the low category. That information indicates that the effort to improve concept understanding is needed to reduce the low category and increase the high category.

The main factor that influences students' concept understanding in low level is that the students are unready to attend the learning process which is applied method and strategy. Another factor is learning model that less facilitate students to be active in learning. Those main factors are based on the survey result on 15 December 2014. That result showed that 74,5% students are unready to attend the learning and 70,2% students do not read the material and do not write the summary of the concept they will learn in advance. The method, strategy, and learning model that applied are group discussion (assignment), question and answer, and presentation. Presentation is dominated in learning process. The students are still passive in discussion, question and answer, and presentation. It can be seen from the certain group domination that are very active in asking and the lack of concept understanding among group members in presentation. .

Individual readiness in learning will determine the quality of learning process and achievement. Having good readiness in learning, the students are able to attend the learning actively and easy to accept the knowledge in learning process. If the students have a good readiness, they will get ease in accepting the knowledge and they will concentrate in learning process (Mulyani, 2013). It certainly will have an impact on increasing students' concept understanding and the achievement of learning goals.

One of the efforts to increase the concept of understanding is by improving the quality of learning process. Learning process is related to the strategy or learning model that applied in learning process because strategy and learning model influence the result of learning goals. The research from Puspitasari, et al, (2014) explained that strategy and learning model influence the students' concept understanding. Strategy and learning model that able to increase the concept understanding should facilitate students to be active in learning (Hermawati, 2012). It should give freedom to conduct the activity that lead to creative establishment independently and facilitate the students to present their opinion as well (Mauke, et al, 2013).

The detailed result of the analysis in each indicators of students' concept understanding can be seen in Figure 2.

Figure 2. Percentage of Students' Concept Understanding

Figure 2 showed that the indicators order from the highest to the lowest are remember (C1), understanding (C2), analyzing (C4), applying (C3), evaluating (C5), and creating (C6). The lack of facility in strategy and learning model that supported the students to create the new concepts influences the low indicator of creating. Mauke, et al (2013) stated that the learning model which less facilitate students to be active and explore the idea will make the students are less accustomed to create something in finding the solution. Eka, et al (2014) explain learning that restricted the students in improving their potential has the impact in depth concept understanding.

Depth concept understanding will be embedded in the memories and can be shown through the ability in transferring knowledge in new situation and in certain time. The result of students' retention test (memory) was done two weeks or fourteen days after concept understanding test. The result can be seen in Figure 3

Figure 3. Percentage of Students' Retention Mark

Figure 3 explains that students' retention mark is dominated in poor category. It is happened because the learning process does not involve the students actively and oriented in memorizing not oriented in experience to find or build the new concept. This learning process does not embedded in students' memory for long time. The research from Maesyarah, et al. supported that result. It is explained that retention can be increased by using learning strategy and involving students actively in finding the relation between the knowledge they know with the new knowledge. Hermawati (2012) elaborates learning that involves students to be active mentally, intellectually, socially, and emotionally will be able to increase retention.

Information or knowledge that getting from accepting and memorizing will not embedded in the memory for long time so that it cannot be able to solve the daily life problem. Smarabawa, et al (2013) explained that in increasing retention, the teacher should revise the early knowledge of students and elaborate the knowledge so the students will build their own knowledge automatically and what they get will embedded in their memory. Eka, et al (2014) elaborates the learning process that tend to be based on theory memorizing and not be based on students' experience will make the students only able to memorize.

4. CONCLUSION

According to the result of data analysis and discussion, the research is concluded as follows:

- 1) The total mark of students' concept understanding is dominated on high category. The detailed marks of students' concept understanding are 57, 60% in high category, 29, 50% in low category, and 12, 90% in very low category. The lowest indicator of concept understanding is in creating (C6) indicator which is 50, 30%.
- 2) The total of students' retention mark is dominated on poor category. The detailed marks of students' retention are 50, 30% in poor category, 43, 70% in good category, 5, 60% in very good category, and 0, 40% in very poor category.
- 3) The conclusion was the high concept understanding was not followed with high students' memory.

5. SUGGESTION

The suggestions which are given to the pertinent parties of this research are the learning process which accommodates students' readiness in learning and involved students actively is needed. Other suggestions are teacher should train the students to build and find the new concept and apply the learning process which oriented to long time memory

Those suggestions can be done by applying learning model which accommodate students to read the material before class. This effort will help students to be ready in learning. In addition, writing the students' idea will make students involve actively in learning process and make students have a good memory. And the last, discussion will also help student to have a good concept understanding.

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