

The Effect of Mastery-Based Blended Learning on the Independence and Creativity of Students

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Abstract. *Blended learning is a combination of online learning and direct learning. One type of blended learning is mastery-based blended learning. The purpose of this study was to determine the effect of using mastery-based blended learning and conventional learning on students 'independence and creativity and to find out the increase in students.' independence and creativity by using a mastery-based blended learning model on basic graphic design subjects. This research used a quantitative approach to the quasi-experimental research method. The population used was class X students majoring in TKJ SMK N 1 Sawit Boyolali by collecting data using questionnaires and evaluating using observation sheets. The results showed that mastery-based blended learning had an influence and could improve the independence and creativity of students*

Keywords: *blended learning, mastery learning, creativity, independence*

I. INTRODUCTION

In this 21st century, education is an important element to ensure students have the skills to learn, innovate, the skills to use technology and information media, and the ability to work using life skills. According to Law Number 20 the Year 2003 Article 15, vocational education is secondary education which prepares students primarily to work in certain fields [1]. Vocational education consists of Vocational High Schools (SMK), and Aliyah Vocational Madrasah.

Firdausi & Barnawi [2] defines Vocational High School (SMK) as an educational institution that creates a profile of graduates who have expertise and skills in the world of work. So that practicum activities in vocational students are preferred during the learning process. Practical activities undertaken by students are needed to gain hands-on experience.

Therefore, the Ministry of Education and Culture of the Republic of Indonesia has adopted the concept of 21st-century education to develop curriculum in Vocational High Schools. These three concepts include 21st Century Skills [3], Science and Technology Approaches [4], and Authentic Learning and Assessment [5]. Furthermore, the three concepts were adapted to develop education towards Creative Indonesia in 2045 [6].

Based on observations during educational apprenticeship activities at SMK N 1 Sawit Boyolali, some students have difficulty working on the practice because of the teacher's

explanation. The teacher still uses the conventional model when practicum. This makes the lab less effective because students often ask to repeat the explanation. Students also do not have the initiative to solve the difficulties experienced during the learning process and develop what has been taught before. Besides, the results of designs created by students are still often imitated and encouraged by the examples provided by previous teachers. Therefore, a learning model is needed that can combine face-to-face learning with online so students can access and explore material provided by the teacher or from other learning resources. So students can learn, explore, develop learning independently.

The model that can be used to integrate face-to-face and online learning is the Blended learning model. Blended learning is a medium for integrating technological advances and innovative online learning with conventional learning [7]. One type of blended learning is mastery-based blended learning [8]. Mastery-based blended learning is a combination of mastery learning methods (complete learning) and blended learning itself. Mastery learning or complete learning is a systematic learning process or carried out in a structured and sequential manner so that learning can adjust to groups of students and individuals [9]. One of the principles of mastery learning is students can learn actively. This principle allows students to start learning by utilizing other learning resources namely from e-learning [10].

In short, blended learning is a mixture of conventional learning with web-based learning [11]. The definition of blended learning leads to four concepts [12], namely: (a) Blended learning is learning with the help of various web-based technologies so that educational goals can be achieved. (b) Blended learning is a mixture of learning approaches with the help of technology to produce more optimal learning. (c) Blended learning also combines online learning media with face-to-face assignments to produce quality work and learning. (d) Blended learning is a combination of several technology formats in learning such as pictures, audio, visuals, and real learning in class.

Mastery learning is a learning model developed by John B. Carroll (1971) and Benjamin Bloom (1971). Complete learning is a learning model where students are expected to be able to complete and master learning thoroughly following specified competency standards [13]. In its implementation, mastery learning has several stages that must be done. The stages of the mastery learning strategy include [14]: (a) Orientation Stage. (b) Presentation Stage. (c)

Structured Training Stage. (d) Guided Training Stage. (e) Independent Training Stage.

According to Mujiman [15], learning independence is an ability or characteristic possessed by students in carrying out learning activities based on motivation to master learning and competencies possessed. Independence of students is marked when they can solve a problem presented. Besides, students can determine their own goals, initiatives that are strong, creative, can regulate behavior, can determine a decision, be able to hold back, and can overcome a problem without influence from others [16]. There are several indicators of learning independence according to Sumarmo (2004), including: (a) Learning initiatives. (b) Diagnose learning needs. (c) Establish learning targets and objectives. (d) Monitor and control. (e) Think of difficulties as challenges. (f) Utilizing relevant learning resources. (g) Determine effective learning strategies. (h) Evaluating learning processes and outcomes. (h) Self-efficacy (self-concept).

