The Effect of the Implementation of E-learning Model on Learning Outcomes:

Case study in Basic Mechanics Course at State Vocational High School 5 Bandung, Indonesia

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Abstract—**This study aimed at determining the impact of the implementation of E-Learning model during the Covid-19 pandemic at State Vocational High Schools 5 Bandung. In particular, in Department of Modeling Design and Building Information, Class X DPIB 2, on Basic Mechanics subjects. The Covid-19 pandemic in the City of Bandung has made the learning process of this subject was carried out by the distance learning method since March 2020. The method used in this research was causal research, to examine the relationship between the independent variable (E-Learning Application) and the dependent variable (Learning Outcomes). The Pearson Correlation value showed that there is a significant correlation between variables. The correlation coefficient was 0.429 and this correlation was categorized as medium category, with correlation significance value is 0.023 <0.05, The coefficient of determination is 0.184, then E-Learning model can explain 18.4% of the variability of learning outcome. The significance value from the results of the simple regression analysis <0.05. That can be interested as the E-Learning model has a significant effect on learning outcome. Because the E-Learning model is related and has a significant effect on learning outcome, the better the application of the E-Learning model, the better the learning outcomes. Because the contribution of E-Learning video quality is high, improving the quality of E-Learning videos can contribute in improving learning outcomes, in particular in the context of distance learning due to the Covid-19 pandemic.**

Keywords—E-Learning model, learning outcomes, regression analysis

I. INTRODUCTION

Bandung was affected by the Covid-19 and this pandemic has resulted in the suspension of learning and teaching activities at the schools since March 2020. This case is also true at State Vocational High Schools 5 Bandung or *Sekolah Menengah Kejuruan Negeri* 5 Bandung (SMK 5). This temporary suspension forced students to study using distance learning from home, and teachers to study remotely as well. Of course this will be a challenge for teaching and learning activities, because it was carried out remotely without preparation and the transition is carried out in a very short period of time. The impact of this pandemic for Vocational High School 5 Bandung is that there is still some subject matter that has not been delivered according to the planned schedule. Of course this is a significant impact because it will change to the main schedule such as daily test schedules, practical exams, and etc.

E-Learning is an educational process in which internet facilities are used as a medium and means of learning. In addition to that, E-Learning also means learning using electronic devices. E-Learning has the potential because by using this learning model the teacher does not need to meet directly with students, teachers and students can do it remotely at home. Researchers are trying to apply the E-Learning model in the midst of this current pandemic situations. Researchers applied the E-Learning model in Engineering Mechanics subjects at the State Vocational High Schools 5 Bandung.

The purpose of this study was to examine the impact of the application of E-learning models on learning outcomes. This study was conducted during the Covid-19 pandemic, applied for Engineering Mechanics subjects, Department of Modeling Design and Building Information Class X DPIB 2, at State Vocational High School 5 Bandung, West Java, Indonesia.

Review of previous research which were relevant to this research was conducted. In the study conducted by Sutrisno et al, the ability of students to learn independently was high, therefore, it was potential to develop E-Learning learning models. The result of their study showed that the effectiveness of E-Learning-based models increased, with learning outcomes greater than previous learning outcomes. E-Learning based learning model resulted in 1.3 hours' efficiency in learning time compared to previous learning models [1]. According to previous research who have similar topic that were relevant to this study, the availability of facilities and infrastructure that support E-Learning-based learning must be complete, along with internet access for the smooth learning process [2]. The

results of other previous studies show that learning with E-Learning was more effective than conventional learning when viewed from student learning outcomes [3]. From other previous studies, the application of E-Learning in learning was very effective because the results of this previous study showed the difference between classes that use E-Learning and classes without E-Learning. This was proven by the results of descriptive analysis of student learning outcomes in learning using E- Learning model, which stated that there was an increase in learning outcomes [4].

With the results of previous research that have positive relationship between the variables, the researcher of this study hypothesized that the implementation of E-Learning model in this case study can improve learning outcomes of students enrolling in Basic Mechanics Engineering subjects, Department of Modeling Design and Building Information Class X DPIB 2, at State Vocational High School 5 Bandung.

II. RESEARCH METHODS

The method used in this research was causal research, where this method was used to examine the relationship between the independent variable (X) and the dependent variable (Y). X variable was the implementation of E-Learning Model, while Y variable was Students' Learning Outcomes.

