Increasing the Students’ Practicum Skills via Flipped Classroom Model

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ABSTRACT
The allocation of learning time in the lecture of Electric Measuring Instrument is very limited, so that the college students’ practicum skills is designed virtually. In this way, flipped classroom model can bridge a problem of a very limited time allotment of the learning. Flipped classroom model combines instructional technology and active learning where students learn outside the classroom virtually. This model allows the students to discuss learning materials that have not been comprehended inside the classroom, invite teachers to have an interesting and a collaborative learning circumstance. This research tried to increase the students’ practicum skills via flipped classroom model. The subject of this research was college students of Physics Education in Universitas Indraprasta PGRI. By implementing a quasi-experimental research, the research administered an observation sheet of practicum skills as the research instrument with the t-test data analysis. The research findings pointed out that the implementation of flipped classroom model with Edmodo-based e-learning contributed a significant effect on the students’ practicum skills. It was shown in the mean score of the students’ practicum skills in the experiment class that was higher than in the control class. It is concluded that the flipped classroom model had been successfully facilitated the students in physics practicum and improved the students’ practicum skills.

Keywords: Flipped classroom, Edmodo, E-learning, Students’ practicum skills

1. INTRODUCTION

A learning process in the 21st century experiences a paradigm shift from teacher-oriented learning into student-oriented learning with an active learning characteristic. The learning process which involves students actively as a whole will help them to develop and to build their knowledge independently. The active learning facilitates students to study actively and to get involved continuously, both mentally and physically.

A lecture of Electric Measuring Instrument lasts about 14 meetings, with the time allotment of 3 x 50 for each meeting (3 credits). Based on the analysis result on the syllabus of Electric Measuring Instrument subject used by the Physics Education Study Program in Universitas Indraprasta PGRI is defined that from the content issue of Electric Measuring Instrument subject consists of fact, concept, and experiment that related to daily life. Due to the issue of the working method, it is identified that the learning objective of the lecture of Electric Measuring Instrument expects students to be able to memorize, to comprehend, to analyze, to apply, and to make a simple electric measuring instrument, including the factors that influence the electric measuring instrument, theories, and concepts of electric measuring instrument.

Viewed from its psychomotor issue, students were less understood in developing science skill. They only perceived the concept or the theory without applying and developing that concept in the science field. The students only concerned on the cognitive value, while the psychomotor value was seemingly ignored. In fact, psychomotor value in the science skill is one of the students’ skills that must be developed due to scientific method principle. In the lecture of Electric Measuring Instrument, students should develop and apply theory in their daily life; for instance, the production of simple...
electric measuring instrument that needs to be developed from the students’ practicum skills.

Practicum skills is a psychomotor skill that students should have in understanding physics concepts by experiment. This is also part of the science process skills. The science process skill is a teaching-learning approach that leads to the development of several particular skills of the students. The students who are the teachers’ candidate, have to be able to process information so that such new valuable things will be invented, either the fact, the concept, or the development of attitude and value. By experiencing the practicum skills, the concept obtained by students will be meaningful as students’ thinking skill will be more developed [1]. The practicum skills is very important to be conducted in the learning of Electric Measuring Instrument as the process skill in the learning itself. In this way, the students are no longer focused only on one particular theory or concept, instead of developing practicum skills in their psychomotor skill.

According to the number of contents which must be mastered by the students in the lecture of Electric Measuring Instrument, it was defined that there were 11 quite broad topics which were not only factual, but also conceptual and procedural. Meanwhile, the provided time allotment that was suited with the legal order had very limited time with 3 x 50 minutes for each meeting. In that limited time, each meeting demanded various learning activities, starting from presentation, discussion, and question-answer as well as demonstration of the learning result. Theoretically, the lecture of Electric Measuring Instrument requires additional time proportionally for students to have more learning opportunity, but not disturbing the time allotment provided by the institution.

In order to achieve the expected learning objective, it needs a learning model that will be simply implemented for its achievement. One of the learning strategies that can be applied in the lecture of Electric Measuring Instrument with limited time allotment as previously mentioned is the use of flipped classroom model. The flipped classroom learning model can be set as the problem’s solution as it rearranges the time allotment inside and outside the classroom. According Brooks, flipped classroom is a learning which integrates instructional technology and active learning, where students learn online outside the classroom, and discuss materials that they do not comprehend yet inside the classroom so that it will lead teacher to give interesting learning and to create collaborative situation [2].

In a planned manner, the flipped classroom changes the learning management strategy on what must be carried on outside the classroom by the students. Variety activities such as assignments that are being worked on in the classroom accompanied by the lecturer as the learning partner; and what should be conveyed and discussed in the classroom such as facts, theories, and concepts, are delivered outside the classroom virtually [3, 4]. Flipped classroom offers an ease in the learning by delivering learning content by online which enables it to be accessed by students flexibly wherever and whenever. Flipped classroom focuses on the learning achievement which stresses on the students’ learning activity. In other words, flipped classroom facilitates students to learn appropriately with the way that is considered easy to achieve the expected learning objective and gives lecturer an ease to teach. The utilization of online learning is aimed at giving the students an ease in accessing the learning materials as well as in studying learning materials before the classroom meeting, so that when the students involve in a face-to-face meeting, students will be ready, and the topics discussed can also be more encompassed in detail.

