Using Laboratory Monitoring Application to Improve Learning Outcomes of Digital Systems of PTIK Unima Engineering Faculty Students

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Abstract: This study aims to improve learning outcomes of the Digital System of PTIK students in the second semester of the 2016/2017 school year through the use of the Netop School laboratory application. The research method used is Classroom Action Research (CAR). Population and sample are all second semester students of the PTIK Department of the Faculty of Engineering Unima who contact the Digital System subject in the 2016/2017 school year. The research data was taken from the value of student learning outcomes in cycle I and cycle II with digital circuit material. Student learning outcomes in the initial conditions which only reached 59% increased to 75% in cycle 1. Likewise the grade completeness grade has increased from 76% to 80% in cycle 1. While in cycle 2 it becomes 100% or the whole student has reached the value individual completion amounted to 75. Class completion value also increased from 80% to 87% in Cycle 2. From the results of this study it can be concluded that using laboratory monitoring applications can improve learning outcomes of Digital System courses. Laboratory monitoring application Netop school can support and facilitate learning to be more enjoyable and more efficient, students' activities during the laboratory can be controlled and more active in learning. So the use of the latest technologyl advancements can maximize laboratory functions to improve learning outcomes.

1 INTRODUCTION

The development of information and communication technology in the current era of globalization cannot be avoided anymore in the world of education (Cipolla and Siino, 2017). Along with these developments learning methods also experience a lot of development, both personal learning methods, learning media or learning processes (Kolb, 2014). The form of information technology development applied in the world of education is E-Learning (Clark & Mayer, 2016).

E-Learning applications such as the use of electronic media and others that have been used in digital system courses at PTIK Unima, Faculty of Engineering. But the use of this media is still not effective especially the learning process carried out in the laboratory. Even though students and lecturers can open course material on a computer, they cannot communicate over the computer. They keep communicating manually, asking or explaining

directly what to do and explain. Likewise when the lecturer gives a test during evaluation.

Thus the focus of the problem lies in learning media that have not been used efficiently and effectively. Media development that has been used is needed. The media developed need to be adjusted to the characteristics of students and material, so that students can easily use the media and understand the materia (Collins and Halverson, 2018). One of the learning media is the use of Netop School laboratory applications (Hidayatullah, 2017).

Netop School application is very suitable to be used as, because Netop School is a program specifically created to assist in the learning process and supervision of computer use by students (Suhardjo & Purnama, 2013).

1.1 Learning Media

Instructional media are used by teachers to convey subject matter not only as a tool, but nowadays

learning media can also provide stimulus for students to learn and develop students' intellectual and emotional aspects (Rusman, 2011).

According to Wiji Suhardjo, various theoretical and empirical studies show the use of media in learning as follows; 1) Media is able to provide varied stimuli and reduce verbal tendencies, 2) Media can overcome the limitations of experience possessed by students, 3) Media can overcome physical limitations and learning environment (classrooms) such as; objects that are too big or too small, movements that are too fast or slow, objects that are too complex or objects that are too far away or difficult to reach (geographic), 4) Media allows direct interaction between students and their environment, 5) Media produces uniformity observation (unifying responses), 6) The media evokes new desires and interests, 7) The media evokes motivation and stimulates learning, 8) The media provides integral / comprehensive experiences of concrete and abstract things, 9) The media provides opportunities for students to learn independently, at the place, time and speed that is self-determined (Suhardjo & Purnama, 2013).

1.2 E-Learning Media Using Netop School

E-Learning media is learning that uses electronic circuits through internet media, to deliver learning material that is packaged in an e-book. E-Learning is learning to use electronic circuits (LAN, WAN, or internet) to convey the contents of learning, interaction, or guidance. Learning and learning materials delivered through this media have text, graphics, animation, simulation, audio and video.

Netop School is designed for teachers / lecturers to simultaneously disseminate the display of a monitor in a class. Used for online lectures in a computer network, one computer is installed (installed) NetOp School in the choice as a teacher, and the student computer is installed (installed) NetOp School in the choice as a student (acting as a client). The teacher can control the activities on the student computer from the teacher computer, including demonstrating the desktop teacher on the student desktop, locking the student computer to get attention, monitoring the student monitor screen, distributing files to student computers, collecting files from students, giving tests and surveys to students, prevents students from running application programs outside lecture material, preventing students from opening certain website addresses, recording from teacher and student computer

screens, displaying an application program to student computers and changing the classroom environment.

