

The Development of a Blended Learning Model by using E-Book (BLME) on the Subject of Basic Programming



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Abstract: The researchers conducted direct observation at the State Polytechnic Creative Media PSDD Medan. The object of the research includes learning on the subject of Basic Programming. The researchers found several phenomena including: 1). The subject of Basic Programming is a subject in which the material guides students to think logically in solving problems through algorithms in the form of coding (instructions). 2). Learning set used the textbook. 3). Teaching and learning process was conducted conventionally. The lecturer delivered the material in the textbooks to the students, the conclusion of the material was written on the white board. 4). Tools used on the subject of the Basic Programming were the C ++ programming language. Based on the phenomenon, the researchers found several problems including: 1). Low skill and the students had not mastered the material that has not been achieved in learning the subject of basic programming. 2). Students did not respond when interacting in question and answer session, which impacted the learning process become non-interactive. 3). Independence and active role of students in learning the subject of basic programming had not been seen because learning was lecturer centered. 4). Learning model that was centered on the lecturer made the students unable to think creatively and solve new problem presented by the lecturer on the subject of basic programming. Based on the explanation above, in this research, the researchers developed a learning model used in learning the subject of Basic Programming that is a blended learning model using an e-book integrated with the Learning Management System (LMS).

Keywords: Blended Learning, E-Book, Basic Programming, C++.

I. INTRODUCTION

One of human life is education both individually and in groups. Education can establish a better personality, increasing the intelligence,

providing skills and build better moral and spiritual. Education is a necessity and occurs naturally, has a social role because it occurs in people's lives, there are values and meanings of guiding because the different lifestyle between the old and new generations and characterize the development of civilization and culture of society. The Changes experienced by human life both individually and in society will definitely occur. Education is one of the processes of continuous changes, the changes include creativity and skills.[1] The part of education is learning by lecturer and students conducted in class for the implementation of theory and in the laboratory for the implementation of lab work. The rapid development of information technology causes most of the learning process has utilized the role of information technology to conduct learning objectives and also increase students' mastery of the learning material.

The learning model is used to support the learning process and implemented when the lecturer teaching. The learning model is closely related to technology such as the blended learning model. According to Thorne blended learning is a change in learning that can provide the solution to the problem in learning and provide the development in learning adapted to the needs of students.[2] Direct observation conducted by researchers at the State Polytechnic Creative Media PSDD Medan with the object of the research is learning in the subject of Basic Programming which has several phenomena including: 1). The subject of Basic Programming is a subject in which the material guides the students to think logically in solving problems through algorithms in the form of coding (instructions). 2). Learning from the subject of Basic Programming is conducted by working in the laboratory. 3). Set of learning used the textbook. 4). Teaching and learning process is conducted conventionally. The lecturer delivered the material in the textbook to the students, the conclusion of the material was written on the white board. 5). Tools used on the subject of the Basic Programming is the C ++ programming language. 6) The subject of Basic Programming is presented in semester 1 (one) of the Graphic Design Study Program which the lecturer is that researcher himself.

From the phenomenon above, the researchers found several problems including: 1). Low skills and the students had not mastered the material that have not been achieved in learning the subject of basic programming. Learning evaluation through the average midterm score is 65.6 (the score of the letter C) and the value of the final semester of the exam with an average score of 64.9 (the score of the letter C). The data of average score was taken from the academic year 2017/2018 from 15 students 2).

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The students do not respond when interacting in question and answer session. 3). The Independence and active role of the students in learning the subject of basic programming have not been seen because learning is centered on the lecturer. 4). The lecturer centered learning model makes students unable to think creatively and solve new problem presented by the lecturer in the subject of basic programming. Based on the explanation above, in this research the researchers developed a blended learning model in learning the subject of Basic Programming. Besides syntax the researchers used integrated e-book with Learning Management System (LMS) Google Classroom. E-book in blended learning model that the researchers developed consists of graphic object, 3D animation and sound.

II. MATERIALS AND METHODS

Blended learning is a combination of conventional and electronic learning by applying information technology. Blended learning combines aspects of web / internet based learning, video streaming, synchronous and asynchronous audio communication with conventional / face to face learning.[3] By using Blended learning, the students are expected to understand the material better and also become more active in learning, so it can improve learning outcome of the students. Blended learning is basically a combination of excellent learning done face-to-face (face to face learning) and virtually (e-learning). Online learning or e-learning in blended learning is an extension of face-to-face learning.[4]

According to Carman there are five keys to implement learning by using blended learning, as the following:[5]

1. Live Event, synchronous, direct learning or face-to-face in the same time and place or at the same time but different place.
2. Self-Paced Learning, combining with independent learning (self-paced learning) that allows the students to learn anytime, anywhere by online.
3. Collaboration, combining collaboration, both collaboration of teachers, and collaboration among students.
4. Assessment, the lecturer must be able to formulate a combination of online and offline assessment both types test and non-test.
5. Performance Support Materials, make sure learning materials are prepared in digital form, accessible to students both offline and online.

