Hybrid Active Learning to Develop the Science Competence of Preservice Elementary Schools Teachers

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Abstract. This paper investigates the effectiveness of a hybrid active learning through analyzing the science concept and teaching ability of elementary education. In the study which is an action research study based on Kemmis & McTaggart model, consist of planning, implementation, observing, reflection. The study was administered to 30 elementary education preservice teacher to gather data on their science concept and teaching ability. Posttest at the end of learning was used as a performance measure. We applied the online test on the Edmodo platform. Therefore, the course consists of face to face and online learning. The simple descriptive method showed that elementary education pre-service teacher's teaching ability could be developed by hybrid active learning. Meanwhile, science concept of elementary education pre-service teacher needs further training before they do the internship.

Keywords: science competence of preservice elementary school's teacher, active learning, hybrid learning

1 Introduction

A teacher's professional competence is very important. Teacher competence will greatly affect emotions [1], behavior [2], and student learning outcomes [2], [3]. Teacher competence will also greatly affect the success of achieving learning goals in the classroom [4].

The results of the preliminary study using pretest of material, energy, and universe subjects showed that not every prospective science teacher was able to design and carry out learning in the form of an optimal learning scenario. The lack of optimal ability to design and carry out learning is due to the lack of understanding of students about the science materials that have been taught in the previous lecture process [5]. This is in line with research [6] which states that although prospective teachers have taken four years of college, their science concept understanding is still lacking. One of the improvement efforts made to overcome the lack of teaching ability and mastery of science concept for a preservice elementary teacher is implementing active hybrid learning in lectures.

Hybrid active learning is a combination of active learning and hybrid learning. Active learning is a learning process which involves students to be active in discussing and solving the problems [7]. Active learning is usually done offline where teacher and students meet face

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to face. Meanwhile, hybrid learning is a learning process which combines face to face and online learning [7]–[9]. Thus, a learning process can run through either offline or online.

Several previous studies in various countries only examined hybrid learning or active learning, without combining the two. Hybrid learning is believed to be able to develop teacher teaching competencies [10], fun for teachers and students [11], [12], and students are satisfied with the learning [13]. Hybrid active learning is able to develop students' creative thinking in higher education [14]–[17]. This fact shows the importance that learning that combines technology in learning has a good influence on students and lecturers. Meanwhile, active learning is believed to be a model for prospective teachers in carrying out classroom learning [18]. In addition, active learning can also develop skills that are skillful [19], [20]. In this study, hybrid learning was combined with active learning.

Hybrid active learning highly influences the students' competence. Hybrid active learning has been proven to be able to develop students' mastery in concepts [7] and to motivate students to prepare the lesson before and to look for relevant references for the lesson which will be taught [8]. Hybrid active learning can also integrate cognitive, psychomotor, or effective [21]. Most students in the hybrid active learning feel satisfied because of the availability of online course which makes it possible for them to access the needed learning sources for 24 hours. Moreover, the students can also choose when they take the quiz [21], [22]. Hybrid active learning can also improve the communication among students in an online forum because usually, students who feel shy to give comments at class can communicate well through online forum [22]–[24]. Therefore, hybrid active learning is expected to be able to improve the competence of preservice elementary school's teachers.

This study aims to develop the competence of science primary school teacher candidates in terms of carrying out learning and mastering science teaching materials using hybrid active learning. The result will certainly provide benefits for the development of learning using Hybrid active learning in universities.

2 Methods

The research design used was the Classroom Action Research (CAR) model of Kemmis & McTaggart [25], [26]. This model uses the stages of a research cycle which consists of four stages, namely planning, implementing, observing, and reflecting. This design is followed up with an implementation phase to monitor the competence of preservice teachers in microteaching activities.

Research is conducted in the even semester of 2017/2018 school year. The research sample was taken using purposive sampling technique, which is non-random sampling that has a specific purpose [27]–[29]. In this study, the sampling technique aims to select samples that take part in science courses. The research subjects used were 30 preservice teachers, students of the Materials, Energy, and Universe courses at the Maulana Malik Ibrahim Malang Islamic Elementary School Teacher Education Department.

There are two data measured in this study, namely the ability of students to carry out learning and understanding the scientific concepts of students. Collecting research data is done through observation and tests. The ability of students to carry out learning is observed using the learning implementation observation sheet in the form of a Likert scale. The ability of students to carry out learning is assessed by peer assessment techniques between lecturers and students. Students science concept understanding is measured using an online test through

Edmodo. The data obtained were analyzed using coding and data reduction then presented in the descriptive form.

Indicators of success in the study are determined using the percentage of active learning implementation ≥75%. At the end of the implementation phase, the percentage of ability to carry out student learning is ≥80%. At the end of the cycle, the average score of the student test results is ≥75. Determination of research success indicators refers to the initial observation data.

