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Implementation of Laboratory-Based Active Knowledge Sharing

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Abstract. This research aimed to apply learning Active Knowledge Sharing based on laboratory to improve knowledge and skill of oral communication of student teacher candidate. This study is a classroom action research using two cycles. Subjects in this study were students of Chemistry Education Program Islamic University of Indonesia at sixth semester as many as 38 students. Data collection conducted in this research is by using test method and non-test method. In the test method, the instrument used is a test of knowledge, while the non-test method used an observation sheet of oral communication skills. Analysis of the data used was to change the score into categories. The results of this study indicated that with the implementation of Active Knowledge Sharing was able to improve student achievement on aspect of knowledge and skill of oral communication.

INTRODUCTION

Chemistry is one of the branches of science where the theory derived from experimental inventions that have been done by researchers. Chemical learning can not be separated from the laboratory as a place of experimentation takes place. In chemical laboratory, storage of chemical substance and material is a strategy that must be done to reduce the risk of accidents in the laboratory [1].

Chemical Education Students of Islamic University of Indonesia who are prepared to be chemistry teachers in schools must master the management of chemical laboratory. Chemical laboratory management is included in the course of Management and Quality Assurance of School Laboratory for 2 credits. Learning achievement in this course is student teacher candidate can master the laboratory management in the form of: organization structure and laboratory plan, handling tool and materials, laboratory safety, and waste management laboratory.

Based on the research that had been done, Nuha indicates that the laboratory contributes to chemistry learning chemistry in senior high school that is facilitating the achievement of knowledge and skills competence [2]. The laboratory has a very important role in the formation of knowledge of high school student. Student teacher candidate should always intersect with the laboratory not only as a practitioner but also able to master the principles of good laboratory management. Students are accustomed to work in the laboratory to perform a chemical lab that is accompanied by a practicum assistant. Students are accustomed to use various equipments and materials used for lab work that have been prepared by laboratory.

Chemistry teacher candidate must be ready to face chemical laboratory conditions in a school. Laboratory conditions are vary according to school circumstances. There are schools that have complete/ incomplete laboratory facilities, there are laboratories that are completely unused because all chemicals are out of date, and there are even laboratories whose functions are combined into one (physics, chemistry and biology).

Active Knowledge Sharing (AKS) strategy is one part of active learning where students dominate learning by doing learning activities in the form of mutual exchange of knowledge. The AKS involves students to build interest, curiosity and stimulate thinking. The implementation of AKS is able to gain the participation of the whole class and individual accountability. In addition, AKS provides an opportunity for students to act as lecturers for other students

[3]. AKS is a good way to introduce students to the taught material and how it can be used to assess students' level of knowledge while conducting team-building activities. It is suitable for all class sizes and with any subject matter [3].

Active Learning educational methodology is attracting interest in education fields [4]. McKeachie & others [5] explained that Active Learning enhances thinking and writing skills.

“Bonwell and Eison explained Active Learning features as described below [6],

- a. Students are involved in more than listening.*
- b. Less emphasis is placed on transmitting information and more on developing students' skills*
- c. Students are involved in higher-order thinking (analysis, synthesis, evaluation)*
- d. Students are engaged in activities (e.g., reading, discussion, and writing)*
- e. Greater emphasis is placed on students' exploration of their own attitudes and values.”*

With the implementation of these strategies it enable improvement of thinking ability and writing skills. Furthermore, if students are able to master both capabilities, the students are able to explain it to other students.

Communication is one of the most important elements of humans need. Educational communication is the process of information exchange between two sources, one source is the student and the other source is the teacher [7]. Communication skill is necessary to achieve success in learning because student will easily communicate various matters concerning learning materials, both orally and writing [7,8]. Daif-allah & Khan reveals that oral communication skills are one of the important skills besides four skills (listening, speaking, reading and writing) [9].

The purpose of this research was to know the improvement of knowledge and the ability of oral communication of students in the course of Management and Quality Guarantee of School Laboratory with the implementation of Active Knowledge Sharing based on laboratory

METHODS

This research was a classroom action research using Spiral Model by Kemmis and Mc. Taggart where there are four important stages consisting of (1) planning, (2) actions, (3) observation, and (4) reflection as in Figure 1. This research was done two cycles.

