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24 Online Learning Transformation Technology in Higher Education: Challenges & Strategy

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Abstract

35 The presence of information technology has a very important role in everyday human life both in business and in managing organizations as well as in education. The current education budgeting without utilizing information technology will experience significant obstacles, especially in the midst of the Covid 19 pandemic which attacks almost all parts of the world. Technology-based learning solutions must be able to present and strengthen interactions between teachers and students, with an online system so that the learning process continues as expected by the general public. Therefore, technology-based learning solutions must be able to provide precise and fast solutions when students need direct learning, there can be interactions between teachers and students online. Therefore, this paper wants to test how student perception and IT trust can influence Benefit. The econometrics model in this study is the effect of student perception and trust on benefit. This study uses primary data with 216 respondents. 19 The analytical method in this study is Robust Least Squared Model. The results of the analysis of this study conclude that an increase in student perception and IT trust can significantly bring increase in benefit. A unit increase in student perception will increase the benefit by 0.669, and then a unit increase in trust will increase the benefit by 0.343. In this will discuss about the strategy how the organizations shall resilience especially in education in the pandemic Covid19 situation.

Keywords:

student perception, IT trust, pandemic Covid19, strategy

1. Introduction

8 Since the Corona Virus Disease 2019 (COVID-19) pandemic first occurred in the city of Wuhan, China at the end of December 2019. This virus spreads very quickly and has spread to almost all parts of the world, including Indonesia, in just a short time. So the WHO on March 11, 2020, declared this outbreak a global pandemic. This has led several countries to establish policies to impose lockdowns in order to prevent the spread of the corona virus. This Covid-19 disease has disrupted the normal learning process, which is done conventionally. Due to the necessity of physical distancing, we are required to find a solution to answer these problems. Online learning is an alternative of higher educational management as one of options that can solve this problem as transformation technology services (Argawal, 2020, Purba, 2014). The research objective was to obtain an overview of the implementation of online

learning service delivery in a Higher education as an effort to reduce the spread of covid-19 in the tertiary institutions. The research respondents were students of a big university in Jakarta and Tangerang, Indonesia. Data were collected by interview via Microsoft Teams cloud meeting by distributing to respondents. Data analysis was performed using the statistical application Stata with latest version in describing the results (Budiono & Purba, 2019, 2020). To prevent the spread of Covid-19, WHO and the government have appealed to physical distancing that can prevent the spread of the Corona virus. Therefore, face-to-face learning that gathers a large number of students in the classes were reviewed for implementation. Lectures must be held in this scenario which prevents close contact between lecturers and students as well as lecturers during the teaching and learning process.

The government policy on this matter has been effective in several provinces in Indonesia since Monday, March 16, 2020. However, this does not apply to several schools in each region. These schools are not ready for online learning systems, which require learning media such as cellphones, laptops, or computers. The online learning system (in a network) is a learning system without face to face directly between teachers and students but is carried out online using the internet network (Purba, Samuel, Purba, 2020, Simbolon, et al, 2020, 2020).

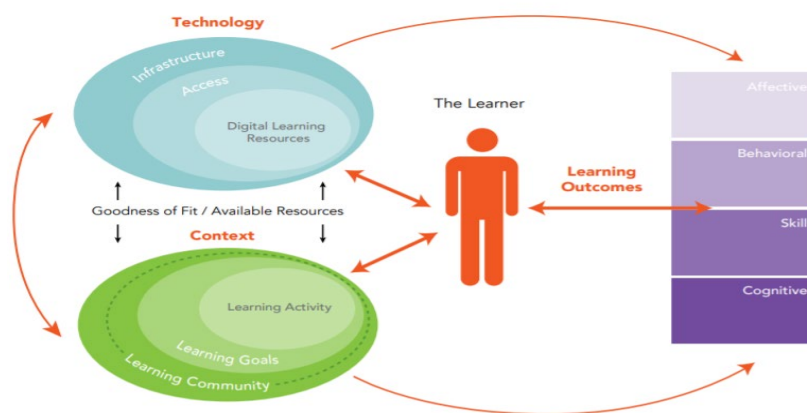


Figure 1. Digital Learning transformation Ecosystem (Hammond, 2014)

