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Measuring E-Learning Effectiveness at Indonesian Private University

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ABSTRACT

Telkom University was founded in 2013, as a result of merging four existing higher education institutions in Indonesia. One of their study programs is Master of Management (MM) program, which also facilitates full-time workers to participate in the program. Since their physical presences are sometimes unfulfilled, an e-learning program was implemented for the first time in 2014. This research was conducted to acknowledge the phenomena that Master of Management is the most favorite study program at Telkom University. The census data collection was conducted to each participant of Master of Management (MM) program, afterwards the problem-solving method used multiple linear regression. The independent variables are application-specific computer self-efficacy, Perceived usefulness, Interaction, and Social presence, while the dependent variable is e-learning effectiveness. The result showed that each independent variable effects on the dependent variable significantly. Independent variables simultaneously have significant influence on the dependent variable. Using percentage analysis technique, participants in distance learning programs at Telkom University argued that the l of implementation of the elements of distance learning 76%-88% are in the good-very good category. The elements of distance learning effect significantly influence the e-learning effectiveness at Telkom University.

Introduction

The efforts to improve the education system in Indonesia require the use of information and communication technology, as well as involve the relevant parties such as students, faculty, administrators, staff and other parties to use computer

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applications. Due to run the learning process involves tools such as computers and other online materials.

Telkom University, or abbreviated Tel-U is a private university in Indonesia. Its main campus is located in Bandung regency, West Java, precisely in the compound of Bandung Technoplex. It also has other campus buildings located in the area of Gegerkalong Hilir, north of Bandung, in the office complex PT. Telkom (Telkom Innovation and Development Center and Telkom Corporate University / Telkom Training Center). Telkom University is a result of merging four educational institutions that are under the organizing body of Telkom Education Foundation (YPT). The four merged institutions were namely Telkom Institute of Technology (IT Telkom), Telkom Institute of Management (IM Telkom), the Polytechnic Telkom, and the High School of Art and Design Indonesia Telkom (STISI Telkom).

This research is focused on Master of Management (MM) program at Telkom University for a reason that it is the most favorite study program at Telkom University. Aside of regular students, the program facilitates full-time workers to participate in the program. To support them during their physical absences, the e-learning program was implemented for the first time in 2014. The use of ICT in distance education course must be perceived usefulness for students to apply their learning. Telkom University as a college applying distance education is expected to increase the usefulness of learning so as to improve the performance and satisfaction of college students, especially for the MM program.

The electronic learning (e-learning) system is characterized by the exchange of information between the parties involved in the system. As an example for teaching materials uploaded, of course will be used as material for online discussion so that the interaction between students and faculty. It is intended is not to support the effectiveness of distance education.

This method is progressively being chosen among students in the higher education institutions. Allen and Seaman (2008) indicated that online enrollments have been growing significantly faster than the higher education enrollments in general. Here, a cycle of learning consists of externalization (of tacit knowledge), sharing, discussion, refinement and then internalization. Neglect of task design tends to have two consequences –either students flounder around unproductively and unhappily, not knowing what is expected of them, or tutors find themselves spending much more time than they can afford trying to animate online discussions (Goodyear, 2002).

In addition, social presence is also considered as one of the factors supporting the achievement of the effectiveness of distance education. Just like the conventional education that requires face-to-face meetings, distance education also requires a

social presence. Social presence is needed to keep the learning environment becomes more active and socialize.

The problem identifications in this study are as follows:

1.   How much the computer efficacy influences the effectiveness of the e-learning of MM program at Telkom University
2.   How much the perceived usefulness influences the effectiveness of e-learning of MM program at the Telkom University
3.   How much students' interaction influences the effectiveness of e-learning of MM program at the Telkom University
4.   How much the social presence influence the effectiveness of e-learning of MM program at the Telkom University

Theoretical Framework

E-Learning is a type of learning that allows the transfer of learning materials to learners by using the internet, intranet, or other computer network media (Davis, 1989). Distance education using technology-based module, by utilizing information and communication technology, such as computers connected to the Internet, television, or radio. Learning technology utilizing internet / intranet / extranet, known as the World Wide Web (www) (Warsita, 2011).

