

Implementation of Blended Learning on Subjects of Building Science in Vocational Schools

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Abstract—This study aims to determine the improvement of student learning outcomes, teaching activities, and learning activities in applying blended learning on the building science lesson in vocational schools. The research method used is Classroom Action Research. The results showed student learning outcomes after the application of blended learning are: in cycle 1 shows that students who complete as many as 20 students or 60.60%; In cycle 2 shows that the complete student as many as 24 students or 72.73%; In cycle 3 shows that the complete student as much as 26 students or 78,79%. The results of teaching activities are: in cycle 1 shows the average of teaching activities is 3.10 with good enough criteria; In cycle 2 shows that the average score of the teaching activity is 3.55 with good criteria; In cycle 3 shows the average of teaching activities of teachers is 4.05 with good criteria. The results of student learning activities are: in cycle 1 the average value of student learning activities is 3.25 with good enough criteria; In cycle 2 the average score of student activity is 3.65 with good criteria; In cycle 3 the average value of student learning activities is 4.15 with good criteria.

Keywords—*blended learning; learning outcomes; teaching activities; learning activities*

I. INTRODUCTION

Building Science is a basic subject in the Vocational School in Building Engineering. Student learning outcomes in one of the Surabaya State Vocational Schools in the 2015/2016 school year shows that classical mastery in Building Science subjects is 65.22% with an average value of 69.42. This shows that student learning outcomes have not reached the completeness criteria set by the school, namely not 75% of students score greater or equal to 70. This condition requires strategic and innovative efforts to facilitate students in understanding Building Science subjects so that student learning outcomes can increase.

Learning innovation needs to be done in order to overcome the low learning outcomes of Building Science subjects by utilizing available resources, one of which is information technology in the form of internet. The internet is a technology that is experiencing rapid development, so it is very strategically used by teachers in designing learning so that the quality of learning increases. Blended learning is a learning

that combines delivery through face-to-face activities, offline computer based learning, online computers in the form of internet and mobile learning [1]. The application of blended learning is the best choice to increase effectiveness, efficiency, and attractiveness in following learning and understanding the material, so as to improve learning and improve student learning outcomes.

Based on the description above, this study was conducted to answer the problem: 1) how is the improvement of student learning outcomes in the application of Blended Learning in Building Science subjects in vocational schools? 2) how is the increase in teacher teaching activities in applying Blended Learning? 3) how is the improvement of student learning activities in the application of Blended Learning in Building Science subjects in vocational schools?

II. THEORY

A. Blended Learning

Blended learning is known as a hybrid course or combination of courses. The general definition of blended learning is learning that combines or mixes between face-to-face learning and computer-based learning (online and offline). Blended learning as "It represents an opportunity to integrate the innovative and technological advances offered by online learning with the interaction and participation offered in the best of traditional learning [1]. Blended learning as: "the combination of different training "media" (technologies, activities, and types of events) to create an optimum training program for a specific audience. The term "blended" means that traditional instructor-led training is being supplemented with other electronic formats. In the context of this book, blended learning programs use many different forms of e-learning, perhaps complemented with instructor-led training and other live formats" [2].

Blended learning based learning has 6 (six) elements, namely: (a) face to face (b) independent learning, (c) applications, (d) tutorials, (e) collaboration, and (f) evaluation. Face-to-face learning is done like what was done before the discovery of printing, audio visual and computer technology, the teacher is the main learning resource. The instructor

conveys the contents of learning, questions and answers, discussions, giving guidance, assignments, and examinations. All is done synchronously, meaning that all students learn the contents of learning at the same time and place. Some variations are made, for example the teacher divides learning into topics that must be discussed by students in front of the class, students make papers for student presentations as participants and clarify, question-answer, and solve problems. Learning with a student-centered, face-to-face approach is done with tutorials, workbooks, writing papers, and assessments. Face-to-face to accommodate individual differences then develops by providing independent learning assignments through learning using modules or Student Worksheets. The goal is that students with different characteristics of intelligence will learn according to the speed of learning

Through blended learning all learning resources that facilitate learning can be developed. That is, learning is carried out with a learning technology approach with a combination of face-to-face learning resources with teachers and those contained in computer media, cellular phones or iPhones, satellite television channels, video conferencing, and other electronic media. Students and instructors / facilitators work together to improve the quality of learning. The main purpose of blended learning is to provide opportunities for various student characteristics to enable independent, sustainable, and evolving learning throughout life, so that learning will be more effective, more efficient, and more interesting.

Blended learning based learning is the best choice to increase effectiveness, efficiency, and greater attraction in interacting between humans in diverse learning environments. Blended learning offers learning opportunities to be both together and separately, as well as at the same time and differently. A learning community can be carried out by students and teachers who can interact at anytime and anywhere because they utilize what is obtained by computers and other devices (iPhone) as learning facilitation. Blended learning provides learning facilitation that is very sensitive to all differences in psychological characteristics and learning environment.

