E-Learning as a Response to COVID-19 Pandemic: A preliminary study on College Students

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Abstract. There is a dilemma of accepting the new educational system, that we know as "e-learning" by students within educational institutions. We have to replace face-to-face education with distance education in response to the COVID-19. This form of distance education, e-learning, differs from conventional education: being suddenly, unreadily and forcefully implemented. This study examined and assessed the impact of e-learning to college students, during pandemic. An online survey was conducted amongst some college students in the Mechanical Engineering Dept, at Universitas Balikpapan using a purposive sampling technique. Data were analyzed using Partial Least Square - Structural Equation Modelling (PLS-SEM). The result of this study has confirmed the positive of direct effect variables (attitude, affect and motivation; perceived behavioral intention (ease of use technology, accessibility and cognitive engagement). This study suggests relevant parties to the education system, to improve the implementation of e-learning systems.

Keywords: COVID-19 pandemic, online survey, e-learning

1 Introduction

Since the emergence of the first case of positive COVID-19 patients in Indonesia which occurred in early March 2020, it has brought significant changes to all community activities, especially in this case educational activities. Changes in learning activities do not only occur in elementary, junior high school and senior high school, but also changes occur in learning activities in higher education, college. The Ministry of Education and Culture of the Republic of Indonesia has implemented a policy of learning and working from home since March 2020 [1]. University of Balikpapan (UNIBA) as one of the private universities in Balikpapan, has also responded to this policy by conducting student learning activities on-line / online / in a network [2].

Like other campuses that are not accustomed to conducting online learning, like it or not, starting with compulsion out of necessity, UNIBA must also make changes. Changed in the implementation of the learning system, which initially used a face-to-face system to become long-distance lectures, carried out online.

Apart from being faced with the COVID-19 pandemic conditions, the existence of a new policy from the Ministry of Education and Culture of the Republic of Indonesia, related to the Merdeka Learning program - an independent campus is one of the challenges for universities to make changes. Higher education has the fastest potential impact in building superior human resources. Universities must move faster in order to be competitive, close to the industrial world. Innovations carried out by higher education, both in learning, research and community service

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can only occur in an unrestricted ecosystem. Independent learning is a natural learning process to give freedom from complicated bureaucracy to both lecturers and students, free to choose fields that students like according to their interests and talents, but still in accordance with the rules / policies of each university [3].

This of course requires readiness for UNIBA to participate in making changes, both in the quality of learning and in producing superior human resource graduates. Improving the quality of learning that must be carried out in this pandemic era certainly requires a lot of effort, given the significant changes that have occurred, where both lecturers and students are forced on existing situations and conditions, must carry out learning activities online. Despite the fact, UNIBA has actually started preparing an online E-learning system using the Moodle-based Learning Management System (LMS) and socializing it to lecturers since early March 2019. However, because they still don't see the need for online learning, there are not many students or lecturers who are active in using this system, for online and offline learning (outside the network).

Online learning itself, in addition to having several advantages, for example, learning can be done anytime and anywhere, and can reach a wide range of students. This of course can be a separate opportunity for universities to further optimize online lecture activities. However, online learning also has several weaknesses, namely it requires a stable internet network, adequate infrastructure, and costs that are not small in terms of providing internet quota [4]. In addition, sometimes online lectures conducted by lecturers are accompanied by multiple assignments, which can create psychological pressure for students, stress or even worse, can interfere with the mental development of students [5].

Online learning is effective for theoretical courses, while for practicum courses and practical field work, it is less effective if it is done online [6]. Optimization of the learning process can be achieved if there is an evaluation by the lecturer which is followed up with efforts to improve it at the next meeting [7]. Therefore, for tertiary institutions that are just starting online learning, it is very important to conduct a study to find out the enthusiasm of students in following online learning that has been carried out [8].