As displayed in figure 1 by using the digital transformation, it can be described the in a risky situation, as well as preventing additional losses, namely reducing the learning crowd by using the main means of access and transfer of technology-based information (Purba & Panday 2014, Purba, 2014, Kamaludin & Purba, 2015). The good news is research shows that if students at risk gain direct access to appropriate technology used in a prudent manner, they can benefit substantially in learning and technological readiness (Hammond, et al 2016, Aileen, et al, 2019, Adirinekso, et al. 2020)

2. Literature Review

There are a number of definitions of transformation e-learning. In general, this definition refers to the same thing, the use of information and communication technology for learning in education or training. The essence of e-learning includes the means of delivering learning (Stockley, 2010), access to learning resources anytime and anywhere (Holmes & Gardner, 2006), and bridging synchronous and asynchronous learning activities (Naidu, 2006). e-Learning can also be seen as an innovative approach in delivering learning that has been well designed, learner-centered, interactive and can facilitate learning for anyone, anywhere and anytime by utilizing the attributes and sources of various digital technologies together with materials teaching is another appropriate learning environment for learning that is open, distributed and flexible (Khan, 2005). e-Learning is not just a means of conveying learning, but is furthermore as an effort to create learning experiences (Horton, 2006).

The transformation of e-learning itself has the following characteristics (Mayer, 2011): 1. learning materials in accordance with learning objectives: 1. use a variety of learning methods to help occurrence of learning such as examples and exercises; 2. use appropriate media elements such as visuals and narrative to support the

material and method; and can be done with guided learning strategies (instructor-led synchronous learning) or independent learning (self-paced individual study asynchronous learning).

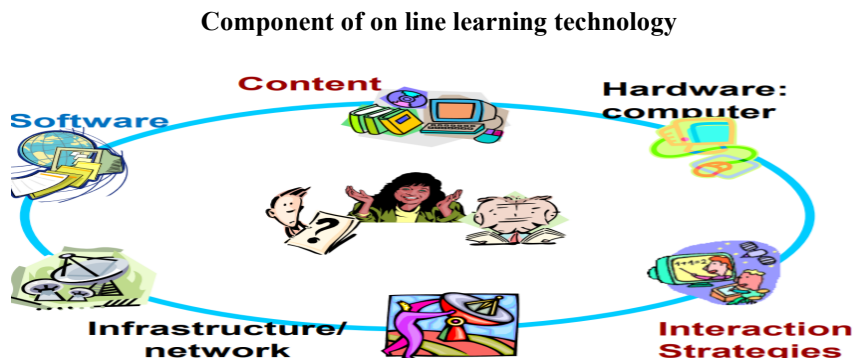


Figure 2. Components E-Learning Technology (Ristek Dikti 2019)

Referring to figure 2 above, shows that the transformation of learning technology must meet the application of software and content, as well as hardware, networks as infrastructure. Then, the development of New Literacy (data, technology, humanities) and new skills & subjects: coding, big data, artificial intelligence, e-commerce, etc. Promote Extra-curricular activities to develop leadership, collaborative teamwork. Facilitating entrepreneurship & internship with industries (OJK, 2020, Ristekdikti, 2019, Purba, 2014, Noviantoro, et al. 2020)

Learning is social □ Connected □ Communication □ Collaboration □ Creation “Learning (and teaching, such as it is) is not a process of communication but rather, a process of immersion. Put loosely, it suggests the idea of teaching...through the creation (or identification) of an environment into which a learner may be immersed.” (Holmes, 2005a)