Creativity is one of the learning objectives that must be achieved. According to Sriraman, creativity is the ability of a person to create or produce new and original works [17]. With more creative ideas, some of these ideas can be useful to solve problems [18]. Creativity is the ability of individuals to create or create something new [19]. Livne believes that creativity is the ability to produce diverse and new solutions to problems flexibly but can still be accepted rationally [20]. From the opinion above, Munandar said that creative students tend to have confidence and independent attitudes [21]. Indicators of creativity include : (a) Thinking smoothly, by generating many relevant ideas. (b) Flexible thinking, such as generating many diverse ideas, can determine effective methods, and different ways of thinking. (c) Thinking original, by giving answers that are different from others. (d) Thinking in detail, such as expanding an idea, enriching an opinion, and explaining an opinion in detail.

From the the explanation above, research is needed on the influence of mastery-based blended learning. So, mastery based- blended learning is to improve the independence and creativity of students in the basic subjects of graphic design,

II. METHODOLOGY

This study is used a quantitative approach with quasi-experimental methods (quasi-experimental research). This design has a control group and an experimental group, where the treatment is given only to the experimental group. The two groups with different treatments will then compare the results. This research was conducted without randomization.

This study uses the Pretest-Posttest Control Group Design. This design was used because measurements or tests were held at the beginning (pretest) in the control group and the experimental group. The two groups were then treated. The experimental group used the mastery-based blended learning model (X1) while the control group used a conventional model (X2) as in Figure 2.1.

This study use two variables, namely the independent variable and the dependent variable. Independent variables are variables that cause change or the emergence of dependent variables, while dependent variables are variables that are affected or are due, because of the existence of independent variables [22].

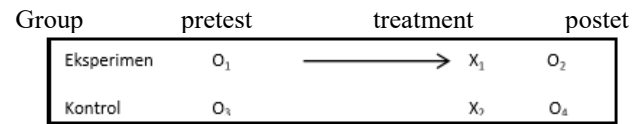


Figure 2.1 Research Design *pretest-posttest group design*

The independent variable in this study is the mastery-based blended learning model. The dependent variable used in this study is the learning independence and creativity of students. Learning independence can be interpreted as perceptions of students who have the initiative to learn, diagnose learning needs, set targets or goals of learning, control, view difficulties as challenges, find relevant learning resources, evaluate the learning process and self-concept. the creativity of students is defined as activities that bring new results in an innovative sense and can produce better ideas.

The population in this study were all class X students majoring in Computer Network Engineering SMK Negeri 1 Sawit Boyolali Academic Year 2018/2019. there are two classes with 35 students and 36 students in each class. So that the total population of this study was 71 students. The sample used is from all populations and uses saturated sampling. The use of saturated sampling is because in class X TKJ Department of SMK N 1 Sawit Boyolali there are two classes namely X TKJ 1 and X TKJ 2. And this study only needed two groups, namely one class as the experimental group and one other class as the control group. The experimental class is a class that uses the mastery-based blended learning model, while the control class is a class that uses conventional learning models.

The data were collected by distributing questionnaires and observation sheets. The variable learning independence of the students in this study was measured using a questionnaire. The independence questionnaire is given two stages, namely before treatment and after treatment to know to learn independence and learners in the two conditions. Meanwhile, the creativity of students is measured using an observation sheet. Both instruments then passed the validity, reliability, and subsequent test requirements for analysis, namely normality, homogeneity, and balance.

III. RESULTS AND DISCUSSION

This quasi-experimental study was conducted for 3 weeks from April 22 to May 10, 2019, with a duration of 4 x 45 minutes per meeting. This research was conducted at SMK N 1 Sawit Boyolali in the X class TKJ majors with the subjects used were the basis of graphic design and topographic learning material.

After getting the pretest and posttest scores, a normality, homogeneity and balance were be conducted from the results of the two classes using the SPSS application. Based on the calculated results, there are results of the normality test on the pretest and posttest data in the control class and experiment using the Kolmogorov-Smirnov test and the Shapiro-Wilk test. From these results the value of the significance level is above 0.05, this means that the data are normally distributed. Homogeneity test on posttest data in the control class and experiment using the Lavene method. From these results, the significance level above 0.05 is obtained, this means that the data has a homogeneous variance. The data balance test results have sig> 0.05 so

there is no significant difference in initial abilities between the experimental class students and the control class students which means that H_0 is accepted.

The results of the pretest and posttest of the participants 'independence and students' creativity in the experimental class were obtained from the independence questionnaire and observation sheet. Pretest questionnaires were given to students before using the mastery-based blended learning model and the posttest questionnaire was given to students after using the mastery-based blended learning model for 2 meetings with 36 students filling out questionnaires. For the control class, the questionnaire was given before and after using a conventional model with a total of 35 students. While observations in both classes were carried out before and after treatment. The average results of the independence and creativity of the pretest and posttest of students in the experimental and control classes can be seen in Table 3.1, Table 3.2 and Figure 3.1.