B. Student Learning Outcome

Learning outcomes are abilities possessed by students after receiving their learning experience [3]. Learning outcomes are when someone has learned there will be a change in behavior in the person from not knowing to knowing and from not understanding to understanding [4]. Learning outcomes are the output of the learning process. Changes in knowledge and skills will occur after the learning process. The learning process is an activity carried out by students in achieving learning goals. Learning outcomes can be known when evaluating learning outcomes. Evaluation of learning outcomes is a process to gather information, hold considerations about the information, and make decisions based on the considerations that have been.

Learning outcomes consist of three types, namely: (a) skills and habits, (b) knowledge and understanding, (c) attitudes and ideals. While according to Gagne divides the five categories of learning outcomes, namely: (a) verbal information, (b)

intellectual ability, (c) cognitive strategies, (d) attitudes, and (e) motor skills. The national education system is the formulation of educational goals using the classification of learning outcomes in broadly divided into three domains, namely: cognitive, affective, and psychomotor domains [5].

The cognitive domain deals with intellectual learning outcomes which consist of six aspects, namely: knowledge or memory, understanding, application, analysis, systematic and evaluation. Affective domains are pleased with the attitude which consists of five aspects, namely acceptance, answer or reaction, assessment, organization, and internalization. While the psychomotor domain is related to the results of learning skills and acting abilities that cover six aspects, namely: reflex movement, basic movement skills, perceptual ability, harmony or accuracy, complex skills movements and expressive and interpretive movements (Lesch, George Brown College).

It was concluded that learning outcomes were the result of a learning process that showed the ability of the students after receiving the learning experience. In terms of the process of learning outcomes or competency formation said to be successful and quality if all or at least most of the 75% of students are actively involved, physically, mentally and socially. Whereas in terms of results, the learning process is said to be successful if there is a positive behavior change in the students as a whole or at least the acquisition of individual competence is ≥ 70 and classical competence is $\geq 75\%$.

C. Teacher Teaching Activities

The activities of the teaching and learning process between educators and students are very closely related. Without lecturers and students, activities in teaching and learning cannot take place. Students as one element that is taught or who accepts while the lecturer is a teaching element or who gives lecture material.

1) *Lecturer activities before teaching:* To carry out their duties effectively and efficiently, before teaching, the teacher must prepare in advance by mastering the material to be taught before dealing with students in front of the class, then the teacher must prepare at least three types of preparation, namely: a) inner preparation, namely ability and willingness to become a teacher; 2) Preparation of material, namely getting materials or notes containing ways to do their tasks, including mastery of materials; 3) systematic written preparation, namely thinking about what types of subjects will be given, where they are from, how to deliver well so the purpose of teaching and learning can be achieved.

2) *Lecturer activities when teaching:* At the time of teaching, the main task of the teacher is to create an atmosphere in the classroom so that there is a teaching and learning interaction that can motivate students to learn sincerely. To create an atmosphere that can foster learning passion, improve student learning achievement, then a teacher must master the class in which the teacher teaches.

The steps that must be taken by the teacher during teaching are: 1) Apperception is the teacher connects the subject matter that has been discussed at the previous meeting; 2) Explain to students about the subject matter being studied which certainly

does not miss the goal to be achieved; 3) Give students the opportunity to ask questions or responses related to the material being studied; 4) Summing up the material that has been studied.

3) *Lecturer activities after teaching:* Teacher activities after teaching preparations, then carry out their duties in the teaching and learning process, the teacher's last activity is to provide an evaluation to students which is intended to measure the extent to which students' ability to understand and study the subject matter presented.

The purpose of evaluating students is as follows: 1) To control whether students can receive or understand lesson material that has been explained by the teacher; 2) To control whether students have carried out the instructions given; 3) To find out where the will, tenacity and ability of the child to the subject matter. It is emphasized that children's achievements are expressed as the values permitted in the report card or the last grade in the school year.

The three components of the teacher's activities above, it is clear to us that the task of a teacher is not easy. A teacher must have good skills in teaching skills, skills are also needed in giving assessment to students.

D. Student Learning Activities

One of the teaching characteristics that is success-fully seen from student activities in learning. The more active the student learns, the higher the chances of successful teaching. Student learning activities are divided into three categories, namely: 1) Student activities in independent / individual learning, meaning that every child in the class conducts their respective learning activities. Learning activities may be the same or may be different between a student and other students; 2) Student activities in group learning, meaning students do activities in group situations, for example discussion in solving problems; 3) Student activities in classical learning, meaning all students in the same time, for example when the teacher teaches with the lecture method, the student learning activities include classical learning methods.

