

Learning and Innovation Skills of Chemistry Education Students in Lesson Study Learning Community-Based Microteaching Course

Zonalia Fitri^a, Andromeda^b Yerimadesi^c, Faizah Qurrata Aini^d, Nadia Julianti and Lillah Fitri
Department of Chemistry, Universitas Negeri Padang, Prof. Dr. Hamka Street Air Tawar, Padang, Indonesia

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Abstract: Competent prospective teachers have to be prepared in this disruptive era with the learning and innovation skills that make them ready to compete in the work field in the future. Lesson Study Learning Community (LSLC) based micro-teaching courses were conducted to develop their pedagogical content knowledge as well as 21st-century skills through three specific stages namely plan, do, and see. This study aims to describe the critical thinking and problem-solving, communication, collaboration, and creativity (4C skills) of students who take the LSLC-based micro-teaching course. A class of students were observed and the 4C skills were measured using a four scales observation sheet for a semester program. The study obtained that the student's learning and innovation skills are in good and very good categories which are the former for collaboration and creativity and the latest for communication, critical thinking, and problem-solving skills. Some detail abilities such as working together in groups and the ability to build ideas while doing plan, do and see activities need to be improved.

1 INTRODUCTION

Twenty-first-century skills, particularly learning and innovation skills in achieving a knowledge-based society (KBS) are one of the Indonesian government's objectives. A knowledge-based society will allow people to achieve knowledge, create and apply it effectively to enhance economic and social life. It will improve competitiveness globally, alter the paradigm from developing natural resources to human resources (Nugroho, 2005). Universities and schools have an important role in achieving KBS on an ongoing basis, linking science with cognitive, attitudes and skills in learning (Karpov, 2016).

Scientific learning can be implemented through learning models such as guided discovery learning (GDL), guided inquiry learning (GIL), and problem-based learning (PBL)(Ministry of education, 2013). These learning models are effective in improving student learning outcomes (Fajriati & Fitriza, 2020; Yerimadesi et al., 2019) and are able to bring up

critical thinking and problem-solving skills in chemistry subjects (Yerimadesi et al., 2019). These skills are highly expected by the government of the Indonesian generation and are obtained through learning in schools. Therefore, teachers must have knowledge and skills in applying the three learning model.

The micro-teaching course is a compulsory subject in the Chemistry Education Study Program which aims to train students' pedagogic competence. Microteaching involves teaching learning simulation in the classroom that is carried out to peers for 10 to 15 minutes (Iksan et al., 2014; Lowe, 2019). It is a simplification in terms of study time, number of students, breadth of material and teaching skills (Sukirman, 2012). Some of the teaching skills that must be possessed by teachers are a variation of stimulus, opening skills, closing skills, reinforcement skills questioning skills, and explaining skills. Through micro-teaching courses, students are trained in applying the basic skills of teachers such as

^a <https://orcid.org/0000-0003-4984-4274>

^b <https://orcid.org/0000-0002-1307-1620>

^c <https://orcid.org/0000-0002-8379-6918>

^d <https://orcid.org/0000-0001-8148-6476>

implementing a scientific approach at school in teaching internship course and their future work as professional teachers. They have to follow the scientific approach to plan and conduct learning scenarios.

LSLC is a professional development process that emphasizes improving students' learning difficulties. LSLC is oriented to students' problems along teaching-learning process (Saito & Atencio, 2015). It consists of three continuing stages called a plan, do, and see (Herliani & Masitah, 2018; Saito & Atencio, 2015; Susetyarini & Miharja., 2017; Tonya Monique Nicki Collins, 2013). Through LSLC-based micro-teaching, students can plan to learn with their group or community at the "plan" stage, conduct a learning process based on planning that is called as "do", and reflect on the learning carried out in the "see" stage (Iksan et al., 2012; Saito & Atencio, 2015). LSLC which is conducted in groups makes students collaborate in planning learning so that student creativity is created in learning with the GDL, GIL, and PBL models (Fernández, 2005; Zhou & Li, 2017). Joint observation of the problems faced by students/peer students in micro-teaching course at the "do" stage helps students find out student problems, and at the reflection stage students provide problem-solving for improvement in the next "plan" stage.

Chemistry education student competency in planning, implementing, and evaluating the process of learning through learning models is useful during teaching internships by applying the LSLC system in future schools. The problems faced by students in achieving learning outcomes and 21st-century skills can be solved cooperatively by teaching internship students, mentor teachers, and school principle. Then, they can work together to plan the next meeting.