The results of research conducted by Dziuban, Hartman and Moskal [6] found that blended learning has the potential to improve study learning outcome of the students and also reduce dropout rates compared to online learning fully. Hence, it was also found that blended-based learning model was better than face-to-face learning.

So it can be concluded that blended learning is learning by combining information technology in the form of software as a learning medium in the form of e-learning which includes multimedia technology, video streaming that contains animation, graphics and text. Learning can also be conducted by online (virtual) or offline. By applying the blended learning the teacher's role is not as a learning center but rather to students. With the application in the form of software in learning will provide varied atmosphere in learning.

The role of lecturer in blended learning is very important in managing learning, the lecture must understand information technology. Besides having teaching skills in delivering face-to-face learning material, the lecture must also has knowledge and skills in developing information technology-based learning resources and skills for accessing the internet, then can combine two or more of the learning methods.

The research conducted and published by D. Randy Garrison and Heather Kanuka [7] entitled Blended Learning: uncovering its Transformative in Higher Education in Indonesia. They explained that higher education in Indonesia such as the campus would adopt blending learning approaches in a significant way. Blended learning in university is evaluated and assessed to see the changes that have been resulted from applying blended learning in university. The assessment and evaluation based on learning outcome (output), satisfaction of the students and achievement. In addition, the learning process can also be used as an assessment, evaluation and the impact of learning change by applying blended learning in university.

The results of the research of Won Sun Chen and Adrian Yong Tat Yao [8] focus on the level of students' satisfaction with blended learning. The level of satisfaction is influenced by several factors, namely (1) students, (2) lectures, (3) university, (4) technology, (5) design and (6) environment, which become the indicators of students' satisfaction, especially in e-learning component on blended learning. In the research it was concluded that design is the most important factor in students' satisfaction to e-learning on blending learning. It has become the interest of the students in learning. Therefore educational institutions that have implemented blended learning with e-learning can design interesting web page on e-learning.

In Sarah Bibi's research [9] entitled The Effect of the Blended Learning Model on the Students' Motivation and Understanding on the subject of Algorithms and Programming, it can be concluded that (1). Students motivation in the Information Technology and Computer Education Study Program STKIP PGRI Pontianak for Algorithms and Programming subject has a significant difference between class that use blended learning model and class that use conventional model. (2). the level of students' understanding of the Information Technology and Computer Education Study Program STKIP PGRI Pontianak for the subject of Algorithms and Programming has a significant difference between class using blended learning model and class using conventional model. (3). Student motivation in the Information Technology and Computer Education Study Program STKIP PGRI Pontianak for the subject of Algorithms and Programming has increased significantly due to the application of the blended learning model. (4). the level of students' understanding of the Information Technology and Computer Education Study Program STKIP PGRI Pontianak for the subject of Algorithms and Programming has increased significantly due to the application of the blended learning model.

This research was using Research and Development Method. According to Sugiyono [10] research and development is method which is used to produce a product, and validate the effectiveness of the product.

Research and development is a research approach to produce new product or make product perfect [11]. In this research, researchers conducted the research and developed a blended learning model with a set of learning in the form of integrated e-books by using Learning Management System (LMS) on the subject of basic programming, the effectiveness of this product will be validated by material expert/ validator, validity by the media (information technology), validity by lecturer and testing by students.

The procedure of the research conducted by researchers in this development was adapted from the development steps developed by Borg and Gall with limitation.[12] Borg and Gall state that it is possible to limit the research on a small scale, including limiting the research step. The implementation steps are accommodated to researchers' need. Because of the limited time and fund owned by researchers, these steps are simplified into four steps.

III. FINDINGS

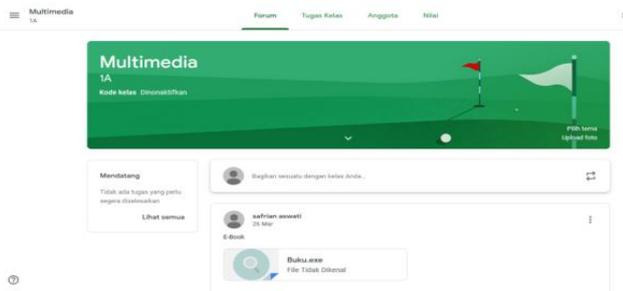


Fig. 1 LMS with Google Classroom



Fig. 2 The front Page of E-Book



Fig. 3 The Content of E-Book

A. Validity

The validity of the developed blended learning model before being tested, was conducted by validator and expert of education, specifically the subject of basic programming. Validity was conducted by providing the manual of model and the validation sheet to validator. Assessment includes aspects of supporting theories, learning model structures, syntax, social system, reaction principle, support system, instructional and Accompaniment impact and the implementation of learning. The result of the validity model can be seen in Table 1 below.