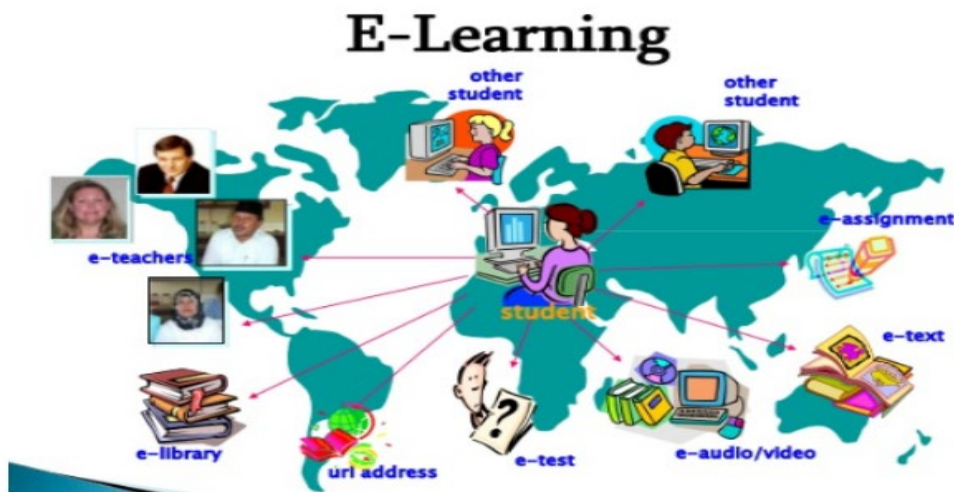


Figure 3. Components of Proses E-Learning

Fig. 3 discuss about component and facilities in E-learning. A good teaching and learning process according to Albert and Canale (1996) must have the ability that is more than just establishing two-way communication. These capabilities include: a) delivery of material in various forms of data and can be linked to various other sources of information (hypermedia) b) registration of students online so that it can be done at any time c) identification of the next access for students who have already registered d) tracking of learning progress e) evaluation f) flexibility of control over learning flow etc. Evaluation problems become complicated in the WBI

program. As with any other distance learning program, there is no way to guarantee that the people sitting working on the problems at a computer far away in the world are students who are enrolled and still active at the institution.

Table 1. Classification continuum e-learning transformation

Adjunct	Mixed/Blended	Fully Online
<p>Continuing traditional learning processes, but enhancing them or extending them beyond classroom hour with daring resources particularly using computer mediated communication (CMC).</p>	<p>Becoming as integral part of curricula. Mixing delivery of content, CMC, or daring collaboration with face to face session. Determining the appropriateness of daring or face to face to deliver different aspects of curricula.</p>	<p>All elarning interactionsn takes place daring and all learning materials delivered daring, e.g. CMS, streaming video, audio hyperlinked course materials, text and images.daring collaboration is the key features of this model.</p>

Source: Noirid, 2007

The table 1 provide the transformation of teaching and learning proses from adjunct, mixed or blended learning until fully on line as happened todays era. Also describe that Fully Online Technology; namely the use of transformation technology with learning interactions and delivery of learning materials that occur fully online (Simbolon, et al, 2020a, Simbolon, et al, 2020b). There is no traditional learning at all. The main characteristic of this model is the occurrence of learning by collaborating internet technology with online learning content giving the service quality toward the students accordingly (Indra, et al 2019, Purba, Hery, Widjaja, 2020, Purba, 2015, Chaeruman,).

Therefore; a country needs to implement an appropriate measurement framework to assess readiness for coming changes and they also need a platform for modern ICT solutions to facilitate local collaboration with small and medium to large business ecosystems to adopt the evolving expectations set by the key players global industrial production value chain (Nick & Pongrácz, 2016, Purba, et al, 2019, Purba, 2015). Talking about Industry 4.0 is basically related to new industry revolution or new innovation and focuses on the integrated use of state-of-the-art information technology and operational technology such as; IoT, cyber physical systems, big data, and advanced data analytics and decision making methods, artificial intelligence and robotics, cloud and haze calculations, virtual and augmented reality and others (Batchkova, 2017, Tan, et al, 2019, Purba, 2018, 2014) as shown in Figure 1.



Figure 4. Basic collaborated technologies transformation

When viewed from a technical perspective, the context of Industry 4.0 can be the development of digitalization and automation of information and communication technology with the creation of digital value chains' (Oesterreich and Teuteberg, 2016). Thus there is no doubt that the term 'Industry 4.0' is a trend in the development of digital technology that has attracted the interest of practitioners and community academics (Liao et al., 2017; Purba, et al 2019; Fatorachian and Kazemi, 2018). The presence of Industry 4.0 with the support of the Internet of Things (IoT), cloud and cognitive computing, the availability of digital infrastructure and strong cyber physical system applications can collect, transfer, and understand Big Data (Zhou et al., 2015) on intelligent industrial development that is capable of meet fluctuating market demands with high quality accuracy production.

30 That is why industry 4.0 is widely used in the manufacturing industry such as the car industry and by other kinds of companies. Now industry 4.0 has been in our midst as a series from the previous industrial period, called Industry 1.0, 2.0 and 3.0 (Pereira and Romero, 2017). As a result of the transformation of a series of opportunities according to the demands of the era which was previously defined as a manufacturing model by proving the operational processes and targets that are most suitable and able to face the associated challenges (Almada-Lobo, 2016; Pereira and Romero, 2017).