21st-century skills consist of critical thinking and problem-solving, collaboration, creativity, and communication skills. Critical thinking skills are mental processes, strategies, and human representation used to solve problems, make decisions and learn new concepts. Problem-solving skill is a thinking skill starting from looking for data to concluding. Creativity is the ability to provide a new answer to a problem or find a new relationship and provide a new mental structure in a row (Piedra et al., 2010). Collaboration skills are activities that initiate dialogue such as making proposals or expressing ideas to initiate discussion, respond to contributions from group members by providing feedback, and explore opinions on certain points of view (Gogoulou et al., 2005). While communication is the process of exchanging information from someone who provides information through verbal or

non-verbal methods to people who receive information (Sukaria, Muhammad Ikhlan, Nahadi, Sriyati, 2018)

2 MATERIALS AND METHODS

The research was conducted on a class of chemistry education students of Universitas Negeri Padang, Indonesia who take Micro Teaching course. The students were divided into 3 groups that designed, do, and see the learning activities using GDL, GIL, and PBL. They compiled lesson plans together then the model teacher did the teaching-learning practice while other members of the community observed peer students. The result of the observation contributed to the lesson plan for the next meeting. Plan and see activities were conducted online and recorded while the do activity was carried out by face-to-face meeting.

The recording was observed and noted in the observation instrument to assess learning and innovation skills which are critical thinking and problem solving, communication, collaboration, and innovation. The instrument consists of indicators of each skill and was completed by the level of skill. There are 5 indicators of communication skills, 4 indicators of collaboration, 8 indicators of critical thinking and problem solving, and 7 for creativity. There are 4 categories of ability, they are very good, good, fair, and poor.

The data found was analyzed using Miles and Huberman method consisting data reduction, data display and verification (Matthew & Huberman, 1994). We categorize the data for each student, each indicator, and for every skill.

3 RESULT

Critical thinking skills, problem-solving, communication, and collaboration of students when carrying out LSLC were measured using a 4-scale observation instrument containing indicators of critical thinking and problem-solving, collaboration, communication, and collaboration as shown in Figure 1.

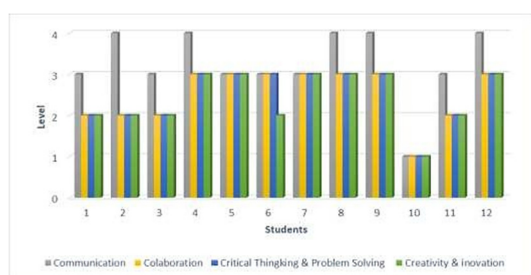


Figure 1: Learning and innovation skills of chemistry education students in the LSLC-based microteaching course.

In general, it appears that the best skills possessed by students who take microteaching lectures by planning and reflecting on learning of LSLC are communication skills while other skills are almost the same for every student. Communication skills are at a very good and good level except for 10th students 60% of students have excellent communication skills. Critical thinking skills and problem solving and collaboration are always at the same level for each student, while the level of student creation varies where 60% is good, 33% is fair and 7% is poor.

This level is the mode value of the skill level of all students in each indicator. Based on Table 1, it is known that students have critical thinking and problem-solving skills as well as good communication shown through these indicators, but collaboration and creative skills, especially the ability to work together in groups, express creative ideas conceptually and practically, and make problems as an improvement benchmark.

Table 1: Communication skill level of chemistry education students in LSLC-based micro-teaching course.

Indicators	Level
Using the ability to express ideas, both during discussions, inside and outside the classroom, as well as in writing	Very good
Using spoken language that is appropriate to the content and context of the conversation	Good
Have the attitude to be able to hear, and respect the opinions of others	Very good
Using a logical and structured flow of thinking	Good
Using multilingual communication	Good

Table 2: Collaboration skill level of chemistry education students in LSLC based micro teaching course.

Indicators	Level
Have the ability to work together ingroups	Poor
Able to adapt in various roles and responsibilities, work productively with others	Good
Have empathy and respect for different perspectives	Good

Able to compromise with other members in the group to achieve the expected goals	Good
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Table 3: Critical thinking and problem solving skill level of chemistry education students in LSLC based micro teaching course.

Indicators	Level
Using various types of thinking or reasoning, both inductive and deductive, appropriately and according to the situation	Good
Understanding the interconnection between one concept and another	Good
Assess and make decisions effectively in processing data and giving arguments	Good
Evaluating and developing connections between information and arguments	Good
Processing and interpreting the information obtained through the initial conclusions and testing it through the best analysis	Good
Give solutions to various problems in their own way	Good
Optimize their abilities to solve problems	Good
Compile, express, analyze, and solve a problem	Good

Table 4: Creativity level of chemistry education students in LSLC based micro teaching course.

