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Research Article

Maker-Centered Project-Based Learning: The Effort to Improve Skills of Graphic Design and Student's Learning Liveliness

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Abstract

Maker-Centered Project Based Learning is one of the developed learning models that emphasize the concept of stimulation to develop students' creativity, productivity, and innovation. This learning model is suitable because it has a positive simulation value to encourage students to solve real-life problems. Therefore, this research focuses on examining the application of the Maker-Centered Project-Based Learning Model in student lecture activities to improve graphic design skills and student learning activities. This research uses a quasi-experimental method with a Posttest-only Control technique through a quantitative approach. A total of 68 students were involved in this research, with 34 students for each control class experimental class. The sampling technique used in this research is cluster random sampling. Student project assessment sheets consisting of 2 aspects, namely graphic design skills and Student Learning Activities, were used to collect data. The results showed that students' graphic design skills and active learning increased significantly after applying the Maker-Centered Project-Based Learning Model with a 95% confidence level. In its application, the Maker-Centered Project-Based Learning model can give real meaning to life for students. Realizing the goals of human life requires an active role from oneself, which is supported by the role of other individuals from outside oneself. In addition, the application of maker-centered project-based learning on the creator can significantly increase student learning activity.

Keywords: Maker-Centered; Project-Based Learning; Graphic Design; Learning Liveliness

1. Introduction

Education is the primary key for a country to excel in global competition. Education is considered the most strategic field to realize national welfare. Human Resources who are intelligent and with character are prerequisites for forming a high civilization (Rachmadtullah et al., 2020). Therefore, each country makes various efforts to improve the level of education of its citizens, such as changing the curriculum (Govender, 2018; Patrick et al., 2021), providing appropriate learning methods and models (Ngubane & Makua, 2021), making interactive learning media (Iasha et al., 2020; Setiawan et al., 2017; Usman et al., 2019). Using the appropriate learning model is one method for improving educational quality (Aningsih et al., 2022; Sarkadi & Iasha, 2019). Providing the appropriate learning model may help students develop their abilities (Wahyudiana et al., 2021). However, unfortunately, educators are still not exemplary in applying the learning model in the learning process.

In the past decade, there have been many studies done on students' ways to learn together and develop competencies through participation. Maker-Centered Project-Based Learning is one of the learning models developed that emphasizes the concept of stimulation for developing students' creativity, productivity, and innovation (Novak & Wisdom, 2018; Sormunen et al., 2020). Maker-Centered Project-Based Learning is the same as education creator or creating works in an educational context (Bell, 2010; Bender, 2012; Saputra, 2016; Schuetz, 2018). This concept is a stimulus that can build students' critical thinking, feeling, and acting creatively through a strong attitude and imagination to achieve the expected educational goals. This learning model is suitable for use because project-based learning there were positive simulation values for encouraging students to solve real-life problems (Condliffe, 2017). In addition, the concept of this learning model can also build students' critical thinking, feelings, and actions creatively through a strong attitude and imagination as a stage in achieving the expected educational goals (Novak & Wisdom, 2018; Schuetz, 2018).

Graphic design skills activities are considered a relevant concept in Project Maker-Centered technology. Because graphic design may convey information or messages clearly and effectively and change people's views of something (Yasbiati et al., 2019). Graphic design is an art form that aims to solve communication problems through a combination of graphic elements such as shapes, lines, colors, and so on (Gandana, 2019; Lestari et al., 2019; Yasbiati et al., 2019; and Nurzaman et al., 2020). The visuals created are expected to deliver information or messages clearly and effectively; moreover, they could form the human perception of something. So it is hoped that the makers have these skills through the Maker-Centered Project-Based Learning learning model. In addition, students' liveliness in learning seems to be an essential aspect of implementing Maker-Centered Project Based Learning. Students' liveliness, in this case, is the movement of the individual's soul which is influenced by the mental and thinking abilities of the individual (Saputro et al., 2017).

Based on the studies above, it can be seen that the Maker-Centered Project-based Learning Model has advantages in improving graphic design skills and student liveness. In addition, the authors have not found information about the use of this model to improve the ability of graphic design and students' learning liveliness in Indonesia. So, this research focuses on examining the application of the Maker-Centered Project-based Learning Model at the students lecturing activities to improve graphic design skills and student learning liveliness.

2. Method

2.1 Research Design

This research employed a Quasi-experimental method utilizing the Posttest-only Control technique (Creswell, 2002). The use of the Maker-Centered Project-based Learning Model was studied in eight meetings, each lasting two hours and fifty minutes. The research sample was taken from two different classes; one was assigned as the experimental class and the other as the control class, as shown in

table 1.