3 Result and Discussion

3.1 The Ability to Conduct a Learning Process

One of the preservice teachers' competencies developed in the course of material, energy, and the universe was the ability to conduct the learning process. The ability to conduct a learning process could be improved by skill training. The result of this study showed that preservice teachers' ability to conduct a learning process had improved. They conducted a microteaching which then was reflected by the lecturer and their friends. The result of the reflection would be implemented in the second microteaching. After reflection, they were given chance to reflect and revise the learning process which had been conducted. After reflection, their ability to conduct the learning process was improved as visualized in Fig. 1.

Based on Fig. 1, when the first microteaching result 45% of the students had scores above 80, while students who score less than 80 by 55%. After being given treatment, the second microteaching showed that 82% of students had scores above 80 or a 37% increase between the first and second microteaching, while students who scored less than 80 were 18%. It can be concluded that the use of active learning hybrids can improve the ability to carry out the learning of students in the matter, energy, and the universe course.

The ability to conduct the learning process trained to the preservice teachers including the ability to open the lesson, to use the learning model, to master the learning material, to deliver the learning material, to manage the classroom, and to close the lesson. Preservice teachers' ability to conduct the class was presented in Table I.

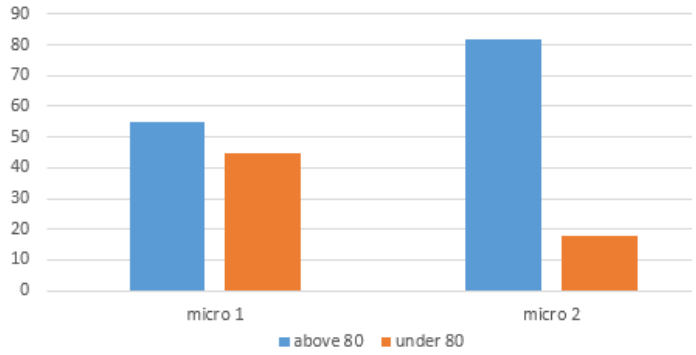

Figure 1. The Percentage of Preservice Elementary School Teachers' Ability to Conduct the Learning Process

Table 1. The Ability To Conduct A Learning Process Achieved

Aspect	Microteaching 1 (%)	Microteaching 2 (%)
Opening the Lesson	55.20	69.85
Using the Learning Model	77.50	82.40
Using the Learning Media	85	98
Mastering the Learning Materials	53	72.83
Delivering the Learning Materials	76.65	88.54
Classroom Management	75.30	82.53
Closing the Lesson	65.45	73.65

Table 1 shows the percentage of students who have scores above 75 in carrying out learning. In the first microteaching, students who open the lesson well or have a score above 75 as much as 55.20%, while in the second microteaching the ability of students to open learning that has values above 75 reaches 69.85% or an increase of 14.60% between first and second microteaching. This research shows that the use of active learning hybrids can develop the ability to open teacher learning, in line with research [30], [31]. The percentage of ability to open learning is still quite low, both in the first and second microteaching. Most students experience difficulties in finding events related to teaching material. This is naturally experienced by new inexperienced teachers, due to the immature mastery material [32], [33]. Thus, the ability of students to open lessons still needs to be improved.

The percentage of preservice elementary school teachers' ability in using the learning model in the first microteaching reached 77.50%, while in microteaching the second percentage reached 82.40% or an increase of 4.9%. preservice elementary school teachers are very creative in choosing learning models. This is a positive impact of active learning hybrids applied by lecturers. The percentage of preservice elementary school teachers' ability in using the learning media in the first microteaching is quite high, which is 85%, while in microteaching the second percentage reaches 95% or an increase of 10%. This shows that almost all preservice elementary school teachers have used the media in learning. preservice elementary school teachers have a variety of creativity in the use of learning media. preservice elementary school teachers not only use powerpoint in the learning process but also use simple tools that can attract students' interest in learning. It can attract students to be more enthusiastic in learning [34], [35].

The percentage of preservice teachers manage class ability when the first microteaching is 75.30%. While the percentage of students' ability in managing classes when the second microteaching is good, reach 82.53% or an increase of 7.23%. Most preservice teachers conditioned classrooms into circles so that students' attention is centered on the teacher who is practicing teaching. Students who practice teaching also encourage students to actively argue and ask questions. Students also organize interactions between students in the class. Nevertheless, there is still some preservice teacher who still have difficulties in classroom management. This shows that students also still need guidance in classroom management because the conditions when teaching practice will be different from the classroom conditions at the real school.

After the implementation, the preservice teacher has the ability to analyze their learning even though their reflection analysis has not been maximized. The ability of students to close learning when the first microteaching only reached 65.45%, while when the second microteaching reached 73.65%. Although there was an increase between the first and second microteaching of 8.2%, the percentage was still quite low. Many preservice teachers

immediately close learning with greetings without reflecting. In addition, there are also many students who provide feedback that is not in accordance with the learning objectives to be achieved discussing the issues expressed at the beginning of learning. This is because the time for learning has been completed so that students do not have time to turn and give assignments to students.