Table 3.1 *pretest* and *posttest* statistic of Learning Independence of Student in Experimental Class and Control class

Data	N	Minimum	Maximum	Mean
Pretest Experimental Class	36	44	70	56,25
Posttest Experiment Class	36	55	76	65,75
Pretest Control Class	35	42	69	55,20
Posttest Control Class	35	47	70	56,60

Table 3.2 *Pretest* and *Posttest* Statistics of Student Creativity Experimental Class and Control Class Control Class

Data	N	Minimum	Maximum	Mean
Pretest Experimental Class	36	5	13	8,25
Posttest Experiment Class	36	9	16	12,25
Pretest Control Class	35	4	12	7,20
Posttest Control Class	35	6	14	9,20

In this study, the class used for the experimental class was TKJ class X 2 at SMK N 1 Sawit Boyolali with 36 students. The learning process in this class used a mastery-based blended learning model using Spada (online course) which can be accessed using a PC or mobile phone. Learning is done in 2 meetings. The first meeting discussed the notion of typography and examples. While the second meeting is used to chase the assignments given by the teacher, namely

to make typographic designs. Materials and questions given to students were given through Spada (online course). Spada is a moodle based e-learning.

The control class used in this study was class X TKJ 1 SMK N 1 Sawit Boyolali with a total of 35 students. In this class, the learning process is carried out with a conventional learning model with the lecture method. The meeting was held twice, the first meeting was held on 15 April 2019 and the second was held on 22 April 2019. The two meetings were held in the school computer laboratory.

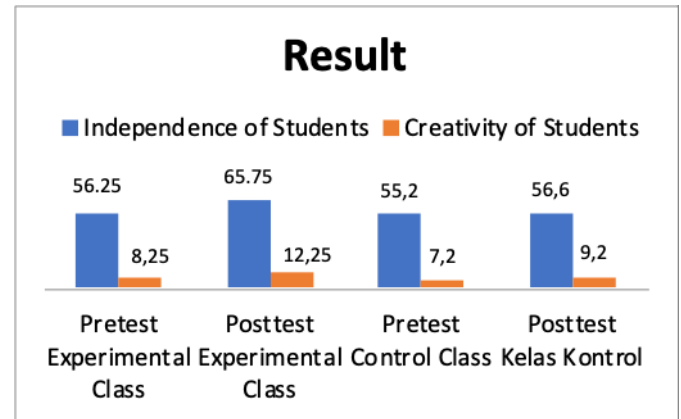


Figure 3.1 Average *Pretest* and *Posttest* of Student Independence and Creativity in Experimental Classes and Control Classes.

Hypothesis testing is done using the Independent Sample T-Test and Paired Sample T-Test. Hypothesis test results can be seen in Table 3.3, Table 3.4, Table 3.5, and Table 3.6.

H_0 : There is no effect of using mastery-based blended learning on students' independence in class X basic graphic design subjects.

H_a : There is the influence of the use of mastery-based blended learning on the independence of students in class X basic graphic design subjects.

Table 3.3. Posttest Hypothesis Test Results Independence of the Control and Experimental Classes

Posttest Learning Independence of Students					
Class	Total	Mean	Significance	Significance Level	Information
Control	35	56,60	0,000	0,05	Ho rejected
Eksperimen	36	65,75			

H_0 : There is no effect on the use of mastery-based blended learning on student creativity in class X basic graphic design subjects.

H_a : There is the influence of the use of mastery-based blended learning on the creativity of students in class X basic graphic design subjects.

Table 3.4. *Posttest* Hypothesis Test Results Creativity of Control and Experimental Classes

Posttest of Students Creativity					
Class	Total	Mean	Significance	Significance Level	Information
Control	35	9,20	0,000	0,05	Ho rejected
Eksperimen	36	12,25			

Table 3.5. *Pretest* and *Posttest* Hypothesis Test Results Independence of Experimental Classes

Data	Mean	Total	Significance	Significance Level	Information
Pretest	56,25	36	0,000	0,05	Ho rejected
Posttest	65,75				

H0: There is no increase in creativity in class X students using the mastery-based blended learning model.

Ha: There is an increase in creativity in class X students by using a mastery-based blended learning model.

Table 3.6. *Pretest* and *Posttest* Hypothesis Test Results for Experimental Class Creativity

Data	Mean	Total	Significance	Significance Level	Information
Pretest	8,25	36	0,000	0,05	Ho rejected
Posttest	12,25				

Based on Tables 3.1 and 3.2, there are results from the calculation of pretest and posttest data on the independence of students in the experimental class. The pretest results have an average of 56.25, the lowest value obtained is 44, the highest value obtained is 70, and the range value obtained is 26. For the results of the calculation of posttest independence of students in the experimental class, the value obtained has an average of 65.75, the lowest value obtained is 55, the highest value obtained is 76, and the range value is 21.

