Difference in Learning Outcomes Between High School Student Taught Using Learning Cycle 5E and Learning Cycle 7E on Colloid Subject

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Abstract—**This research was aimed to know differences in learning outcomes between high school student taught using learning cycle 5E model and learning cycle 7E model on the subject of colloid. This research was conducted at SMAN 4 Samarinda, East Kalimantan, Indonesia. This research used quasi experimental with post-test only control design. Sample of this research were 2 groups of 12nd grader student of natural science and chosen by using purposive sampling technique. Each group of student consisted of 36 students. A group of student namely student of XII IPA 1 was taught using learning cycle 5E model and a group of student namely student of XII IPA 2 was taught using learning cycle 7E. The learning outcomes of the student were cognitive learning outcome that collected from evaluation test each meeting and final subject examination. The data were statistically analyzed using chi-square, F-test and t-test. Student learning outcomes average of XII IPA 1 student was 77.31 and significantly lower ($\alpha=0.05$) than that of XII IPA 2 student; 77.16. This research showed that the learning outcomes of high school student taught using learning cycle 7E model was higher than that of student taught using learning cycle 5E model.**

Keywords: learning cycle, learning outcome, colloid

I. INTRODUCTION

Chemistry is a part of natural science that studies about structure, properties, and transformation of matter, and energy change in the transformation of the matter [1]. Colloid is a part of chemistry that plays a major role in development of industrial sector. Many natural phenomena can be explained by the concept of colloids such as deltas formation in river, water purification process, and sky color changes. Therefore, the colloids concept is needed in daily life [2].

Colloid is concrete subject, so it will be easier for student to understand the subject with experiment methods. By using the method, the student is more interested in learning colloid. In addition, students can unite new thoughts and understanding through discussion [3].

An appropriate learning model is needed to facilitate students in conducting experiments and discussions. As a part of cooperative learning model, learning cycle is a learning model that facilitated student to conduct the experiments and discussions. The model is student centered; students are actively involved in presenting and conveying their knowledge [4].

The learning cycle initially consists of three stages, namely exploration, explanation, elaboration/extension, which is known as learning cycle 3E. The three stages are further developed into five stages: engagement, exploration, explanation, elaboration, and evaluation, which are known as learning cycle 5E [5]. It was developed again into seven stages, namely elicit, engage, explain, elaborate, evaluate and extend, which is known as learning cycle 7E [4].

In Learning cycle 5E and learning cycle 7E, students are not only required to understand theory, but they are also trained to find concepts and convey verbally the concepts found [4]. Several studies have been shown the effectiveness of the learning cycle 5E and learning cycle 7E in improving student learning outcomes. Reference [6] states that implementation of learning cycle 5E influenced learning outcomes of 11th grade student at SMA N 2 Pontianak on colloid subject. On the other hand, the use of the learning cycle 7E can improve student learning outcomes on the subject of buffer solutions [7].

According to the reasons above, this research was conducted to know the learning outcome differences between student taught using learning cycle 5E and student taught learning cycle 7E on the subject of colloid.

II. METHOD

This research was categorized as quasi experimental researches with posttest only control group design. This research was conducted at SMA N 4 Samarinda, East Kalimantan Province, Indonesia. Subjects in this research were a group of 12th grade student namely students of XII IPA 1; taught using learning cycle 5E, and a group of 12th grade student namely students of XII MIPA 2; taught using learning cycle 7E. They were chosen by purposive sampling technique. Both of the group subjects were taught on the subject of colloid. The learning outcomes were collected using tests, posttest and final subject examination. The data were analyzed its normality, homogeneity of variance and the differences of learning outcomes using statistical test.

III. RESULT AND DISCUSSION

Student learning outcomes of students XII MIPA 1; taught using learning cycle 5E and XII MIPA 2; taught using learning cycle 7E, on the subject of colloid are shown in Fig. 1.
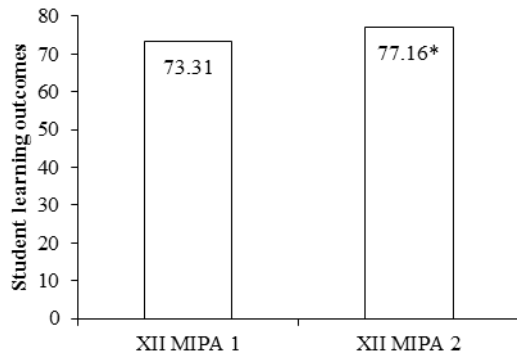
Fig. 1. Student learning outcomes of students XII MIPA 1 (taught using learning cycle 5E) and XII MIPA 2 (taught using learning cycle 7E) on the subject of colloid. * significantly different with left value.

According to the Fig. 1, it is clear that student learning outcomes taught using learning cycle 7E was significantly (α=0.05) higher than that of student taught using learning cycle 5E. It is caused by the effectiveness of the learning cycle 7E on increment of student interests and motivations. There are 2 phases in the learning cycle 7E that are not found in learning cycle 5E namely elicit phase, a phase at the beginning of the learning, and extend phase, a phase at the end of the learning. In elicit phase, students' initial knowledge are revealed by giving questions related to the topic. In this phase, teacher knew the students' initial knowledge so the teacher could choose right action in the next phase. According to observation data (the data is not shown), the implementation of elicit phase was categorized as good. This result is in accordance with previous research [8].

In extend phase, students were asked to think, search, find, and explain an example of concepts that have been studied. This phase was also asked students to find relation between obtained concept and other concept that have or have not been studied. According to observation data (the data is not shown), the implementation of extend phase was categorized as very good.

IV. CONCLUSION

Learning outcomes on the subject of colloid at SMA N 4 Samarinda in the academic year of 2017/2018 of 12th grade student taught using learning cycle 7E was higher than that of 12th grade student taught using learning cycle 5E.

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