14 The core principles of Industry 4.0 lay the foundations for the Industry 4.0 manifesto published in 2013 by the German National Academy of Science and Engineering. According to Kagermann (2011), "Industrie 4.0 is a new level of value chain organization and management throughout the product life cycle." 1) Production needs to adapt to low, medium and high demand by varying product types; 2) Self-tracking and recognition of parts and products through intelligent machines; 3) Better interaction between Human Machine Interface; 4) Optimization of production based on communication tools for the Internet of Things (IoT); 5) Radical changes in business models that contribute to changing the form of interactions with the value chain (Santoso, et al. 2017, humas Sekneg 2020).

The Fourth Industrial Revolution and transformation represents a momentum for decision-makers from the public and private sectors to be faced with a new set of uncertainties regarding change in many fields (Purba, 2002, Purba and Panday, 2014). With technology enabling efficient computing with the digital revolution, transforming the physical world through robotics and new production methods; enhances human physically, mentally, and experience; and penetrate the environment to facilitate greater interconnectivity, monitoring, and efficient use of the resources available for use. Advanced technology such as; The Internet of Things, artificial intelligence, wearable, robotics and additive manufacturing - are spurring the development of new production techniques and business models that will fundamentally transform global production in a number activities from businesses till the teaching and learning service delivery (Kearney, 2018, Purba and Panday 2015 and Panday and Purba, 2015) .

3. Methodology

Based on the problems and possible causal relationships between benefit (BE) with student perception (SP), Trust (TR) with student perception (SP) and ease of use (EOU) with student perception (SP), then we compile an research model as outlined in the following figure.

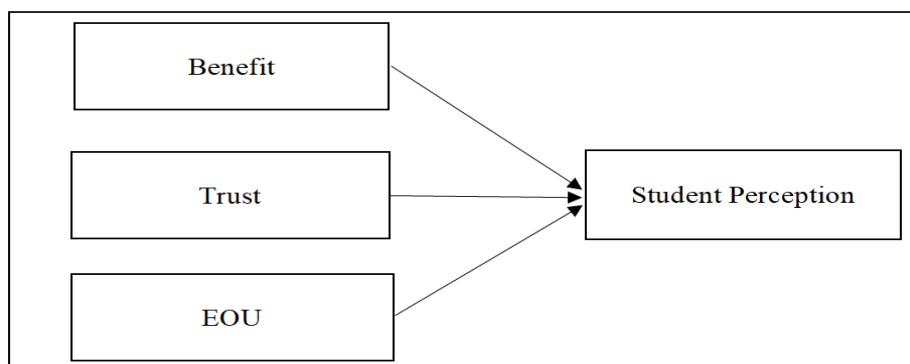


Figure 5. Economics Model.

Next, the analysis tools as figure 5 above, 4 used are the econometrics and statistics methods to test the models and their respective parameters. The analysis tools used are the econometrics and statistical methods to test the model and their respective parameters (Greene, 2018). The unknown parameters of the stochastic relation $y_i = x_i'\beta + \varepsilon_i$ are the objects of estimation. It is necessary to distinguish between population quantities, such as β and ε_i , and sample estimates of them, denoted b and e_i . the population regression is $E[y_i|x_i] = x_i'\beta$, whereas authors estimates of $E[y_i|x_i]$ denoted

7
$$\hat{y}_i = x_i'\beta \tag{1}$$

The disturbance associated with the i -th data point is

$$\varepsilon_i = y_i - x_i'\beta \tag{2}$$

7 For any value of b , we shall estimate ε_i with the residual

$$e_i = y_i - x_i'\beta \tag{3}$$

From the definitions, so The basic framework for analyzing cross section data is a regression model of the form (Greene, 2018)

$$y_i = x_i' Economics Model. \beta + \varepsilon_i = x_i'\beta + e_i \tag{4}$$

This study uses cross section data which includes variable Benefit (BE), ease of use [EOU], trust [trust] and students perception [SP]. 20 The purpose of this study was to analyze the influence of the variables BE, EOU and TR on SP. The following is an explanation of the variables used in the economic model. Based on the basic framework of this regression model, the applied regression model for this study is

$$SP = \rho_0 + \beta_1 BE + \beta_2 TR + \beta_3 EOU \tag{5}$$

Subsequently a calculation is made by estimating the suitability of the econometric model that is 25 the magnitude of the R-squared and F-test with a significance level of 5%.