Departing from some of the weaknesses mentioned above, it is also necessary to do a special preliminary study for students of the Mechanical Engineering Study Program, Faculty of Industrial Technology. This preliminary study aims to provide an overview of the conditions of online learning that have been carried out in the Mechanical Engineering Dept., Balikpapan University. Then it is hoped that this preliminary study can provide recommendations in the form of input on things that can be done to improve the quality of learning in preparation for the Independent Learning Campus. In particular, in the face of technological advances in the era of the industrial revolution 4.0, the Mechanical Engineering Study Program must continue to improve. For this reason, relevant studies are needed that can be used as guidelines as steps for preparing the next work program.

2 Methods

This preliminary study was done to evaluate the implementation of online learning that were conducted from March to July 2020. This research used a survey method which was conducted online and a purposive sampling technique. Primary data was collected by distributing questionnaires online to 104 respondents consisting of students of the Mechanical Engineering Department, starting from semester 2 to 10. The questionnaire contains several questions about obstacles and student responses to the implementation of online lectures. In addition, secondary data collection was carried out through literature reviews to look for

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relevant previous research references relating to the effectiveness of online learning and readiness to go to an independent campus in other universities in Indonesia.

Primary data was analyzed using Partial Least Square – Structural Equation Modelling (PLS – SEM), with some latent variables and indicators as shown in Table 1. We used Smart PLS 3.0 software. The study's model was contained two level of constructs (upper and lower), thus to conduct the measurement model assessment, each of composite reliability, indicators reliability, average variance extracted, and discriminate validity were tested [9].

Table 1. Latent Variables and Indicators

No	Latent Variables	Indicators
1.	Perceived of Lecturer's Attitude (PT) – X1	• Effort during teaching (PT1) • Ability to start teaching activities (PT2) • Ability to finish teaching activities (PT3) • Ability to complete schedules in one semester (PT4) • Ability to make students understood (PT5)
2.	Perceived of Lecturer's Affect (PS) – X2	• Effective in teaching (PS1) • Good in deliver the material and well managed (PS2) • Able to generate students interest (PS3) • Effective from the aspect of teaching time (PS4) • On schedule (PS5) • Helpful (PS6) • Assessment is given on time (PS7) • Assessment is givent objective (PS8)
3.	Perceived of Lecturer's Motivation (PM) – X3	• The objective of learning is well informed (PM1) • The clourse material is well managed (PM2) • The clourse material us suitable with current needs (PM3) • Task load suit with student ability (PM4) • Active involved student during teaching learning process (PM5)
4.	Attitude (ATT) – Y1	• Attractive (ATT1) • As needed (ATT2) • Interested (ATT3) • More comfort (ATT4) • Easier to understand (ATT5) • Fully supported (ATT6)
5.	Behavioral Intention (ITT) - Y2	• Intention to join virtual/online learning (ITT1) • Prefer online rather than offline (ITT2)

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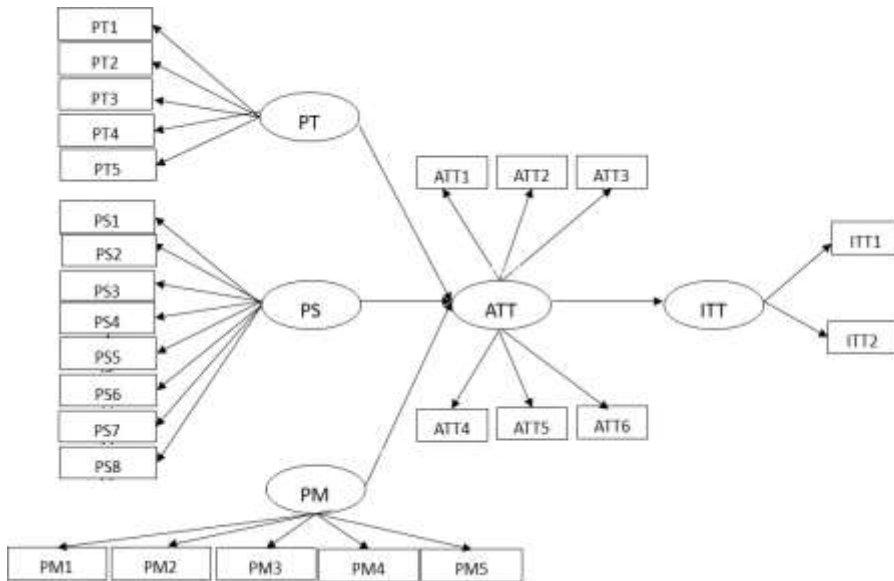
Fig. 1. Intervening Model