Hybrid active learning strongly supports students in developing their teaching abilities. In Hybrid active learning, more often students carry out microteaching, better the quality of learning [36]–[38]. This is because the ability to carry out learning is an ability that can be improved through skill training [39]–[42]. Skills that are skillful can be enhanced by active learning which provides opportunities for students to think and act [19], [20]. When the lecturer applies active learning in lectures, it can be a model for prospective teachers [18], so that the ability to carry out learning also increases.

The ability of preservice elementary school teachers to carry out learning increases significantly, especially in terms of opening lessons, mastery of teaching materials, and delivery of teaching materials. This is because active hybrid learning can motivate students to prepare previous material [7]. Students can also search for some references that are appropriate for the learning to be taught [8].

3.2 The Mastery of Science Learning Materials

One of the competencies which must be owned by teachers is a professional competence. Professional competence is an ability to master the learning materials broadly and in-depth [43], [44], including (a) concept, structure, and method of scientific/technology/art which cover/ coherent with the learning materials; (b) the available learning materials in schools curriculum; (c) the relationship between the related subjects; (d) the implementation of scientific concepts in daily life; and (e) the professional competition in global context by preserving national values and cultures.

Professional competence for the preservice teacher was prepared through science material course. The mastery of science concepts of preservice teachers was shown through their ability in delivering science learning materials at schools. Their ability in mastering the materials was also seen from their scores of seven online formative tests in various fields of science materials using Edmodo. Seven formative quizzes include various scientific material, including motion, style, work, energy, sound and light, electricity, and magnetism. The test results of the mastery of the science material for prospective primary school teachers are explained in Fig. 2 below.

Fig. 2 explains that the ability of prospective teacher candidates to master the concept of science has fluctuated. The most dominant mastery of science concept is about style, effort, energy. As many as 72% of students have scores above 75 in force concept, 90% of students have scores above 75 in work concept, 68% of students have a value above 75 in energy concept.

The ability to master the learning materials was related to the preservice teachers' ability in delivering learning materials. The principals which needed to be considered in explaining the materials were the content of the materials delivered and the students who had to be ready [45]. Therefore, to deliver the learning well, preservice teachers need to get training regarding the use of good spoken language and written language to deliver the learning materials. That training has been obtained through hybrid active learning. During the hybrid active learning process, preservice teachers were demanded to give their comments or arguments in front of the class and in online discussion. Their habit of giving arguments led to the high score of

ability to deliver the learning materials during the teaching practice, in line with [23], [24], [46].

Preservice teachers found it easier to remember and to understand the learning materials using hybrid active learning. The learning materials were focused on the materials used to be the basics during the teaching practice in elementary school. They were not only asked to learn the materials but also to develop and to form their own learning characteristics. This condition was in accordance with the learning objectives of active learning, Student-Centered Learning.

The results of the research described above reinforce some of the results of previous studies in various countries [14]–[17]. Learning by integrating technology can improve students' cognitive skills that will lead to applications in higher education. The ease of receiving material information that has been delivered helps illustrate the content of the abstract material to be clear and easily captured by students.

Edmodo can also give direct feedback to the preservice teachers. When they do their formative quiz, the score obtained will directly be presented by the time they finished doing that quiz. This will support them to do self-reflection to which materials needed to learn further [14], [24]. They can also choose when they will learn and access Edmodo. Thus, this can develop their self-regulation ability [14].

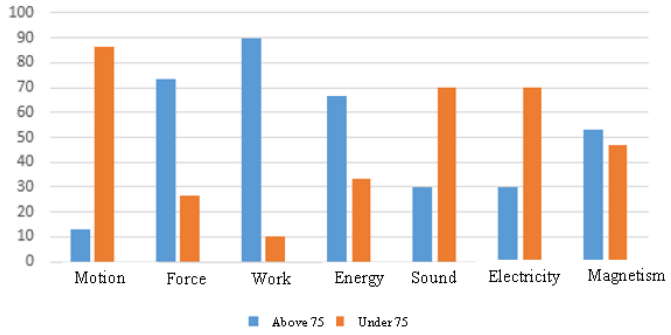

Figure 2. The Percentage of Preservice Elementary Schools Teachers' Ability in Mastering Science Materials

4 Conclusion

The effort to improve the competence of preservice elementary schools teacher through a hybrid active learning process which consisted of the ability to conduct the learning process and to master the learning material had been made in the course of material, energy, and the universe. The implementation of hybrid active learning was able to improve pre-service teachers' ability in conducting the learning process including opening the lesson, using the learning model, using the learning media, mastering the learning materials, delivering the learning materials, managing classroom, and closing the lesson. That improvement had not been in line with the improvement of pre-service teachers' in mastering Science materials. Those preservice teachers still need debriefing and training before they do the internship.

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