Participants of this study were students of class X DPIB 2, Department of Modeling Design and Building Information at the State Vocational High Schools 5 Bandung, West Java, Indonesia. Respondents were selected based on their participation in Basic Mechanics Engineering subjects in Even Semester 2019/2020. The sampling technique used was Saturated Sampling, which is part of the Nonprobably Sampling technique. Saturated Sampling is a sampling technique when all members of the population are used as samples [5]. The sample was determined by the researcher based on consideration of problems, objectives, hypotheses, research methods and instruments, in addition to considerations of time, energy, and financing. The population sampled to be researched were students majoring in class X DPIB 2 at State Vocational High Schools 5 Bandung. This study group consisted of 35 students.

Part of data collection process for this research started from developing video for E-learning. Then, the video was distributed to students as implementation of E-learning model. After watching the video and use it for their learning process, the research process was followed by distributing questionnaires to the students of class X DPIB 2 to gauge their opinion on the implementing E-learning model on Basic Mechanics Engineering subject. The questionnaire comprised of questions using Likert scale to measure students' opinion. Student learning outcomes was measured by taking test after the online learning model was implemented. This test score was our Y variable.

III. RESULTS AND DISCUSSION

A. Results of Regression Analysis

The researcher took the decision for simple linear regression analysis by referring to the way to compare the significance value with the probability value of 0.05. If the significance value <0.05, then variable X has an effect on variable Y. If the significance value is> 0.05, then variable X has no effect on variable Y.

TABLE I.   ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	571.036	1	571.036	5.861	0.023[b]
	Residual	2533.205	26	97.431		
	Total	3104.241	27			
a. Dependent Variable: Learning Outcome (Y)						
b. Predictors: (Constant), E-Leaarning Model (X)						

Table II illustrate the statistical analysis to determine the significant effect of variable X on variable Y. In the table, the calculated F value of 5.861 and the Sig. 0.023. This means that the significant value is 0.023 <0.05 and the F value is 5.861> F table 4.23, which means that the X variable affects the Y variable.

Simple regression analysis has the equation of $Y = a + bX$. The coefficient values of a and b in this equation can be found by the results of the regression analysis. The result is stated in Table II.

TABLE II.   SIMPLE REGRESSION ANALYSIS

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	47.699	11.321		4.213	0.000
	E-Learning Model	9.305	3.844	0.429	2.421	0.023
a. Dependent Variable: Learning Outcome						

To delve into more details, the researcher has broken down variable X into several indicators. Variable X was divided into three indicators, namely 1) "ICT Literacy", 2) "Perceptions of E-Learning Models", and 3) "Quality of E-Learning Videos". Researchers perform this solution in order to criticize the results of the previous simple linear regression. The researcher took the decision for multiple linear regression analysis with reference to how to compare the significance value with the probability value of 0.05. If the significance value is <0.05, then the indicators "ICT Literacy", "Perceptions of E-Learning Models", "E-Learning Video Quality" have an effect on variable Y. If the significance value> 0.05, then the indicator "ICT Literacy", "Perceptions of E-Learning Models", "Quality of E-Learning Videos" has no effect on variable Y.

TABLE III.   MULTIPLE REGRESSION ANALYSIS

Model		Unstandardized Coefficient		Standardized Coefficient	t	Sig.
		B	*Std. Error*	*Beta*		
2	(Constant)	49.468	12.103		4.087	.000
	ICT Literacy	2.933	3.139	0.188	0.934	0.359
	Perceptions of E-Learning Models	1.352	5.055	0.069	0.267	0.791
	Quality of E-Learning Videos	4.759	4.467	0.291	1.066	0.297

From Table III above, we can examine the value of Standardized Coefficients Beta, the indicator for "ICT Literacy" is 0.188, the indicator for "Perception of E-Learning Models" is 0.069, and the indicator for" E-Learning Video Quality "is 0.291. This means that the value of Standardized Coefficients Beta is the amount of the contribution of the indicators "ICT Literacy", "Perception of E-Learning Models", "Quality of E-Learning Videos" to Learning Outcomes (variable Y).