The advantage of NetOp School is that teachers can monitor all student activities while students cannot see the activities of the teacher. Teachers can also give different assignments / explanations to each student, which is immediately displayed on the student monitor. With this software the teacher can monitor the entire student display screen or see what programs are run by students and vice versa, the teacher can display what is on the monitor so that it looks on the student's computer. Teachers through NetOp School Teacher can communicate in writing or with audio video. In addition, the teacher can lock the student's computer if students do actions that are not pleasing. With NetOp School, teachers can also turn off / turn on students' computers remotely, and make online tests / exams easily.

1.3 Thinking Framework

One of the successes of teaching and learning activities can be seen from the level of understanding and mastery of the material of the students. The extent to which students are capable of understanding and applying various concepts to solve problems. Students are identified as understanding and knowing, if students have been able to explain, define using their own words when faced with questions, questions, tests, and assignments. The student is passed when students can work on the questions given properly and correctly.

One problem that impedes the achievement of student learning outcomes in the computer laboratory is the amount of distraction in students, and the low ability of the teacher to monitor and direct the activities of students in the laboratory. So the application of auxiliary software, namely Netop School is expected to contribute, especially in improving the ability of teachers to monitor and direct learning, easier to use and give special treatment to certain students. So it is assumed that the use of laboratory monitoring applications is the right step to improve student learning outcomes in computer practice. The Action Hypothesis in this study is; Use of Laboratory Monitoring Applications Netop school can improve learning outcomes of Digital Systems of Unima PTIK Faculty of Engineering students.

2 RESEARCH METHOD

The research method used in this study is Classroom Action Research (CAR). The sample of this study were 24 PTIK Faculty of Engineering students, Unima Tondano, consisting of 14 men and 10 women. This Classroom Action Research is conducted from March to May 2018.

The preparation of classroom action plans is carried out in several stages, namely: 1) Preparing learning plans using the Netop school application, including learning scenarios, time allocation, and student worksheets. 2) Input data and teaching materials into Netop school such as images, videos, audio and tests. 3) Preparing learning evaluation formats and learning observation formats. 4) Establish data types and data collection methods through observation. 5) Assess and determine indicators of success of action, in this case the absorption of students and the completeness of student learning. 6) Establish the way of implementing reflection, which is carried out after the giving of actions and the implementation of observations in each cycle. 7) Establish criteria for success, namely increasing student learning outcomes.

The Classroom Action Stage is designed in two cycles namely; 1) Cycle 1 is conducted for 4 weeks (4 meetings). The first meeting begins with planning, implementation, observation and reflection. The same action was held in the second, third and fourth meetings, but with more emphasis on the evaluation and reflection of the previous meeting. Also accompanied by assessment of learning outcomes through the implementation of tests at the end of the cycle. 2) Cycle 2 is conducted for 4 weeks (4 meetings) with steps such as Cycle I.

3 RESULT & DISCUSSION

Before carrying out class action, the researcher observes the achievement of student learning outcomes in the previous period (pre-cycle). This aims to find out the initial conditions of students' abilities. One of them is reviewing students' daily test data in the previous period, as shown in the table below.

Tabel 1: Initial conditions of student learning completion recapitulation.

No	Parameter	Quantity
1	Individual Learning Completion	58%
2	Number of Overall Students	24
3	Number of Students Who Have Completed Learning	14
4	Number of Unfinished Students	10
5	Classical Learning Completion	76%

The results of pre-cycle observations showed that the completion of individual student learning was 58%, of which 24 students had only 14 who had completed their study and 10 students had not yet completed their study. The percentage of students' completion of learning in the initial conditions can be seen in the following Figure 1.
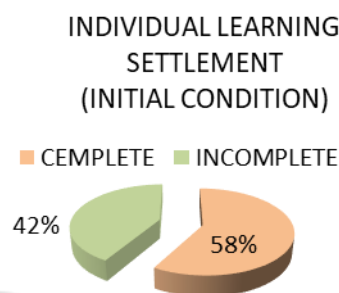

Figure 1: Graphic of initial conditions of the student learning completion percentage.

The model used in this CAR is a Cycle Process Method (Round / Spiral) which refers to the Kemmis and Taggert CAR models. The research cycle has four stages of activity in each cycle, namely Planing, Acting, Observing, and Reflecting along with the evaluation of the achievement of results for further implementation in the next cycle (Suharsimi, 2006: 74). Each cycle is carried out using the Netop School Application during Learning, each Class Action Research cycle is carried out in four meetings.