The equation of regression Intervening Model as shoen in Figure 1, for exogenous latent variable (reflective) outer model, can be seen in equation (1), (2) amd (3).

$$x_1 = \lambda_{x1}\, \xi_1 + \delta_1 \tag{1}$$
$$x_2 = \lambda_{x2}\, \xi_1 + \delta_2 \tag{2}$$
$$x_3 = \lambda_{x3}\, \xi_1 + \delta_3 \tag{3}$$

The equation of regression Intervening Model, for endogenous latent variables (reflective) outer model, can be seen in equation (4) and (5).

$$y_1 = \lambda_{y1}\, \eta_1 + \varepsilon_1 \tag{4}$$
$$y_2 = \lambda_{y2}\, \eta_1 + \varepsilon_2 \tag{5}$$

The equation of regression Intervening Model, for inner model, can be seen in equation (6) and (7).

$$\eta_1 = \gamma_1\xi_1 + \gamma_2\xi_2 + \gamma_3\xi_3 + \zeta_1 \tag{6}$$
$$\eta_2 = \beta_1\eta_1 + \beta_2\, \xi_1 + \beta_3\, \xi_2 + \zeta_2 \tag{7}$$

3 Result and Discussion

Based on the result of analyzing data using Partial Least Square – Structural Equation Modelling (PLS-SEM), it is found that during validity convergent test at the beginning (1st simulation) there are some indicators in outer loading which are less than 0.7. It means that we

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have to do a re-estimation the indicators by eliminating a value that less than 0.7 (ITT1 and ATT1, ATT3, ATT6). And finally, after some iterations, it s found that all outer loading parameters are more than 0.7 and all Average Variant Extracted (AVE) values are more than 0.5, as shown in Figure 2.
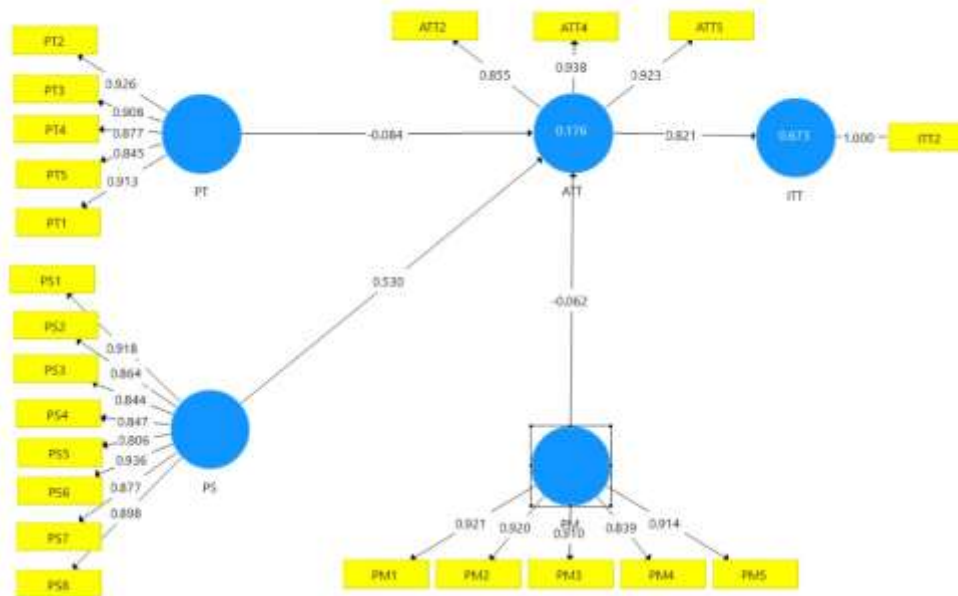