The online flipped classroom learning utilized the e-learning of Edmodo-based learning media. The learning condition of e-learning can accommodate students to play their role becomes more active in learning, students can develop a plan and seek materials by their own effort. The tendency to develop e-learning as one of the learning alternatives in such educational institutions is more increasing by the development in communication, technology, and information. The infrastructures in telecommunication which support e-learning are not only dominating by the big cities’ monopoly, but also has been used by those who live in the districts gradually. Edmodo is a social network for learning that is based on a learning management system (LMS). Edmodo facilitates a secure place for teachers and students to communicate, collaborate, to share content and learning application, students’ homework, a discussion in virtual class, an online test item, provision of value, and so forth [5, 6]. Edmodo is an interactive learning media equipped by a communication device among students and teachers, among students, as well as among students and other learning sources [7].

2. METHOD

The research was engaged by 54 students at fifth semester of Physics Education Program in Universitas Indraprasta PGRI. The students were comprised in the experiment class with 24 students, and the control class with 26 students. The sample was selected by using the simple random sampling It was collecting sample from population members which was conducted by taking the subject randomly, the researchers combine subject-subject in population so that all subjects are considered the same.

The research employed a quasi-experimental research where the control class applied the model of PBL learning model. Meanwhile, the experiment class carried out the flipped classroom model. The instruments used in this research are documentation and observation. The observation applied an observation sheet to measure practicum skills on the lecture of Electric Measuring Instrument. After collected the data, the analysis employed the t-test by using software SPSS 16.0. The t-test was conducted after the prerequisite test, that covered the normality test of one-sample Kolmogrov-Smirnov Test and the homogeneity test of Levene’s.

3. RESULT AND DISCUSSION

Data descriptions of the students’ practicum skills on the lecture of Electric Measuring Instrument can be seen in Table 1.
Moreover, the homogeneity test is needed to identify that the variance on population was the same or homogeneous. The calculation of homogeneity test in this research used the Levene’s test, which was obtained by the homogeneity test’ probability value (p-value) for all variance based on the learning model that had to be more significant than the value of 0.05 so that the test decision of H₀ would be accepted. It could be interpreted that both samples had homogeneous learning strategy variations.

The analysis result of the effect of an e-learning Edmodo-based flipped classroom learning implementation on the students’ practicum skills based on the calculation result presented in Table 2.

Table 2. Hypothesis Test Result

|                     | t-test | p-value | criteria  | H₀-test |
|---------------------|--------|---------|-----------|---------|
| College             | 0.001  | p-value < | 0.05     | Rejected|
| Students’ Science   |        |         |           |         |
| Process Skill       |        |         |           |         |

According to table 2, it can be identified that the p-value is 0.001 with the significance level is 5%. In condition of probability significance (p-value) < 0.05, the null hypothesis (H₀) is in the range of rejection as the probability significance (p-value) < α = (0.05). Based on the calculation on the students’ science process skill, H₀ was rejected while H₀ was accepted. The students’ practicum skills between the control class with PBL learning and the experiment class with an e-learning Edmodo-based flipped classroom showed a significant different so that the implementation of an e-learning Edmodo-based flipped classroom contributed an increase on the students’ practicum skills, particularly on the materials of Electric Measuring Instrument.

Continue to the t-test result, it was defined that the implementation of an e-learning Edmodo-based flipped classroom affected the students’ practicum skills. The t-test result of the students in the class R5A and RSB of the Physics Program in Universitas Indraprasta PGRI for students’ practicum skills can be seen in Table 2. It defined the significant effect between PBL model and an e-learning Edmodo-based flipped classroom model on the students’ practicum skills. This significant means that there was a difference on students’ activity before and after the learning treatment of the Edmodo-based flipped classroom model.

In prior, the students’ activity during the learning process was mostly only sitting and only engaged by the request from the teacher or lecturer, to do something or come in front of the class. The condition had created low motivated circumstances for the students’ skills. Kepichainarong, et al. [8] affirmed that students’ achievement in gaining the knowledge and practicum skills that were found was higher in the investigation laboratory compared to those who were in traditional style. The finding was strengthened by people who developed process investigation led by the learning orientation to increase content knowledge and students’ skill in the physical practicum skills [9, 10].

Table 1. The Results of Practicum skills

|                     | Experiment Class | Control Class |
|---------------------|------------------|---------------|
| Mean                | 23.72            | 21.58         |
| Deviation Standard  | 2.35             | 2.16          |
| Variance            | 5.52             | 4.65          |
| Maximum             | 18.33            | 16.00         |
| Minimum             | 27.67            | 25.67         |
| Median              | 23.50            | 21.67         |
| N                   | 24               | 24            |
Related to the observation data after implementing an e-learning Edmodo-based flipped classroom, the students’ activity in the learning process became more active where the students completed the observation, classifying, predicting, measuring, summarizing, and communicating the learning materials. An active learning according to Pierce [11] could invite students to get involved in all learning process, not only involving their mental but also involving their physical. Students were also trained to ask and to try answering questions through discussion process.