There are three types of e-learning, namely: learning Asynchronous, Synchronous learning and Blended learning. Asynchronous learning is learning between teachers and students with there is a time lag. E.g. teaching materials uploaded to the internet or CD-ROM, online discussion groups, and email (Kaplan-Leiserson, 2000). Synchronous learning is learning that real time (real time). Teachers and students logged into the system simultaneously and communicate directly with each other. Interactions can take the form of audio, video conferencing, Internet telephony, and two-way live broadcast. Blended learning is learning that combine aspects of online and face to face.

A research from the Faculty of Social and Political Sciences, University of Airlangga explained that Hexagonal E-Learning Assessment Model (Helam) is the latest model to evaluate the implementation of E-Learning. Helam has six dimensions, including supporting factors, the perspective of students, faculty attitude, quality systems, quality of information (content), and quality of service (Ningrum, 2011). According to Selim (2007), there are several factors that need to be considered to identify and quantify the critical success factors (Critical Success Factor / CSF) E-Learning applications of perceptual learning. There are four CSF identified and measured, namely: the characteristic results showed that the students assume the characteristics of the instructors as the most important factor in the success of E-

Learning, followed by the IT infrastructure and support the university. Learner characteristics are regarded as the last factor to the success of E-Learning.

Information systems evaluation model was first developed in 1992 as a model of evaluation of information systems. The success of information systems depends not only on one factor, but there are many factors that are related to each other that the quality system (system quality), quality information (information quality), utilization (use), user satisfaction (user satisfaction), the impact of the individual (individual impact), and the impact of the organization (organizational impact).

This research adapts the model Effectiveness of E-Learning (Johnson, 2008). The model was chosen by some consideration after comparing with other evaluation models. Table 1 illustrates some of the considerations that have been adjusted to the conditions at Telkom University through interviews with sources comprise both staffs and lecturers.

Table 1. Comparison of *E-Learning Evaluation Models*

No.	E-learning condition at Telkom University	HELAM Model	CSF E-Learning	IS Success Model	E-Learning Effectiveness Model
1.	Involves computers as additional supporting devices	✓	✓	✓	✓
2.	Comprises *IDEA (Integrated Distance Education Application)* as a system that functions as storage for educational contents.	✓	✓	✓	-
3.	Possesses decent exchange of information between discussion groups established by different involved	-	-	-	✓

	parties.				
4.	Improves class performance and satisfaction routinely by evaluating the e-learning program.	-	-	-	✓
5.	Enforces social presence to maintain the active study environment, especially in review process in the very end of the class.	-	-	-	✓

From the table above, it appears that the model of the e-learning evaluation is the most suitable and fulfilling to measure the e-learning conditions at Telkom University. So that the elements contained in the model was adapted and used as a variable in this study. For more details, variables in this study are as follows:

1. Application-specific Computer Self-efficacy

With the delivery methods of teaching and interaction through information technology, it is required for all parties involved in distance learning is having knowledge of information technology to gain maximum advantage in its use. Computer literacy can be defined as the belief that one has the ability to operate computers that are affected by motivation and behavior (Bandura, 2006). Expertise in using computer applications are believed to affect the success of learning in distance learning methods, because all devices in distance learning related to information technology.

2. Perceived usefulness

According to Davis (1989), perceived usefulness is the degree of a person's belief that the use of a system can improve job performance. In the distance learning, technology can provide some usefulness in several respects: first when technology providing wide-ranging access to students to access the information, either in quality or quantity. The second is when the technology can help students in organizing and controlling the learning process. So that students can improve the flexibility and convenience in the following study. Distance learning provides extensive flexibility in teaching and learning process.

3. Interaction

Interaction is an exchange of information that occurs in the distance learning system. Interaction enables people to share information, to receive feedback, and easily evaluate the achievement of progress (Hiltz, 1994). For example on asynchronous learning, teachers will upload learning materials, in some time the students will respond to the learning materials, reviewing existing response resulting in throwing the response that makes this discussion more depth and breadth. While in synchronous learning, teachers will immediately get a response directly from the students to the learning material and can directly perform the evaluation as well as answers to the students' responses. The more often students interact in the system can improve the sharing of information in a class, forming a positive classroom environment.