One of the most important elements in learning is the adjustment to get the right response to solve the problem at hand. Learning that is important is not to cross the things that must be learned but understand or get a clear understanding of the specific links and relationships in the subject matter that contains a problem.

III. METHODS

The method used is the Classroom Action Research model of Kemmis & Mc Taggart. This study consisted of several cycles, carried out with the stages of planning, action, observation, and reflection. The object of the study was the application of blended learning, while the research subjects were 33 vocational high school students in Surabaya and building science subject teachers. The instruments used are: 1) test of learning outcomes in each cycle; 2) observation sheets for teacher teaching activities and; 3) observation sheet of student learning activities. Data analysis was performed using descriptive analysis techniques.

IV. RESULTS AND DISCUSSION

A. Improvement of Student Learning Outcomes

The criteria for completing student learning outcomes are said to be good, when the score is greater or equal to (\geq) 70; Classical completeness is shown by as many as 75% of students get a score greater than or equal to (\geq) 70. Increased student learning activities in the application of blended learning in cycles 1 through 3 can be seen in the following table.

TABLE I. FREQUENCY DISTRIBUTION OF STUDENT LEARNING OUT-COMES TEST SCORES ON THE APPLICATION OF BLENDED LEARNING FROM CYCLE TO CYCLE

| Interval | Cycle 1 | | | Cycle 2 | | | Cycle 3 | | |
|----------|---------|-------|-------|---------|-------|-------|---------|-------|-------|
| | f | X | % | f | X | % | f | X | % |
| 0 - 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 31 - 59 | 5 | 55.75 | 15.15 | 3 | 58.25 | 9.09 | 1 | 59.15 | 3.03 |
| 60 - 69 | 8 | 64.50 | 24.24 | 6 | 66.75 | 18.18 | 6 | 69.25 | 18.18 |
| 70 - 84 | 15 | 72.70 | 45.45 | 18 | 75.50 | 54.54 | 19 | 79.25 | 57.58 |
| 85 - 100 | 5 | 86.00 | 15.15 | 6 | 87.25 | 18.18 | 7 | 92.35 | 21.21 |

Table 1 show that the student learning outcomes with applied Blended Learning in Building Science subjects are: 1) in cycle 1 shows that students who complete with a score between 70 to 100 as many as 20 students or by 60.60%, while students who are not complete (score between 0 to 69) as many as 13 students or 39.40%; 2) in cycle 2 shows that students complete as many as 24 students or 72.73%, while students who did not complete as many as 9 students or 27.27%; 3) in cycle 3 shows that students who complete as many as 26 students or by 78.79%, while students who do not complete as many as 7 students or 21.21%.

TABLE II. RECAPITULATION OF STUDENT LEARNING OUTCOMES FOR THE COMPLETE AND INCOMPLETE ON THE APPLICATION OF BLENDED LEARNING FROM CYCLE TO CYCLE

| Complete | Cycle 1 | | | Cycle 2 | | | Cycle 3 | | |
|-----------|---------|-------|-------|---------|-------|-------|---------|-------|-------|
| | f | X | % | f | X | % | f | X | % |
| Not Comp. | 13 | 60.13 | 39.40 | 9 | 62.50 | 27.27 | 7 | 64.20 | 21.21 |
| Complete | 20 | 79.35 | 60.60 | 24 | 81.38 | 72.73 | 26 | 85.80 | 78.79 |
| Number | 33 | 69.74 | 100 | 33 | 71.94 | 100 | 33 | 75.00 | 100 |

Table 2 shows that student learning outcomes in the application of blended learning in: 1) cycle 1 shows the average value of student learning outcomes is 69.74 with criteria not yet completed; 2) cycle 2 shows that the average value of student learning outcomes is 71.94 with criteria not yet completed; 3) cycle 3 shows the average value of student learning outcomes is 75.00 with complete criteria. Increasing the average score of learning outcomes occurs cycles per cycle. Student learning outcomes in cycle 1 to cycle 2 increased by 2.20, and in cycle 2 to cycle 3 increased by 3.06.

B. Improvement of Teacher Teaching Activities

Teacher teaching activities using the checklist list instrument scale 1 to 5 with the observed aspects are: 1) opening lessons; 2) learning activities; 3) closing lesson; 4) manage class. Criteria for student learning activities are said to be good, if the score is in the range of 3.5-5; good enough to be in a range of 2.5-3.4; it's not good to be in a range of 1-2.4. Increased teacher teaching activities in the implementation of blended learning in cycles 1 to cycle 3 can be seen in the following table.