Table 1: Research Design

Class	Treatment	Post-test
Experimental Class	X	O_1
Control Class		O_2

  X: Maker-Centered Project-based Learning Model
  O_1: Post-test for experimental class
  O_2: Post-test for control class

2.2   Participant

A total of 68 students were engaged in this research, with 34 students for each experimental class control class. The sampling technique used in this research was Cluster random sampling. Cluster random sampling is a technique in which a researcher divides the population into separate groups known as clusters (Etikan & Bala, 2017).

2.3   Data Collected and Data Analysis

The aspects of students' development expected in applying the Maker-Centered Project-based Learning Data were collected using a student project assessment sheet consisting of 2 aspects, i.e., graphic design skills and Student Learning Liveliness. The indicators for the assessment of the Graphic Design Skills and Student Learning Liveliness are shown in table 2.

Tabel 2: Graphic design skills and student learning liveliness Indicators

No	Aspect	Score
Graphic Design Skills		
1	Color compatibility	10
2	Depth	10
3	Space	10
4	Layout	15
5	Emphasis	10
6	Theme suitability	10
7	Rhythm	15
8	Communicative	20
Maximum score		100
Student Learning Liveliness		
1	Involvement	20
2	Direct learning	20
3	Efforts to create a conducive climate	15
4	Initiative	15
5	Looking for learning resources	15
6	Interact multi-way	15
Maximum score		100

The data analysis technique of this research used the SPSS application to calculate the difference in class average and group variance or ANOVA. The hypothesis in this research is as follows:

    Ho: There is no a significant difference between the average graphic design skills and student learning liveliness after applying The Maker-Centered Project-based Learning Model in lecturing activities

Ha: There is a significant difference between the average graphic design skills and student learning liveliness after applying The Maker-Centered Project-based Learning Model in lecturing activities

3. Result and Discussion

3.1 Result

The results of this research were descriptive and inferential statistical analysis on graphic design skills and student learning liveliness after the implementation of the Maker-Centered Project-based Learning Model. The data from the analysis can be interpreted in table 3. Table 3 shows that the average result of the graphic design ability assessment is 79.56. On the other hand, the average score for students' liveliness is 87.50.

Tabel 3: Results of Data Analysis of Graphic Design Skills and Student Learning Activities

Descriptives					
Y				Statistic	Std. Error
X	Graphic design skills	Mean		79.56	.500
		95% Confidence Interval for Mean	Lower Bound	78.54	
			Upper Bound	80.58	
		5% Trimmed Mean		79.64	
		Median		80.00	
		Variance		8.496	
		Std. Deviation		2.915	
		Minimum		72	
		Maximum		86	
		Range		14	
		Interquartile Range		4	
		Skewness		-.438	.403
		Kurtosis		.519	.788
	Student's liveliness	Mean		87.50	.512
		95% Confidence Interval for Mean	Lower Bound	86.46	
			Upper Bound	88.54	
		5% Trimmed Mean		87.52	
		Median		87.00	
		Variance		8.924	
		Std. Deviation		2.987	
		Minimum	82		

The average score of students' graphic design skills after implementing the Maker-Centered Project-based Learning Model can be seen in figure 1. Figure 1 showed the results of several student abilities after applying the Maker-Centered Project-based Learning Model. The ability to convey communication in an image from students has the highest value compared to other abilities. At the same time, the color compatibility ability has the lowest value. It is similar to Vargas et. al. research, where the application of project-based learning can improve students' communication skills (Castro-Vargas et al., 2020). Baihaqi et. al. also reported in their research that the use of project-based learning models could improve communication skills (Baihaqi et al., 2020).
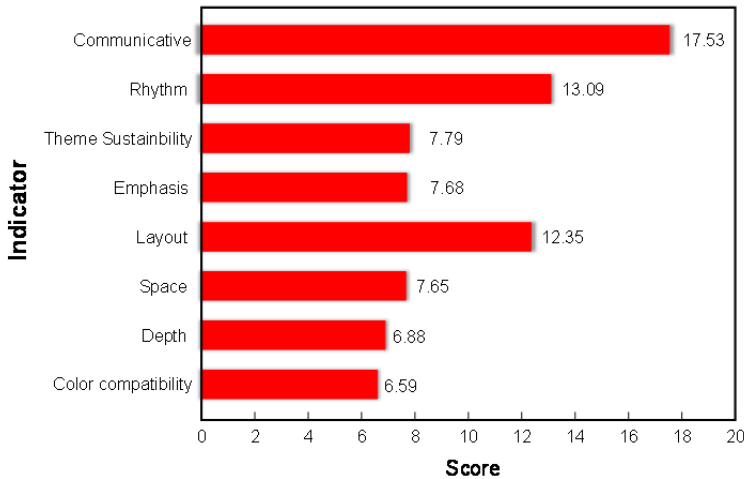
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Figure 1: Graph of Average Student Graphic Design Skills