4. Social presence

To keep learning success, one of the things that must be considered is the environment in which, the extent to which the environment can boost learning success. According to Short (1976), social presence is the degree to which we as individuals perceive others as a private individual and the interaction between them in perspective as a relationship of mutual reciprocity. In the distance learning, interaction and social communication using a computer is an important issue behind the success of online learning. The greater the person's perception of personal, sensitive, warm, and sociable a communication medium, the greater the social presence created. In this study, the authors focused social presence as the extent of students' perceptions of technology to facilitate learning so that the learning environment was sociable, caring, family, and active.

5. The effectiveness of Distance Education

Effectiveness of distance education in the study viewed from three aspects, namely the absorption of the lecture material, lectures

Formulation of research hypothesis as follows:

1.   The computer efficacy element influences the effectiveness of e-learning of MM program at the Telkom University
2.   The perceived usefulness element influences the effectiveness of e-learning of MM program at the Telkom University
3.   The social interaction elements influence the effectiveness of e-learning of MM program at the Telkom University
4.   The social presence element influences the effectiveness of e-learning of MM program at the Telkom University

Result And Discussion

The method used in this research is descriptive method, according to Wagiran (2013), in the sense of extraordinary descriptive study called survey research. Survey research is research by gathering information from a sample by asking through questionnaires or interviews that will illustrate various aspects of the population. Based on the method used in this study the variables to be studied in detail further in the operationalization of variables, with the operationalization of the variables are known indicators that will be used as the basis for the manufacture of the questionnaire. After preparation of the questionnaire is completed, the data collection is conducted.

The population in this study were all students of the Master of Management (MM), based on years of entry ie, class of 2013, 2014, and 2015 which followed the distance education program totaling 116 people, consisting of 26 students in the class of 2013, 57 students for the workforce 2014, 33 students in the class of 2015. The sampling method used in this research is census method, i.e. all members of the population sampled. Of the total population of 116 students, there were 104 respondents who returned the questionnaires

The questionnaires used Likert scale to measure attitude, opinion ad perceptions of the respondents. The weight of the scale ranges from 5 (strongly agree) to 1 (strongly disagree). The table below shows the descriptive analysis:

Table 2: Respondents' Responses

Variabel	Percentage	Category
Computer efficacy	88%	Very Good
Perceived usefulness	77%	Good
Interaction	81%	Good
Social Presence	80%	Good
E-learning effectiveness:		
Course material	79%	Good
Lecture performance	78%	Good
Satisfaction towards lecture	76%	Good

Normality test is required in addition to the use of parametric statistical data should be in the form of interval or ratio. A good regression model is one that has a normal distribution of the residual value. It is therefore necessary normality test for residual values, if the residual values are normally distributed or not.

This research used a significant level of 0.05 or 5%, meaning 95% confidence level. With the method used is the Kolmogorov-Smirnov. The P-value obtained was 0,906, so it follows the normal distribution.

Multicollinearity test aims to test whether the regression model found a correlation between outcome and predictors. VIF values are greater than 10 show symptoms of multicollinearity in the regression model. The test results showed that all variables used as predictors of the regression model showed VIF are small enough, where all the variables are under 5 and tolerance values of more than 0.10. This shows that the independent variables used in the study did not show any symptoms of multicollinearity, which means that all variables can be used because there is no strong relationship between the independent variable.

Heteroscedasticity test aims to test whether a regression occurs unevenness of residual variance in the observations to other observations. If the residual variance of an observation of others still, it is called and if the variance is different homoscedasticity called Heteroskidastity. The regression model is said to be good, so heteroscedasdicity does not happen. Heteroscedasticity test results data in this study using SPSS version 20 by observing the pattern that occurs in Scatterplot, where heteroscedasticity test results can be seen in Figure 3:
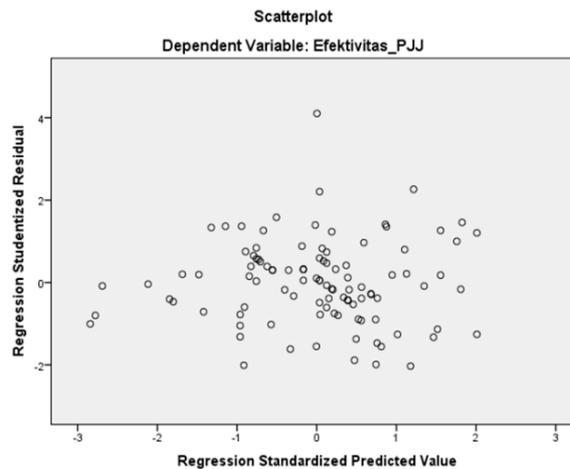

Figure 1: Scatterplot Graph of Heteroscedasticity test

It seems that the dots scatter randomly and spread around the X-axis and Y-axis. According to Sekaran (2003), if the dots spread in the four quadrants or around the X-axis and Y-axis, we can conclude that no heteroscedasticity happened in the regression model, thus the model is reasonable to be used in predicting e-learning effectiveness.