TABLE III. RECAPITULATION OF TEACHING ACTIVITIES ON THE APPLI-CATION OF BLENDED LEARNING FROM CYCLE TO CYCLE

| Aspect of Teaching | Cycle 1 | Cycle 2 | Cycle 3 | Improve C1-C2 | Improve C2-C3 |
|--------------------|---------|---------|---------|---------------|---------------|
| Open the less | 3.25 | 3.65 | 3.90 | 0.40 | 0.35 |
| Learning Act | 3.00 | 3.50 | 4.15 | 0.50 | 0.65 |
| Close the les | 2.80 | 3.20 | 4.00 | 0.40 | 0.80 |
| Manage class | 3.35 | 3.85 | 4.15 | 0.50 | 0.30 |
| Number | 3.10 | 3.55 | 4.05 | 0.45 | 0.50 |

Table 3 shows that the results of teacher teaching activities in the implementation of blended learning in the Building Science subject are: 1) in cycle 1 shows the average value of aspects of teacher teaching activities is 3.10 with good enough criteria; 2) in cycle 2 shows that the average value of aspects of teacher teaching activities is 3.55 with good criteria; 3) in cycle 3 shows the average value of aspects of teacher teaching activities is 4.05 with good criteria. Increased teacher teaching activities occur cycles per cycle. Teacher teaching activities in cycle 1 to cycle 2 increased by 0.45, and in cycle 2 to cycle 3 increased by 0.50.

C. Improvement of Student Learning Activities

Student learning activities using the checklist list instrument scale 1 to 5 with the observed aspects are: 1) prepare before the learning process; 2) student activities during the learning process; 3) student activities in the evaluation and strengthening of learning. Criteria for student learning activities are said to be good, if the score is in the range of 3.5-5; good enough to be in a range of 2.5-3.4; it's not good to be in a range of 1-2.4. Increasing student learning activities in the classroom in the implementation of blended learning in cycle 1 to cycle 3 can be seen in the following table.

TABLE IV. TABLE 4. RECAPITULATION OF STUDENT LEARNING ACTIVITIES FOR THE GOOD AND NOT-GOOD ON THE APPLICATION OF BLENDED LEARNING FROM CYCLE TO CYCLE

| Complete | Cycle 1 | | | Cycle 2 | | | Cycle 3 | | |
|-------------|---------|------|-------|---------|------|-------|---------|------|-------|
| | f | X | % | f | X | % | f | X | % |
| Not Good | 3 | 2.35 | 9.10 | - | - | 27.27 | - | - | - |
| Good Enough | 8 | 3.10 | 24.24 | 9 | 3.15 | 27.27 | 7 | 3.40 | 21.21 |
| Good | 22 | 4.00 | 66.67 | 24 | 4.15 | 72.73 | 26 | 4.90 | 78.79 |
| Number | 33 | 3.25 | 100 | 33 | 3.65 | 100 | 33 | 4.15 | 100 |

Table 4 shows that the results of student learning activities in the classroom in the application of blended learning in Building Science subjects in: 1) cycle 1 shows the average value of aspects of student learning activities is 3.25 with good enough criteria; 2) cycle 2 shows that the average value of aspects of student learning activities is 3.65 with good criteria; 3) cycle 3 shows the average value of aspects of student learning activities is 4.15 with good criteria. Increased student learning activities occur cycles per cycle. Student learning activities in cycle 1 to cycle 2 increased by 0.40, and in cycle 2 to cycle 3 increased by 0.50.

V. CONCLUSION

First, there is an increase in student learning outcomes in the application of blended learning in Building Science subjects. Completeness improvement from cycle 1 to cycle 2 was 12.13%, and from cycle 2 to cycle 3 was 6.06%.

Second, there is an increase in teacher teaching activities with blended learning in Building Science subjects. The improvement of teacher teaching activities from cycle 1 to cycle 2 was 0.45, and from cycle 2 to cycle 3 was 0.50.

Third, there is an increase in student learning activities in the classroom in applying blended learning to building science subjects. Increasing student learning activities in the class from cycle 1 to cycle 2 by 0.40, and from cycle 2 to cycle 3 by 0.50.

REFERENCES

- [1] K. Thorne, *Blended Learning: How to integrate online & traditional learning*. London: Kagan Page Limited, 2003.
- [2] J. Bersin, *The Blended Learning Book: Best Practices, Proven Methodologies, and Lessons Learned*. San Francisco: Pfeiffer, 2004.
- [3] N. Sudjana, *Penilaian hasil belajar*. Bandung: Remaja Rosdakaya, 2006.
- [4] O. Hamalik, *Proses Belajar Mengajar*. Jakarta: PT Bumi Aksara, 2011.
- [5] N. Sudjana and A. Rivai, *Media pengajaran*, 2010.