The average student learning activity data after applying the Maker-Centered Project-Based Learning Model can be seen in Figure 2. Figure 2 shows that several indicators show student learning activity. Indicators on Direct Learning get the highest results in applying the Maker-Centered Project-Based Learning Model. In comparison, the interact multi-way indicator gets the lowest results. It is similar to the Jones et. al. research, where implementing Maker-Centered Project-Based Learning could increase the direct learning aspect to the students (Jones, 2021). In addition, Sourmen et. al. also reported in research that implementing the Maker-Centered Project-Based learning model can increase student activity in the learning process (Sormunen et al., 2020).
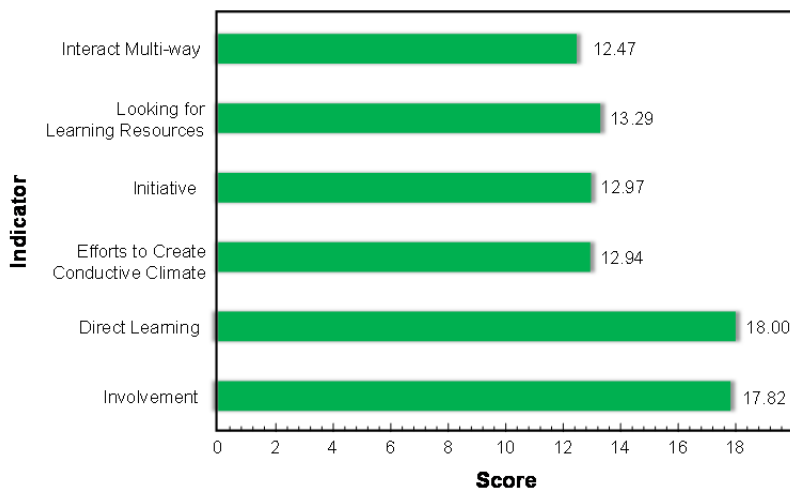

Figure 2: The Average Student's Learning Liveliness

Before the research began, a sample similarity test was conducted to determine the ability of each sample. The test is in the form of normality and homogeneity tests for each sample. The normality

test used the Lilliefors method with a significant degree (α) of 5%, and the results of graphic design skills and student liveliness normality test are shown in table 6.

Tabel 6: Normality Test

	Y	Tests of Normality					
		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
X	Graphic Design Skill	.159	34	.029	.964	34	.314
	Students' Liveliness	.096	34	.200*	.968	34	.418

*. This is a lower bound of the true significance.
a. Liliefors Significance Correction

It was known that the number of samples from each class was < 50, then the normality test used the Shapiro-Wilk. Based on table 6, the value of the normality test for graphic design skills obtained a sig value. = 0.314 > 0.05. Student's liveliness normality test value = 0.418 > 0.05. Thus it can be concluded that the two data above are normally distributed.

Tabel 7: Homogeneity Test

Test of Homogeneity of Variances			
Levene Statistic	df1	df2	Sig.
.239	1	66	.627

Based on the output of the homogeneity test of variances table, it was known that the value of Sig. = 0.627 > 0.05, it could be concluded that the variance of Maker-Centered Project-based Learning Model data on graphic design skills and students' liveliness is homogeneous, so the Anova test is declared valid to test the significance of Maker-Centered Project-based Learning Model on graphic design skills and student's learning liveliness.

Tabel 8: ANOVA Test

ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1072.059	1	1072.059	123.079	.000
Within Groups	574.882	66	8.710		
Total	1646.941	67			

In the ANOVA table, Sig. obtained P-Value 0.000 <0.05 so that Ho is rejected, or it can be concluded that there is a significant difference between the average graphic design skills and student learning liveliness after applying The Maker-Centered Project-based Learning Model in lecturing activities. It means that the model can be used as a stimulation for developing graphic design skills and students' learning liveliness with a confidence level of 95%.