3.1 Cycle 1

a. Planning
  1. Reviewing standard competencies and basic competencies related to the material to be taught, then formulated into a form of Learning Implementation Plan (LIP).
  2. Preparing teaching materials and practice questions then inputting into Netop School.
b. Implementation
  The implementation of the action is carried out in 4 meetings, discussing one subject matter namely digital circuit. Every learning uses Laboratory Monitoring Application, namely

Netop School. The learning scenarios using Netop School are:

1) When learning begins, the teacher explains the problem of learning in class, all students are invited to discuss the problem and are given motivation to learn by selecting the Default Image menu. So that the attention of all students is directed to the lecturer or LCD screen in the class, and not to the computer.

2) After sufficient explanation, then release the Default Image and students are given the task to do something on their computers. When they work on their respective tasks, the lecturer monitors the class as a whole by selecting the Thumbnails Views menu, so that student activities in general can be monitored properly. Aside from Thumbnails Views, the teacher takes turns monitoring each student by selecting the Control - Observe menu.

3) With the Entire Screen menu the lecturer can directly demonstrate the teacher's computer display to several student computers or all student computers. The Entire Screen menu is more effective than the LCD because it can be seen more clearly, especially seeing complicated coding programs and need close visibility to view them.

4) If there are students who have difficulty in carrying out tasks, the lecturer can guide or help with Manage-Chat. Lecturer chat can communicate with certain students without being noticed by other students, so that student privacy can be maintained. Lecturers can also remind students who are not focused with Manage - Send massage.

5) Restrictions on access to the internet by choosing Control - Deny Internet. So until the end of the lesson, the student computer will not be connected to the internet until the Internet Deny menu is released by selecting the Allow All menu. A simpler access limitation is to block one particular site, namely with Options - Policy - Internet and add the site address that we will block.

6) If the class generally experiences difficulties, the lecturer can take over one of the student's computers to be used as a sample case, namely by choosing Manage - Remote Control. Through this menu, the lecturer can explain one example of student work that needs to be improved for all participants

7) Next the lecturer will provide an example of the file that has been prepared, by selecting the Manage - Distribute menu then after the students work on their respective computers, the results can be taken by the lecturer by selecting the Manage - Collect menu.

8) To test all students, the lecturer chooses the Teach - Run test menu. Then all students are faced with test questions to be answered, which can be monitored directly by the lecturer. If the student is working on a question correctly, the student in the question number will get a check code ($\sqrt{}$), and if he does the problem with the wrong result, then the student on the question number will get a cross code (X). When the working time is up, the work is automatically stopped, and the lecturer computer will analyze the test results.

9) Ensure the netop school application on the lecturer computer and the student runs well.

c. Observation

The results of observations in cycle 1 generally show an increase in their learning activities in following the learning process. This is evidenced by the recapitulation of learning outcomes in this Cycle 1 below.

Table 2: Cycles I student learning completion recapitulation.

No	Parameter	Quantity
1	Individual Learning Completion	75%
2	Number of Overall Students	24
3	Number of Students Who Have Completed Learning	18
4	Number of Unfinished Students	6
5	Individual Learning Completion	80%

From the Table 2, it can be seen that there is an increase in student learning outcomes where in the initial conditions the level of student learning completeness was only 59%, increased to 75% in cycle 1. The level of completeness of the class also increased from 76% in the initial conditions increased to 80% in the cycle 1. Of the total 24 students there are 25% or as many as 6 students who have not reached the completeness of learning criteria as shown in Figure 2.

Figure 2: Student learning completionpercentage Cycle 1.

Although in Cycle 1 classical learning completeness has been fulfilled, but the learning outcomes of students in Cycle 1 only reached 75% of the 85% target. Therefore, improvements need to be made in the next cycle.

d. Reflection

Researcher identified several learning deficiencies in Cycle I based on observations of student learning activities:

1) Lack of practice time given.
2) Students are reluctant to express learning outcomes
3) Students are reluctant to answer questions.
4) Students still have difficulty working on questions
5) Many students do not write the material presented.
6) Students are reluctant to ask

Based on the weaknesses above, the researcher can determine improveents actions in the second cycle. The following are the intended actions:

1) Active students are conditioned by the teacher and provide opportunities for students who are not yet active.
2) Give reinforcement by mentioning the names of students who get high grades, in order to motivate students who are not active.
3) Giving reinforcement by displaying the work of each student to all other student monitors.
4) The teacher explains the benefits of Netop School again. One of them is the Chat menu, as a media student to ask directly to the teacher without having to be known by other students.
5) The teacher explains the individual's responsibility to the group, this is so that students work together in group work.
6) Teachers continuously supervise all students. And help students who have difficulties while doing assignments through monitoring from the teacher monitor.