TABLE I-The Result of Validity by Using Developed Blended Learning

No	Aspects Assesed	Validator's score
1	Supporting Theories	21,00
2	Learning Model structure	16,33
3	Syntax	21,33
4	Social System	21,33
5	Reaction Principle	13,33
6	Support System	40,00
7	Instructional and Accompaniment Impact	8,67
8	Implementation of Learning	12,67
Total		155

The validity of developed blended learning model was getting by :

$$NA = \frac{S}{SM} \times 100\% \tag{1}$$

SM = 5 (the highest score on Linkert scale) x point questions in the instrument
Point of questions in the learning model instrument = 37 point of questions (5 x 37 = 185)
Then the validity of 155/185 x 100 = 83.78 based on the criteria (Very Valid)

B. Practicality

Practicality of using developed blended learning model by the lecturer was formulated :

$$NA = \frac{S}{SM} \times 100\% \tag{2}$$

SM = 5 (highest score on Linkert scale) x point question in the instrument
Point of questions for lecturers' ability to manage learning by the developed blended learning model = 8 question points (5 x 8 = 40)
Then the practicality 37.7 / 40 x 100 = 94.25 (Very Practical).

C. Effectiveness

The learning outcomes of the students when learning the subject of Basic Programming using blended learning model developed with e-book using post test data of experimental and control classes. This data was tested using the Independent Sample T Test with the following rules:

1. If the Sig. (2-tailed) < 0,05 there was any different significant between the learning outcomes on the post-test of small scale and field
2. If the Sig. (2-tailed) > 0,05 there was not any different significant between learning outcomes on the post- test of small scale and field.

TABLE II-The Data of Post Test in Experimental Class

No	Score
1	86
2	82

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3	84
4	87
5	88
6	80
7	85
8	82
9	85
10	82
11	85
12	85
13	87
14	83
15	85
16	84
17	82
18	80
19	83
20	85

25	80
26	72
27	76
28	76
29	74
30	78
31	75
32	73

After being conducted the testing so the result is detailed in figure 4:

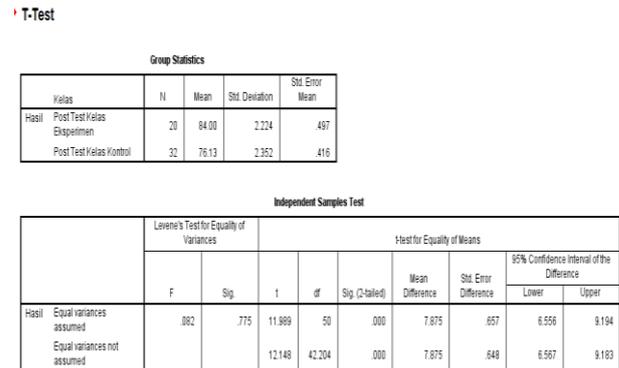


TABLE III-The Data of Post Test in Control Class

No	Score
1	79
2	75
3	77
4	76
5	80
6	78
7	81
8	79
9	75
10	77
11	77
12	75
13	76
14	73
15	74
16	76
17	75
18	75
19	75
20	78
21	74
22	74
23	73
24	80

Fig. 4 Independent Sample T Test

The figure above shows that the Sig. (2-tailed) is 0,000 (at equal variances assumed), meaning the value of Sig. (2-tailed) <0.05. Then it can be concluded that there is a significant difference between learning outcomes in the post test data of the experimental class and the control in the field trials. It means that with the developed blended learning model with e-book can **improve student learning outcomes**.

IV. CONCLUSION

1. The blended learning model on the subject of the Basic Programming at Medan Polytechnic Creative Media Medan PSSD developed with learning tools in the form of an e-book integrated with the google classroom Learning Management System (LMS) meets valid criteria shown by expert and practitioner.
2. The blended learning model on the subject of the Basic Programming in Medan Polytechnic Creative Media Medan PSSD developed with learning tools in the form of an e-book integrated with the google classroom Learning Management System (LMS) meets the practical criteria shown by the implementation of the model and the ability of lecturers in managing learning.
3. The achievement of student learning outcomes by testing the post test scores in small group and field using the Independent Sample T Test. It can be seen that the value of Sig. (2-tailed) is 0,000, it means the value of Sig. (2-tailed) <0.05. It can be concluded that there is a significant difference between learning outcomes on the post test data in the experimental and control classes. This means that the existence of a blended learning model developed with e-books increases student learning outcomes.

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