This research results confirmed the prior research accomplished by Mohanty & Parida [12] who also pointed out that the implementation of flipped classroom strategy contributed a significant positive impact on the learning result achievement. That was due to the learning itself applied the flipped-mastery strategy so that the students had more flexible time to study that they could study the lesson given by online repeatedly until they comprehended the lesson very well. Therefore, they were ready to study the lesson in a deeper way in every meeting in the classroom [13]. The learning activity in the classroom became more focused not only on the basic concepts [14], but already on the level of basic concepts application towards problems that were faced factually, so that students would have a deeper understanding in studying the learning materials.

Based on the statistics test by using SPSS 16.0 program as presented in the above graphics, it was identified that the mean score of students’ practicum skills in the experiment class was higher than the ones in the control class. It was that each of them released on 23.72 and 21.58 with the p-value = 0.001 and the significance level 5 %. It means that if the probability significance (p-value) < 0.05 then the null hypothesis (Ho) is on the range of rejection because the probability significance (p-value) < α (0.05). The calculation on the students’ practicum skills, H0 was rejected so that Ha was accepted on the students’ science process skill between control class with PBL learning and experiment class with an e-learning Edmodo-based flipped classroom learning. There were significant different so that the implementation of an e-learning Edmodo-based flipped classroom learning delivered an effect on the students’ practicum skills in learning the materials of electric measuring instrument.

The research findings confirmed the former research result which stated that the students’ concept mastery through blended strategy was higher than the ones who were not getting involved with blended learning. Those research findings were also in line with the survey investigated by Flipped Learning Network, the research conducted by Moravec [15] stated that the implementation of flipped-classroom strategy could improve performance and learning result achievement significantly. Also, it was argued the former findings conducted in Harvey Mudd College, Claremont [16] that there was no difference of learning result achievement between classes taught with flipped and non-flipped strategy. Edmodo is a learning media which can bridge teacher/lecturer in the learning process in the classroom. The interesting display that is like social media as seen in Figure 2, makes Edmodo learning media enhances many students’ interest. Edmodo can be accessed by both laptop/computer and smartphone.

These sophistication and practicality make Edmodo is much in demand by the students.

In line with the research by Sudibjo & Wasis [17], when a learning process is going on by using an e-learning Edmodo-based learning media for Physics subject, the students’ cognitive value has shown a fair increase compared to the former one, that is, the score is becoming 76.05. That proved that Physics learning media by using an e-learning Edmodo Blog Education-based could help students to increase their cognitive value. The use of an e-learning Edmodo-based was effective to increase the learning result of IPA of the 8th grade students at SMP Negeri 2 Singaraja. This can be proven by the t-test result from the mean score of learning result of which the score of tcourt > ttable (22.87 > 1.992) with the significance level of 5% (α = 0.05), hence, Ha was rejected and Hα was accepted [18].

By using the learning media can activate students in class when learning takes place, as media can also motivate the students’ learning. The packaged learning media must be interactive so that it supports the learning in the 21st century [19, 20]. Collaboration between technology learning media and learning models is one of the newest alternatives in the form of teaching in the classroom. A learning by using flipped classroom model can save time as learning with Edmodo which means giving learning materials, then assignments, discussion and practices will be carried out directly in a face-to-face learning interaction. The materials presented in Edmodo are very broad so that college students can download those materials by themselves.

In particular, the attributes of the social learning platform “Edmodo” is considered alongside the changes in the way in which online learning environments are being implemented (Albin). Our study provided experimental evidence that Edmodo was well suited as social media and m-learning tool. We also confirmed that students are motivated using social media and m-learning. This study further established the argument that m-learning has the potential to change the landscape of learning and medium of learning (Oyelere). The practicum skills of the college students were seen from their understanding on the learning materials of the measurement device that were suited to scientific
procedures. Further, they practiced it by making the learning aid related to the concept of Electric Measuring Instrument. They could comprehend the basic concepts of Electric Measuring Instrument to its implementation in daily life.

4. CONCLUSION

The research findings pointed out that the implementation of an e-learning Edmodo-based flipped classroom model constructed a significant effect on the practicum skills of Physics Education college students in Universitas Indraprasta PGRI. The mean score of the college students’ practicum skills in the experiment class was higher than in the control class in 23.72. This denotes that flipped classroom model was very effectively implemented to Physics Education college students in Universitas Indraprasta PGRI. The implementation of flipped classroom model should also be used to measure college students’ cognitive skill. For further researchers who will use learning media for Physics subject with e-learning Edmodo-based should make a study group as a discussion group in a classroom or at home (by online) so that it can ease the college students in learning.

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