Fig. 2. Result of Validity and Reliability Test Model Intervening

The cross loading value shows the magnitude of the diversity of the indicators both on the latent variable and on other latent variables. A good cross loading value between AVE indicators on all variables is greater than the correlation between latent variables, as shown in Figure 3 (a). So it can be concluded that the indicators used to measure each variables are valid. To measure the reliability, we can use the Cronbach Aplha amd composite reliability. As shown on the Figure 3 (b), Cronbach Aplha more than 0.6 and composite reliability more than 0.7, so it can be concluded that the variables used in this study are reliable.

Inner model evaluation, can be calculated using formula (8), it means that overall the independent variable (X) which consists of perceived lecturer's affect and motivation, attitude, and cognitive engagement can explain 73.06% of interest in online learning ($R_1 = R_{ATT} = 0.176$), behavioral intention ($R_2 = R_{ITT} = 0.673$) and the rest is explained by other variables.
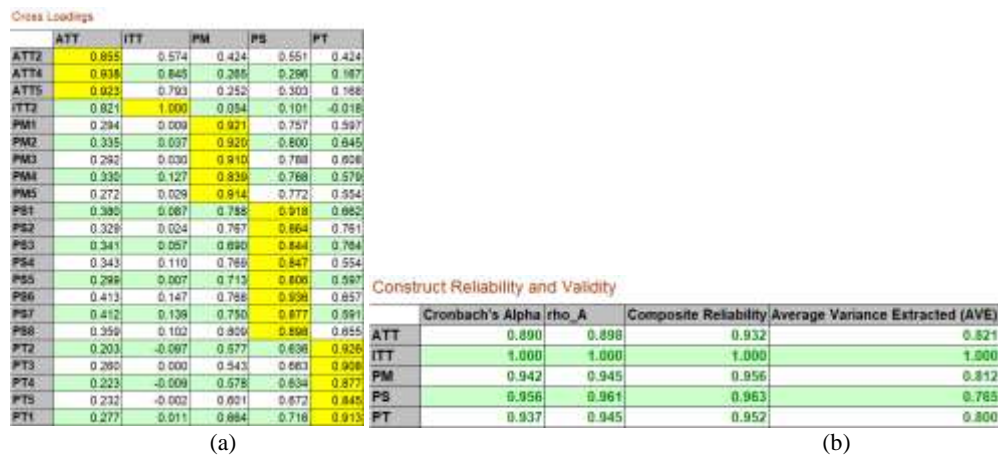
$$Q^2 = 1 - (1 - R_1^2)(1 - R_2^2) \tag{8}$$

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(a)   (b)

Fig. 3 Quality Criteria - Discriminant Validity & Reliability Test

The result of hypothesis test can be seen in Figure 4, that provide information of significance. variable has a significant effect if p-value is smaller than alpha (0.05), and T statistic > 1.96.
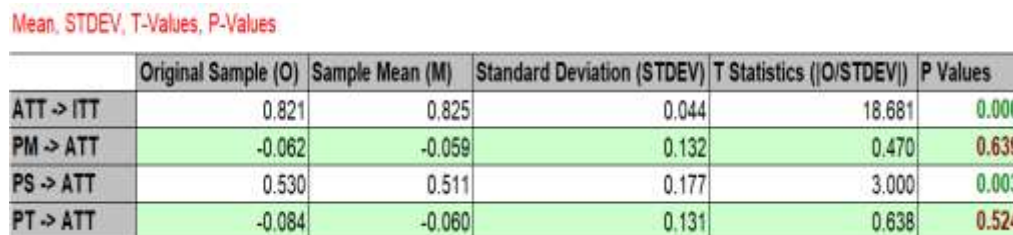
Mean, STDEV, T-Values, P-Values