The R square value (Determination Coefficient) in Table 3 is 0,645. Thus, the value of the correlation was 64,5%. It can be concluded that 64,5% of the variation in e-learning effectiveness can be explained by the change of computer efficacy, perceived usefulness, interaction, social presence, and e-learning effectiveness.

Table 3: Determination Coefficient

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.803[a]	.645	.630	3.756

Predictors: (Constant), Social presence, computer efficacy perceived usefulness, interaction
b. Dependent Variable: e-learning effectivity

F-Test was conducted to see whether the predictors simultaneously affect the outcome. The simultaneous test result showed that the value of F-calculated was 44,873, which was higher than F table, which was 2,46 (44,873 > 2,46). The significance value was in the value of 0,000, or $p < 0.001$. This shows that H_0 cannot be accepted, thus it can be concluded that the predictors (elements of distance learning) simultaneously affect the outcome (e-learning effectiveness), but not partially.

Table 4: F-Test Result

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2531.722	4	632.931	44.873	.000[b]
	Residual	1396.393	99	14.105		
	Total	3928.115	103			

a. Dependent Variable: E-learning effectiveness
b. Predictors: (Constant), Social presence, computer efficacy perceived usefulness, interaction

Afterwards, t-test or partial hypothesis test was conducted to find out the effect of Computer Efficacy (X1), Perceived Usefulness (X2), Interaction (X3), and Social Presence (X4), towards dependent variable, which was e-learning effectiveness (Y).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.588	2.136		.743	.459
	Computer efficacy	.441	.211	.167	2.084	.040
	Perceived usefulness	1.006	.226	.350	4.459	.000
	Interaction	.918	.287	.314	3.199	.002
	Social Presence	.334	.197	.133	1.698	.093

a. Dependent Variable: e-learning effectiveness

For n =104 it was found that t-table for db = 104-4-1= 99. Referring to the r table, the t-critical value is 1,998.

The first three variables (computer efficacy, perceived usefulness and interaction) have their t-calculated values higher than the t-critical value (1,998), thus it can be concluded that they have significant influence on e-learning effectiveness. However, the last one (social presence) is not statistically significant since its t-calculated value (1,698) is less than 1,998.

From there, we also obtained a regression equation that explains the correlation between e-learning elements (X) and e-learning effectiveness (Y):

$$Y = 1,588 + 0,441 X_1 + 1,006 X_2 + 0,918 X_3 + 0,334 X_4$$

From the regression coefficient associated with this research, it can be seen that the higher the indicator value of the element of distance learning, which are the skills to use computer applications, perceived usefulness, interaction, and social presence, the higher is also the level of effectiveness of distance education. So as to increase the success of distance education at the Telkom University, increase students' ability to use computer applications, increasing the perceived usefulness, improve interaction that occurs, and maintaining social presence needs to be evaluated and held continuous improvement.

Discussion

Based on the analysis of the results, it can be found that the calculations show that the implementation of distance education elements in terms of expertise using computer applications based on the responses of students obtained a value of 88%. It is included in the excellent category. T test results that expertise using computer applications (X1) to the effectiveness of distance learning (Y), has a value of t-calculated equal to 2,084 bigger than t-table 1,998, so it can be said that the variable expertise using computer applications have a significant influence on the variable effectiveness of distance learning. This is supported by a background of students who are all employees of the company PT. Telkom, which is a company engaged in the field of Information Technology. The daily work cannot be separated from the use of computers and their applications.

The calculations show that the implementation of distance education elements in terms of perceived usefulness based on the responses of students obtained a value of 77%. It is included in both categories. While the t-calculated value of 4.459 is higher than 1,998 (t-table), so that it can be said that the perceived usefulness variables have a significant influence on the variable effectiveness of distance learning. The results showed that students feel the distance learning program uses technology as a tool in the provision of access to information, both in quality and in quantity. Flexibility there is also improving comfort in the following study, there is no longer the issue of limitations of space and time.