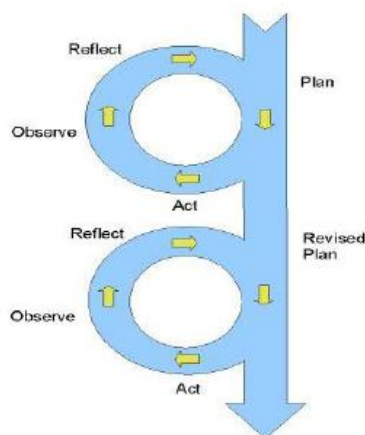


FIGURE 1. Classroom Action Research Research Design

The subjects of this study were Chemistry Education students in the fifth semester as many as 38 students (36 girls and 2 boys). Student achievement was measured from the aspect of student knowledge with a minimum score of 75%. The student knowledge aspect assessment was based on the results of laboratory analysis at each school, Midterm exam score and final exam score. In addition, the learning achievement was based on a questionnaire of the students' oral communicative aspects at the time of presentation. Indicators of communication communicative aspects consist of several indicators [9], i.e.

- a. Message delivery
- b. Grammar

- c. Respecting the Speaker
- d. Giving opinion
- e. Able to give relevant questions
- f. Able to give clear and understandable comprehension.

The criteria for assessing the oral communication skill aspect is based on Table 1

TABLE 1. Criteria of Oral Communication Skill Assesment

Category	Norm Formula
Excellent	$X > M + 1.5SD$
Very Good	$M < X \leq M + 1.5SD$
Good	$M - 1.5SD < X \leq M$
Poorly	$X \leq M - 1.5SD$

RESULT AND DISCUSSION

This study was a classroom action research using two cycles. The purpose of this research was to know the improvement of learning achievement and student's oral communication skills with the implementation of Active Knowledge Sharing based on laboratory.

The first cycle and the second cycle were held during seven times using face-to-face meetings. In each cycle, students were divided into eight groups, and each group conducted observations at a chemical laboratory at one of the high schools in Yogyakarta. The things that were analyzed during this observation activity were :

- a. Laboratory condition
- b. Laboratory organizational structure
- c. Laboratory sketch/plan
- d. Laboratory safety
- e. Storage of laboratory equipment and materials
- f. Disposal of practicum waste.

Based on the results of the research in Fig 2., there was an increase in the score of the knowledge aspect and ability to communicate verbally from the first cycle and the second cycle. Improved score on the aspects of knowledge because students are enthusiastic in the learning process. The learning process is done by using laboratory-based field study. Students are asked to observe the laboratory conditions in a high school to be analyzed according to the standard laboratory of ISO 17025 chemical laboratory. This was aimed so that students can directly know the condition of chemical laboratory in school then the students know the weakness or problem faced by each school in managing a chemistry laboratory.

Active Knowledge Sharing based on laboratory Learning is one of learning that emphasizes active learning where students actively construct their own knowledge. This learning involves students in the learning process to build attention and interest, build curiosity and stimulate to think. Active knowledge sharing learning gives students the opportunity to teach their own friends [3].

Active Knowledge Sharing learning makes students find out how chemistry standard of laboratory in high school. In this case, students study the laboratory of a school by doing observations and interviews.

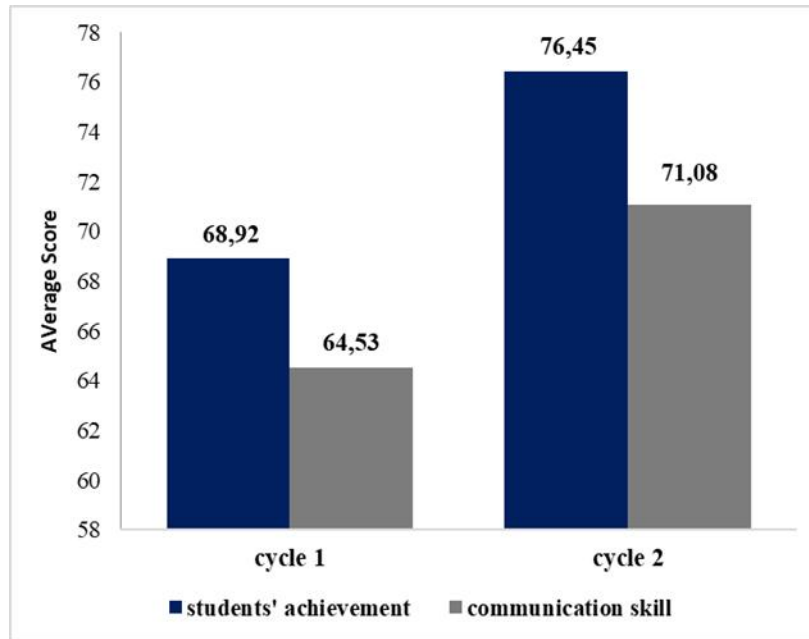


FIGURE 2. The result of the average score increase on the knowledge aspect and oral communication skills of each cycle