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
ATT -> ITT	0.821	0.825	0.044	18.681	0.000
PM -> ATT	-0.062	-0.059	0.132	0.470	0.639
PS -> ATT	0.530	0.511	0.177	3.000	0.003
PT -> ATT	-0.084	-0.060	0.131	0.638	0.524

Fig. 4 Hypothesis test

H0: Variables has no effect
H1: Perceived of lecturer's affect and motivation (PT) has affect to interest in online learning (ATT)
H2: Perceived of lecturer's attitude (PS) has affect to interest in online learning (ATT)
H3: Perceived of cognitive engagement (PM) has affect to interest in online learning (ATT)
H4: Interest in online learning (ATT) has affect to behavioral intention (ITT)

Intreprtation based on the test results as shown in Figure 3, for ATT and ITT, it shows that the p-value is smaller than alpha (0.05), so H0 is rejected. It means there is a significant influence between the interest in online learning (ATT) variable on behavioral intention students (ITT) to continue using online as learning media during pandemic. For PM and ATT, it shows that the p-value is greater than alpha (0.05), so it fails to reject H0, which means that there is no significant effect of the perceived cognitive engagement (PM) variable on the student interest in online learning (ATT). For PS and ATT, it shows that the p-value is smaller than alpha (0.05), so H0 is rejected. There is a significant influence of the perceived of lecturer's attitude (PS) on student interest in online learning (ATT). And the last one, for PT and ATT, it shows that the p-value is greater than alpha (0.05), so it fails to reject H0, which means that there is no significant

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effect of the variable perceived of affect and motivation (PT) on student interest in online learning (ATT).

This research has been followed by similar initiatives (such as distance work and distance learning) that boost social distancing to reach the highest degree of caution [10]. This empirical study confirmed that college students are suffering from psychological distress due to ineffective e-Learning systems [14]. Students have been facing various problems related to depression anxiety, poor internet connectivity, and unfavorable study environment at home. Although a substantial proportion of students are using digital platforms for learning, many of them face huge challenges in online study. Our study has suggested the following recommendation to the government, policymakers, and institutional authorities. to continue the learning process during this pandemic [11]. The disruption and transformational implications of the pandemic have been discussed within a number of perspectives, where articles have addressed how organisations have needed to change their operations to survive during the crisis and how these changes in working practice have impacted workers and wider stakeholders [12]

It is important to remember that online or blended instructional delivery has to be a creative and flexible emergent response to the particular crisis, and requires more reflection and communication than any of the previous educational experiences because it is unique to the emergency circumstances. The findings showed that motivation, self-efficacy, and cognitive engagement decreased after the transition, and only the use of technology increased. This would be the most effective way to create strategies and resources so that all students could continue their education. Furthermore, it is imperative to understand how COVID-19 affected professors' teaching styles and/or strategies. The professors' experience may also be interconnected with the students' learning experiences. Further research is required to test if a short training about self-efficacy and motivation strategies for students can improve their cognitive engagement during online learning. Awareness may encourage students to motivate themselves [13].

The governments must ensure the availability of reliable communication tools, high quality digital academic experience, and promote technologyenabled learning for students to bridge the disparities originated in the education system before and after COVID-19 catastrophe which is also inevitably necessitated for uninterrupted learning. Few steps should be accounted in the wake of this pandemic; to develop such a curriculum that reflects the perceptible change in the content knowledge and learning experience of students as well as enable them to think critically [15].

4 Conclusion

This study confirmed the positive direct impact to the variables lecturer's attitude on student interest in online learning and behavioral intention to continue using online learning as one of learning media during pandemic. This study suggests relevant parties to the education system, to improve the implementation of e-learning systems, such as internet bandwidth, so students can easily access to e-learning, minimize delay time, stable connection and provision of internet quota to lecturer and students. Since less human to human interaction, lecturer has to find creative teaching technic to deliver the material in the lecture.

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