Furthermore, from the results of t count the indicator "ICT Literacy" is 0.934 and Sig. of 0, 359> 0.05, it has a statement that there is no significant (significant) effect between the indicator "ICT Literacy" on the Y variable (Learning Outcomes). The value of the tcount for the indicator "Perception E-Learning Model" is 0.267 and Sig. amounting to 0.791> 0.05, it has a statement that there is no significant (significant) effect between the indicator "Perception E-Learning Model" on the Y variable (Learning Outcomes). The value of the tcount for the indicator "E-Learning Video Quality" is 1.066 and Sig. amounting to 0.297> 0.05, it has a statement that there is no significant (significant) effect between the "E-Learning Video Quality" indicator on the Y variable (Learning Outcomes).

B. Discussions

There is a discussion of the results of the analysis with the formulation of research problems that are intended to answer the research problems that have been formulated. The results of the analysis of variable X (E-Learning Model) and variable Y (Learning Outcomes) obtained a Pearson Correlation value of 0.429. The value is in the range 0.40 - 0.599, including the moderate category. In addition, there is a Sig. with a value of 0.023 <0.05 which means that there is a significant correlation. According to the results of the data in Table 3.4 above, there is a coefficient of determination obtained from the value of R (correlation coefficient) squared, the value of R^2 is 0.184. This means that the effect of variable X on variable Y is 18.4%. Variable X can explain 18.4% of the variability of variable Y. Then, the remaining 81.6% is the influence of other variables that are not studied. When viewed from the significance value, the significance value is 0.023 <0.05. This shows that the variable X has a significant effect on variable Y. This result is in accordance with the results of the research by Herlina and Loisa which show that the relationship between the ability to understand mathematical concepts using e-learning and learning achievement has a very significant effect [6].

Likewise, Soewono's research shows that the correlation results are significant that the effect of using e-learning with a multimedia-based tutoring approach causes student learning motivation to increase and has an effect on increasing student mathematics learning achievement [7].

From the analysis, there is a calculated F value of 5.861 and a Sig. 0.023. This means that the significant value is 0.023 <0.05 and the F value is 5.861> F table 4.23, which means that the X variable affects the Y variable. The following is the Regression Analysis equation:

$$Y = a + bX$$

$$Y = 47,699 + 9,305X$$

The above equation can be interpreted as, if there is no application of E-Learning (variable X) then the value of learning outcomes (variable Y) is 47.699. The X regression coefficient of 9.305 has a statement that for each additional one value of the application of E-Learning, the Learning Outcomes increased by 9.305. Furthermore, from the results of t count 2.421 and Sig. amounting to 0.023 <0.05, it has a statement that there is a significant (significant) effect between variable X (Application of E-Learning) on variable Y (Learning Outcomes). When viewed from such results, it can be said that this variable X increases learning outcomes in a positive direction. This result can happen due to several factors.

With the results of the previous regression analysis, the researcher tried to be more critical by analyzing the X variable into three parts per indicator. The results of the Multiple Regression Analysis (Correlation), the indicator "ICT Literacy" and the Y variable (Learning Outcomes) obtained a Pearson Correlation value of 0.332 This value is in the range 0.20 - 0.399, including the low category. In addition, there is a Sig. with a value of 0.042 <0.05 which means that there is a significant correlation. The indicator "Perception E-Learning Model" and variable Y (Learning Outcomes) obtained a Pearson Correlation value of 0.333 This value is in the range 0.20 - 0.399, including the low category. In addition, there is a Sig. with a value of 0.042 <0.05 which means that there is a significant correlation. Indicators of "E-Learning Video Quality" and variable Y (Learning Outcomes) obtained a Pearson Correlation value of 0.421 The value is in the range 0.30 - 0.599, including the moderate category. In addition, there is a Sig. with a value of 0.013 <0.05 which means that there is a significant correlation.

In the multiple regression results, there is a value of Standardized Coefficients Beta, the "ICT Literacy" indicator is 0.188, the "E-Learning Model Perception" is 0.069, and the "E-Learning Video Quality" indicator is 0.291. This means that the value of Standardized Coefficients Beta is the amount of the contribution of the indicator "" ICT Literacy "," Perception of the E-Learning Model "," Quality of E-Learning Videos "to variable Y. In accordance with these results, the indicator" Quality of E-Learning Videos " "Contributed significantly compared to other indicators, amounting to 0.291, followed by the contribution of the indicator" ICT Literacy "of 0.188 and

the contribution of the indicator" Perception of the E-Learning Model "of 0.069.

From the results of these data, the indicator of "E-Learning Video Quality" is important, because it contributes greatly. The indicator of "E-Learning Video Quality" can be said to have an effect on learning outcomes. Therefore, the indicator of "E-Learning Video Quality" must be improved in terms of the quality of production, materials and others in order to achieve the desired learning outcomes. From this, the teaching staff must be able to make good learning videos, because with good videos, students are comfortable learning and can absorb the material easily.