In the first cycle, the score of student achievement showed a score of 68.92. At this stage, students prepared a list of questions for interviews with teachers at the school, laboratory head and laboratory assistant. This preparation process was new for the students. Students were not yet accustomed to observations and interviews about the state of the laboratory in a school. Based on the observations and interviews done, the students concluded the real laboratory conditions in the school and compared with the ISO 17025 laboratory standard. Each student presented his observations in front of the class.

Nishimura et al. revealed difficulties during the learning process that implemented Active Learning for various reasons [4]. Firstly, the methods to teach and learn should be changed depending on the student because of the nature of the students, such as being shy or sociable, are various. The effects of instruction might be different among students. Under these circumstances, a heavy burden put on each teacher to sense the characteristics of each student. Second, the interaction data among the students and the teacher are usually retained by individual teachers and not used for the Active Learning lecture. Much of the interaction data are created during the Active Learning lecture and such data can be helpful for the teachers to understand the characteristics of each student.

In the second cycle, student achievement score increased significantly to 76.45. At this stage, students were better able to perform laboratory analysis because students had already known the laboratory standards that have met ISO 17025. Improvement of student achievement is also caused by the ability of students in understanding the material being studied. The learning of laboratory based AKS is in line with the theory presented by Piaget Theories illustrate how humans define an understanding through the process of sense and intellectual development through the experience around [10]. The emerging reflexes are quickly replaced by a set of mental or constructed structures that allow them to interact with and adapt to the environment. This adaptation occurs in two different ways (through the processes of assimilation and accommodation) and is a critical element of modern constructivism [11].

When students construct their own knowledge, then there are meaningful learning. Meaningful learning had three principles: (1) when students can visualize these concepts and categorize them in the cognitive structure of students; (2) classification of concept from the most general to the most specific concepts; (3) the readiness of the students to include the knowledge that learners have today and receive new knowledge/ concepts and relate it to their prior knowledge [12].

Based on Table 1, the students' oral communication ability in the first cycle was 64.53 and increased significantly in the second cycle to 71.08. This is because students were accustomed to communicate the results of the observation and analysis activities in the presentation. Presentation activities made students active in expressing all ideas. Students need the ability to express or say something they think or feel and experiment without feeling

threatened [9]. This was positively affected the students' learning experience, students' knowledge can improve as they can explore experiences.

TABLE 2. Results of Oral Communication Skill on Each Indicator Assessment

Oral Communication Indicator	Question	Average Score	Category
Message delivery	Able to deliver the comprehension in front of interlocutors Able to present the materials well and correctly Understand the delivered materials	129.33	Very Good
Grammar	Using polite language Using understandable language Using good grammar (right sentence and word)	128.00	Good
Respecting the speaker	Not doing the activity that disturb interlocutors Listening the interlocutors discussion Accepting new comprehension delivered by interlocutors	129.67	Very Good
Giving opinion	Able to give new idea with good language Able to give opinion in accordance with materials delivered by interlocutors Able to give positive feedback that can build on others	126.67	Good
Able to give relevant questions	Able to give questions in accordance with the material presented by the other person interlocutors Able to give question clearly and not convulted Able to give question in accordance with interlocutors comprehension.	130.33	Very Good
Able to give clear and understandable comprehension	Able to explain with own idea Able to explain the materials using clear articulation and intonation Able to explain comprehension clearly and can be understood by other people	126.00	Good

Table 2 shows that the highest skill communication skills lie in aspects of message delivery, respecting the speakers, and able to give relevant questions. Basically, students are able to convey an intent/ material to other students by using language that is easy to understand. Students who become listeners appreciate the other person by not doing other activities that interfere with the speaker. They are able to do feedback to the other person by asking questions related to the material presented.

CONCLUSION

Based on the research that had been done, showed that the implementation of Active Knowledge Sharing based on the laboratory can improve student learning achievement and improve oral communication skills. Improved learning achievement of 7.53; while the improvement of oral communication skill of 6.55.

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