Based on the theoretical estimates for each parameter to achieve the desired model conditions in mathematical equations are as follows.

$$\beta_1 = \frac{\partial SP}{\partial BE} > 0, \beta_2 = \frac{\partial SP}{\partial TR} > 0 \text{ dan } \beta_3 = \frac{\partial SP}{\partial EOU} \tag{6}$$

Based on the calculus equation, the partial test of each independent variable is one way. BE affects SP in the same direction, Trust also affect SP and EOU affects SP in the same direction. Thus, the value of each parameter β is expected to be positive.

15 While the partial testing of each independent variable on the dependent variable is carried out by t-test with a significance level in this study amounting to 5%.

By using the null hypothesis (H_0) and alternative hypothesis (H_1) for partial testing on the β_1 parameter as follows:

$$H_0 : \beta_1 = 0, \text{ BE does not affects Student Perception}$$

$$H_1 : \beta_1 > 0, \text{ BE affects Student Perception}$$

The null hypothesis (H_0) and the alternative hypothesis (H_1) for partial testing on the β_2 parameter are as follows

$$H_0 : \beta_2 = 0, \text{ Trust does not affects Student Perception}$$

$$H_1 : \beta_2 > 0, \text{ Trust affects Student Perception}$$

The null hypothesis (H_0) and the alternative hypothesis (H_1) for partial testing on the β_3 parameter are as follows

$$H_0 : \beta_3 = 0, \text{ EOU does not affects Student Perception}$$

$$H_1 : \beta_3 > 0, \text{ EOU does not affects Student Perception}$$

4. Result and Discussion

Based on the running data in student perception (SP) are influenced by independent variables in the model. So, using the Robust Least Square Regression Model will get the following results:

Table 2 Result of Linear Regression for Student Perception (SP).

Linear regression		Number of obs	=	216
		F(3, 212)	=	189.50
		Prob > F	=	0.0000
		R-squared	=	0.6013
		Root MSE	=	1.5755

SP	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]
BE	.5473466	.0580634	9.43	0.000	.4328911 .6618021
TR	.1213526	.0836019	1.45	0.148	-.043445 .2861501
EOU	.1210455	.0379013	3.19	0.002	.0463338 .1957573
_cons	1.771856	.7067763	2.51	0.013	.3786461 3.165065

Source: Data Processing.

Based on the R-squared: 0.60 and F-test: 189.50 with probability of 0.000 below the significance limit value with a probability of 5%, then this model has fulfilled the goodness of fit. Therefore, all these variables significantly influence student perception for using the digital technology transformation during the pandemic era.

Furthermore, the partial analysis shows that the results of the t-test on the variable benefit, and ease of use reject the null hypothesis, but variable trust shows the results of the t-test in significant requirement 15%. All coefficients from independent variables toward the dependent variable have the positive direction. From the calculation test shows therefore, the student and lectures, professors in the university eager to use digital technology transformation. The value of this positive coefficient parameters supports to the theory. Every 1 unit increase in level of benefit will increase the student perception by 0.55-unit level in using the technology transformation during the time of learning proses during the pandemic era. A unit increase in level of trust will increase the student perception by 0.12 unit level in Likert Scale. A unit increase in level of easy of use will increase the student perception by 0.12 unit level in Likert Scale. The parameter or coefficient variable benefit is largest than others. Therefore, variable benefit has influenced on student perception dominantly.

10 5. Conclusion

21 From the results and discussion 13 of the above research regarding the use of online learning applications during the Covid-19 pandemic, it can be concluded that the transformation of online learning technology is the best choice. This happened 29 in order to avoid the rapid spread of the Corona virus which has suffered many victims around the world. The presence of the technology transformation has benefit toward the students' perception during the pandemic. The technology application provided by the institution is also useful because it is easy for respondents to use in daily learning activities. The use of learning with transformation technology online will be very effective if it fulfills the essential components in the learning process. Its use must be discursive, adaptive, interactive and reflective with elements that will be very well integrated with the learning environment so that it can become an integrated online learning.

This technology certainly fulfills the components of the digital learning ecosystem transformation so that it can accommodate flexible learning styles so that the learning experiences of students and lecturers can create a comfortable and dynamic feeling. Even though it has several shortcomings, namely it is difficult to connect to the internet network so that students find it difficult to actually stay in online classes making it difficult for them to understand the subject matter.

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Biographies

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