The teacher gives awards to students who work on assignments on time.

3.2 Cycle 2

In Cycle 2, the meeting was held 4 times. The four meetings were held based on the results of reflection in Cycle 1, namely:

a. Planning

Before taking action, the researcher takes planning actions, namely preparing a Learning Implementation Plan (RPP), compiling a worksheet and preparing an observation sheet. Then prepare teaching materials and practice questions to be inputted into Netop School.

b. Implementation

The implementation of the action in Cycle 2 is the same as in the first cycle, only the material is different. To reduce the problems and weaknesses that occur in the previous cycle, there are several things that have been modified, such as the following:

1. In Cycle 2 students are given more time to practice. Because in the first cycle students did not have time to complete the task, even though they already understood the material being taught.
2. Reduce demonstration time and explanation. The teacher monitors more continuously through the teacher's computer. And immediately help students if they have difficulty working on assignments.
3. Use the Attention menu and lock the keyboard and mouse if there are students who do activities that are not related to the task accompanied by a warning to the student.

c. Observing

Observations on student learning outcomes in cycle 2 can be seen in Table 3.

Table 3: Cycle 2 student learning completion recapitulation.

No	Parameter	Quantity
1	Individual Learning Completion	100%
2	Number of Overall Students	24
3	Number of Students Who Have Completed Learning	24
4	Number of Unfinished Students	0

Students learning outcomes achieved has showed better results compared to cycle 1. Where the level of learning completion in Cycle 1 was only 75%, while in cycle 2 it increased to 100% or all of the 24 students had reached individual completion criteria with a value of ≥ 75 The level of class completeness also increased from 80% in Cycle 1 to significantly increase to 87% in Cycle 2.

d. Reflection

Overall the percentage of student learning increases from each cycle that has been carried out. In Cycle I the percentage of mastery learning reaches 100% of the 85% target to be achieved while the percentage of classical completeness has reached 87% of the 80% target to be achieved. These results indicate that the research indicators have been achieved thus no further improvements in learning are carried out in the next cycle.

3.3 Learning Completion Recapitulation in Each Cycle

The learning outcomes obtained by students during Cycle I and Cycle II can be made as the following comparison recapitulation can be seen in Table 4.

Table 4: Student Learning Completion Recapitulation in Each Cycle

No	Parameter	Quantity		
		Pre-cycle	Cycle I	Cycle II
1	Number of Overall Students	24	24	24
	Individual Learning Completion	58%	75%	100%
	Number of Students Who Have Completed Learning	14	18	24
	Number of students who have not completed learning	10	6	0
2	Classical Learning Completion	76%	80%	87%

The results of the study confirm that the increase in student learning outcomes is strongly influenced by mastery of the material. In Cycle II, students and teachers are accustomed and begin to get a match in learning. Laboratory monitoring application that is Netop School is very helpful for students in understanding the material, saving more time and energy so that learning runs effectively and efficiently.

4 CONCLUSION

The use of the Laboratory Monitoring Application has a positive impact on improving student competence and is proven to be able to improve learning outcomes. Laboratory Monitoring Application can help teachers in teaching and learning activities in the laboratory. The teacher can increase supervision to students in a full and continuous manner, so learning activities in the laboratory run effectively and efficiently. Through the use of Laboratory Monitoring Applications, class XI Software Engineering learning outcomes in the subject matter of Application Programming with Visual Basic can be improved.

Teachers are expected to be more creative when teaching in the laboratory, and develop appropriate strategies before teaching. Teachers are expected to be able to take advantage of the latest technological advancements, maximize the function of the laboratory to improve student learning outcomes. This means that there must be innovation in implementing learning, one of which is by using laboratory monitoring applications when teaching or practicing in the laboratory. For the PTIK Department Unima Engineering Faculty is advised to be able to improve facilities and infrastructures that support the course of the education process, especially the completeness of computer laboratory inventories including hardware and software.

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