Indicators	Level
Have the ability to develop, implement and convey new ideas orally and in writing	Good
Be open and responsive to new and different perspectives	Good
Able to express creative ideas conceptually and practically	Fair
Using concepts or knowledge in new and different situations	Good
Using failure as a learning milestone	Fair
Have the ability to create novelty based on initial knowledge	Good
Able to adapt in new situations and make a positive contribution to Surrounding	Good

4 DISCUSSIONS

Firstly, communication skills are general skills that must be possessed by prospective teachers. This communication consists of verbal (oral), written, and social communication, all three of which are needed in the education field. This verbal communication can be trained through presentation and discussion activities, both small and large groups (Iksan et al., 2014). In the plan-and-see activities, each student was trained to present their learning designs because each of them is assigned to be a model teacher. Another activity is a discussion to improve the learning design based on the problems obtained from the do activities.

Community members provide their opinions, criticisms and suggestions so that they are trained to compose the right sentences to be able to state their ideas according to the content, and context of the conversation, logically, structured and can respect the opinions of others (Direktorat Pembinaan SMA Ditjen Pendidikan Dasar dan Menengah, 2017). These skills must be supported by self-confidence, knowledge of content, context and attitudes (Wetchasit et al., 2020).

The next skill is a collaboration which is part of 21st-century skills. It can be formed through LSLC because students are divided into 3 groups, each of which composes and implements learning using GDL, GIL, and PBL. Thus, students are trained to work together and complete each other's tasks. These skills require adaptation to roles and attitudes within the group (Direktorat Pembinaan SMA Ditjen Pendidikan Dasar dan Menengah, 2017). However, one indicator of the low level of collaboration is due to the ability to work together in groups that are not good. This low collaboration skill occurs in the group that composes and implements learning using discovery learning and problem based learning models. This skill is said to be low because some group members did not contribute to the discussion in improving the model teacher's lesson plan. They attended a meeting which was conducted using a zoom meeting, but there was very little interaction between group members, presenting more on lesson plans than discussing their contents. Moreover, there is no division of tasks in which someone acts as chairman and note-taker. Likewise, with the time of reflection, although group members convey the results of their observations, these results are not used as a basis for suggesting improvement in learning.

The third skill is critical thinking. It requires skills in analyzing and evaluating information that is important to solve problems with relevant considerations and reasons for solving a problem. Ennis stated that critical thinking focuses on how a person makes decisions (Ennis, 1993). The level of critical thinking skills is different for each individual, to assess a person's level of critical thinking skills, it can be seen using the leveling of critical thinking skills in solving a problem compiled by Paul and Elder (Paul & Elder, 2006). Problems that must be analyzed and evaluated in LSLC-based micro-teaching courses are how learning plans are prepared, and problems that occur in do activities that are observed and recorded and then reflected on see activities. In general, students have been able to examine and assess the planning, the situation in the field, and the results of observations. However, some

students need to improve these skills. The low skill level is due to the lack of student involvement in discussions so their critical thinking and problem-solving skills were difficult to identify.

Lastly, the level of critical thinking skills affects student creativity because to be able to come up with creative ideas, critical thinking, and appropriate problem-solving are needed. Based on Table 1, it can be seen that students' skills in generating ideas are lower than their creative thinking skills. Someone who thinks creatively is certainly preceded by critical thinking and problem-solving skills. However, students whose creative level is lower than critical thinking due to the ideas that are raised are something that is mainstream or has often been done by other people. To be able to think creatively, students need to brainstorm; create new ideas; describe, refine, analyze, and evaluate ideas (Piirto, 2011).

Limitations of the skills also occur in the ability to express creative ideas conceptually and practically. Students' ability in giving criticism and suggestions is good, but the ideas that are raised are something that is usually carried out in learning, not yet a novelty idea.

5 CONCLUSIONS

Through LSLC-based microteaching courses, students' learning and innovation skills are in very good and good categories, namely communication and creative thinking, and problem-solving, but collaboration and creation skills need to be improved, especially in the ability to work together in groups and the ability to build ideas on problems that faced in a plan, do and see activities. It is recommended that the implementation of LSLC-based microteaching lectures to improve 21st-century skills is to carry out face-to-face LSLCs to improve student interaction and communication.

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