The "ICT Literacy" indicator also contributes, because with the "ICT Literacy" indicator the application of E-Learning will run smoothly and can also maximize the application of E-Learning itself to achieve the desired results. Therefore, the indicator "ICT literacy" also needs to be improved for students and teachers. Students need to master the indicator "ICT Literacy" so that in receiving material, students do not experience difficulties in implementing E-Learning.

The "Perception E-Learning Model" indicator also has a role in contributing to learning outcomes, where the "E-Learning Model Perception" indicator also needs to be known because with students knowing this E-Learning model, students can set their own strategies to be able to learn how to implement it. E-Learning. Students can sort and choose what to do and which to accept.

Based on the study findings, the researcher critically looked at the data to see the indicators on variable X that influence and contribute to learning outcomes, and also increase in a positive direction. This is in line with the study conducted by Rahmatia et al which showed that there was an effect of e-learning media on mathematics learning outcomes [8] and other studies pertinent to implementation of E-learning method on the learning outcomes. However, this study particularly contributed to the body of knowledge, because in this study the E-learning was implemented during a distance learning.

IV. CONCLUSION

As a conclusion, the E-Learning Model (X variable) has positive relationship with the Learning outcomes (Y variable), The correlation coefficient was categorized as medium category and there was a significant correlation. E-Learning Model (X variable) can explain 18.4% of the variability of Learning outcomes (Y variable), and E-Learning Model (X variable) has a significant effect on Learning outcomes (Y variable). The indicator of "E-Learning Video Quality" has a major contribution to Learning outcomes (Y variable), greater than the "ICT Literacy" indicator and the "Perception of E-Learning Model" indicators.

The finding of this study informs teachers and schools to create more quality videos as learning media during distance learning. In this study, students can learn independently using video at home without teacher's direct supervision. Teachers and schools should develop a detailed online learning guidance and high quality E-learning media to assist students in distance learning for better learning outcomes. This calls for attention from the school and Ministry of Education and culture to provide vocational high school teachers with trainings in developing E-learning material to support distance learning.

REFERENCES

[1] S. Sutrisno, A. Hasyim, and H. Fitriawan, "Pengembangan Model Pembelajaran Berbasis E-learning Mata Pelajaran Simulasi Digital," Jurnal Teknologi Informasi Komunikasi Pendidikan (Old), vol. 3, no. 2, 2015.

[2] A. Arif, "Evaluasi Pelaksanaan E-Learning pada Proses Pembelajaran Sistem Kelistrikan Siswa Kelas X Jurusan Teknik Otomotif di SMK Negeri 2 Pengasih," Universitas Negeri Yogyakarta, Yogyakarta, 2016.

[3] A.Z. Nu'man, "Efektifitas Penerapan E-Learning Model Edmodo Dalam Pembelajaran Pendidikan Agama Islam Terhadap Hasil Belajar Siswa (Studi Kasus: Smk Muhammadiyah 1 Sukoharjo)," DutaCom Journal, vol. 7, no. 1, 2014.

[4] M. Muharto, S. Hasan, and A. Ambarita, "Penggunaan Model E-learning dalam Meningkatkan Hasil Belajar Mahasiswa pada Materi Microprocessor," Indonesian Journal on Information Systems, vol. 2, no. 1, 2017.

[5] S. Sugiyono, Metode Penelitian Kuantitatif, Kualitatif, dan R&D. Alfabeta, 2017.

[6] J.L. Herlina, "Perception of Understanding Mathematical Concepts Ability in E-Learning Against Learning Achievement," Jurnal Pendidikan Matematik, 2020.

[7] E.B. Soewono, "Pengaruh Motivasi Belajar Terhadap Prestasi Belajar Matematika Menggunakan E-Learning Pendekatan Bimbingan Belajar Berbasis Multimedia," Jurusan Teknik Komputer dan Informatika, Politeknik Negeri Bandung, 2018.

[8] M. Rahmatia, M. Monawati, and S. Darnius, "Pengaruh Media E-Learning terhadap Hasil Belajar Matematika Siswa Kelas IV SDN 20 Banda Aceh," Jurnal Ilmiah Pendidikan Guru Sekolah Dasar FKIP Unsyiah, 2017.