3.2   Discussion

3.2.1 The Maker-Centered Project-based Learning as a stimulus design for individual behavior change

Student behavior is the nature of actions possessed by students and is influenced by customs, attitudes, emotions, values, ethics, power, persuasion, and genetics (Aningsih et al., 2022). Several internal and external factors might influence the Changes in individual behavior. Internal factors are

motives or self-motivation in the form of a desire to improve the self-system to be better and normative. While external factors are expressed in terms of motivation or encouragement from outside the self, which is the result of a design so that the motives within the individual can realize the expectations to be achieved. In the context of education, the design concept that contains the value of motives and motivation is through the application of a Maker-Centered Project-Based Learning Model (Condliffe, 2017; Sormunen et al., 2020)

It is in line with the results of research showing that The Maker-Centered Project- Based Learning Model can give real meaning to life for students that in realizing the goals of human life requires an active role from oneself which is supported by the role of other individuals from outside oneself. Therefore, Tomlinson and Krauss et al. confirmed that the application of The Maker-Centered Project-Based Learning Model deserved to be stated as a design for stimulating individual behavior change (Tomlinson & Masuhara, 2017). In addition, the research results Sourmen et al. also revealed that Maker-Centered Project-Based Learning could change students' behavior to cooperate and increase willingness to participate in the learning process (Sormunen et al., 2020). Chen et al. also reported that the application of Maker-Centered Project-Based Learning could change student behavior to be more active in the learning process (Chen & Lin, 2019).

3.2.2 Graphic design skills as a manifestation of the application of maker-centered project-based learning

Maker-centered project-based learning is a viable design for changing individual behavior. This concept can be reflected in individual self-performance by demonstrating graphic design skills (Bell, 2010; Bender, 2012). Graphic design skills are simple but complex projects. Graphic design is a communicative art that deals with industry, art, and the process of producing visual images on all surfaces (Meggs, 1992). The process of completing the graphic design requires mental management, thoroughness, tenacity, and patience (Iasha et al., 2020; Nurzaman et al., 2020; Yasbiati et al., 2019). This mentality will later bring up graphic design abilities such as communication, rhythm, theme sustainability, and emphasis (Figure 1). On the other hand, maker-centered project-based learning can change students' attitudes from attitudes and knowledge (Birdman et al., 2021; Novak & Wisdom, 2018), combining various concepts into one object that contains ethics and aesthetics meaningfully for oneself and others (Oishi & Westgate, 2021). It is in line with the research of Mou who reported that the use of Maker-centered project-based learning in the learning process can hone design skills so that they can bring up graphic design abilities such as communication, rhythm, theme sustainability, and emphasis (Mou, 2019). In addition, Vogler et al. reporting on maker-centered project-based learning can lead to communication, collaboration skills) (Vogler et al., 2018). In line with the results of this research, which showed that the concept of developing students' graphic design skills was a manifestation of the stimulation of the implementation of maker-centered project-based learning in lecturing activities.

3.2.3 Individual learning liveliness is the behavior resulting from the stimulation of maker-centered project-based learning

Individual learning liveliness is an individual activity that can change for the better in the individual because of the interaction between the individual and the individual and the individual with the environment (Harris et al., 2009; Jurik et al., 2014). Individual learning liveliness is a form of expected behavior in the maturation of individual skills process (Finkelstein et al., 2010; Louis & Emerson, 2014). Concerning the belief that the Maker-centered Project-based Learning Model is a stimulation design for individual process skills, then the value relevance can also be believed as the primary capital for individual behavior changing in the context of dynamic behavior in learning (Chu et al., 2011; Keller, 2009; Rathnam, 2018). In line with the results of this research showed that the application of maker-centered project-based learning can significantly increase student learning liveliness. It is

also obtained from the research of Wulandari et al., who reported that individual learning liveliness was more appearing being taught by using a maker-centered project-based learning model (Wulandari et al., 2019). Mahasneh et al., also reported that individual learning liveliness appeared when given a project-based learning model (Mahasneh & Alwan, 2018; Setiawan et al., 2017). In addition, Usmeldi et al. reported in their research that there was an effect of maker-centered project-based learning on students' liveliness where students' liveliness was more visible when using the method (Usmeldi, 2019).

4. Conclusion

In this research, we have successfully tested the Maker-Centered Project-Based Learning Model in student lecture activities to improve graphic design skills and student learning activities. A total of 68 students were engaged in this research, with 34 students for each experimental class control class showing the resulting research that students' graphic design skills and active learning increased significantly after applying the Maker-Centered Project-Based Learning Model with a 95% confidence level. In its application, the Maker-Centered Project-Based Learning model can give real meaning to life for students. Realizing the goals of human life requires an active role from oneself supported by the role of other individuals from outside oneself. In addition, the application of maker-centered project-based learning on the creator can significantly increase student learning activity.

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