The results of *pretest* and *posttest* data on the independence of students in the control class were an average of 55.2, the lowest value obtained is 42, the highest value obtained is 69, and the range value obtained is 27. For the results of the *posttest* calculation of the independence of students in the experimental class, the value obtained has an average of 56.6, the lowest value obtained is 47, the highest value obtained is 70, and the range value is 23.

For the results of creativity data, the calculation of the pretest and posttest creativity data of students in the experimental class. The pretest results have an average of 8.25, the lowest value obtained is 5, the highest value obtained is 13, and the range value obtained is 8. For the results of the calculation of the posttest creativity of students in the experimental class, the value obtained has an average

of 12.25, the lowest value obtained is 9, the highest value obtained is 16, and the range value is 7.

The results of pretest and posttest data on the creativity of students in the control class were an average of 7.20, the lowest value obtained is 4, the highest value obtained is 12, and the range value obtained is 8. For the results of the calculation of the posttest creativity of students in the experimental class, the value obtained has an average of 9.20, the lowest value obtained is 6, the highest value obtained is 14, and the range value is 8.

The results of table 3.3, obtained a significant value for the posttest of the learning independence of the experimental class students towards the control class of 0,000. From these results, it can be concluded that Ho is rejected and there is an effect of the use of *mastery-based blended learning* on students' independence in class X basic graphic design subjects.

Table 3.4 obtained significance values for the posttest of learning creativity of the experimental class students in the control class of 0,000. From these results, it can be concluded that Ho is rejected, and there is an influence of the use of *mastery-based blended learning* on students' creativity in the basic subjects of class X graphic design.

Table 3.5 obtained significance values for the pretest and posttest of the learning independence of the experimental class students at 0,000. From these results, it can be concluded that Ho is rejected, and there is an increase in independence in class X students using the mastery-based blended learning model.

Table 3.6 obtained significance values for the pretest and posttest of creativity in the experimental class of 0,000. From these results, it can be concluded that Ho is rejected and there is an increase in creativity in class X students using the mastery-based blended learning model.

From the results of the data and hypothesis testing above it can be concluded that there is an influence of the use of mastery-based blended learning on the independence of students in the basic subjects of class X graphic design compared to using conventional models. The average score of the learning independence of the experimental class students is 65.60. While the control class is 56.75. The difference in the posttest value of the two classes is 8.85.

The posttest results of creativity from both classes showed that there was an effect of the use of mastery-based blended learning on students' creativity in the basic subjects of class X graphic design compared to using conventional models. The average score of the learning independence of the experimental class students is 12.25. While the control class is 9.20. The difference in the posttest value of the two classes is 3.05.

Also, there was an increase in the use of *mastery-based blended learning* on students' independence and creativity in class X basic graphic design subjects. The average score of the learning independence of experimental class students before using the mastery-based blended learning model was 56.25, and averaged the average score of the independence of the experimental class students after using the mastery-based blended learning model of 65.75. The increase obtained is 9.5. The average score of creativity of the experimental class students before using the mastery-based blended learning model was 8.25, and the average score of the independence

of the experimental class students after using the mastery-based blended learning model was 12.25. The increase obtained is 4.

The results of the above research indicate that the incorporation of the blended learning model with mastery learning (*mastery-based blended learning*) can increase students' independence and creativity. This is consistent with the research conducted by Annisa Ratna Sari that blended learning can improve students' independence compared to using conventional learning models [23]. This is also following the research conducted by Ismaniati, Sungkono, and Wahyuningsih where students become independent seen from the intensity of activities carried out in online learning, such as exploring the learning resources and assignment systems [24].

Besides, the same research was also shown by Luntungan, the creativity of students in 7th-grade physics learning also increased. The use of computers and the internet in the learning process can encourage students to be creative and always feel happy in following the learning process[25].

IV. CONCLUSION

Based on the results of research on the effect of mastery-based blended learning on the independence and creativity of students, it can be concluded that:

- a. Mastery-based blended learning can increase the independence of students in the basic subjects of graphic design class X majoring in TKJ. The material and tutorials for practicums can be easily accessed by students; So, students can solve various difficulties and practical activities become more efficient.
- b. Mastery-based blended learning can increase the creativity of students in the basic subjects of graphic design class X majoring in TKJ. Learning resources provided in online learning add ideas for students to develop design results in practical activities.
- c. The use of mastery-based blended learning models can be applied in other subjects to improve students' independence and creativity, especially in subjects that require practical activities.
- d. This model is effective and can be applied at the SMK level. Meanwhile, for other levels of education, further research needs to be done because of differences in subject matter, age and learning experience.
- e. Supporting this model is the level of enthusiasm of students during the learning process because students have new learning experiences
- f. The obstacle of this model is that there are still difficulties experienced by students when using online courses and are not familiar with the use of the blended learning model.

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