The calculations show that the implementation of distance education elements in terms of interaction based on the responses of students obtained a value of 73%, this value is included in both categories. While the t-calculated value of 3.199 is greater than 1,998 of t-table value, so that it can be said that the interaction variables have a significant influence on the effectiveness of ODL variable. Those results confirmed that the interaction in the form of exchange of information between the parties involved in the system take place either because the ICT support that has been provided by the Telkom University, such as the availability of a Learning Management System (LMS), video conferencing, and other communication media.

The calculations show that the implementation of distance education elements in terms of social presence based on the responses of students obtained a value of 80%, this value is included in both categories. While the t-calculated value of 1,698 is less than 1,998 (t-table), so that it can be said that the presence of social variables have no significant influence on the effectiveness of distance learning. It can be understood because generally, distance learning program does not need physical or social presence of the students to succeed because the program can run by itself with the initiative of students as the trigger. This finding is also supported by Means et al. (2013) whose research also concluded that students tend to avoid social engagement as they focus on their individual study processes.

In the calculation of F, the obtained F-value of 11,451 is greater than the value of F table (2.63) so that the elements of distance learning that consists of using computer skills, perceived usefulness, interaction and social presence together significantly influence the effectiveness of distance education. The R square value (coefficient of determination) of 0,645. So the magnitude of the influence obtained using computer application skills, perceived usefulness, interaction and social presence of the effectiveness of distance learning at the Telkom University today is 64.5%. This means that 64.5% change in the effectiveness of distance education can be explained due to the influence by the change expertise using computer applications, perceived usefulness, interaction and social presence of both partially and simultaneously change. The value of other opportunities that may still be developed to the maximum rate in this study was 100% - 64.5% = 35.5%. 35.5% of this figure can be used as an opportunity for Telkom University to delve more deeply about the other factors that have not been researched or not to ask respondents which can increase the distance education element in this case is the use of computer expertise, perceived usefulness, interaction and social presence so that it can achieve the goal of distance learning is an increase in the effectiveness of distance education at the Telkom University.

Conclusion

In its third year of undergoing distance learning program, Telkom University has benefited from the support of technology. One of its active programs is Master of Management (MM) program, a class consisting occupied employees whose physical presences are limited in attending classes. To measure the program's effectiveness, we conducted a research using E-learning Effectiveness Model developed by Johnson (2008). This model consists of computer self-efficacy, perceived usefulness, interaction and social presence.

After analyzing the data collected from 99 distance learning participants at MM program of Telkom University, we concluded that three variables (computer efficacy, perceived usefulness and interaction) have significant influence on e-learning effectiveness since t-calculated values are higher than the t-critical value (1,998). However, the last one (social presence) is not statistically significant since their t-calculated value (1,698) is less than 1,998, which implied that there is no significant influence between social presence and distance learning effectiveness. Based on the F-Test result, we also found that the F-calculated value, which was 44,873, was higher than F table, which was 2,46 (44,873 > 2,46). The significance value was in the value of 0,000, or p<0.001. Therefore, the H_0 cannot be accepted, meaning the predictors (elements of distance learning) indeed simultaneously affect the outcome (e-learning effectiveness), but not partially, since the element of social presence failed to show significant contribution. Related to this matter,

Means et al. (2013) argued that social engagement is not the main focus in the process of distance learning, since classroom presence has evolved into virtual class complemented by virtual teaching assistants and materials.

This study was intended to comprehend the effectiveness of distance learning program at Telkom University, which means the scope was only one program at the institution. Nevertheless, through Johnson's theory, we found that application skills, perceived usefulness, interaction and social presence at the Telkom University today simultaneously contributes to the effectiveness of distance learning, seen from the value of determination coefficient, which was 0,645 or 64,5%. Based on the findings, we recommend that any other institutions who would like to develop their distance learning program to pay attention to the four mentioned determinants.

Disclosure statement

No potential conflict of interest was reported by the authors.

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References

Allen, E., & Seaman, J. (2008). Online nation: Five years of growth in online learning. The Sloan Consortium. Retrieved October 19, 2008 from http://sloan-c.org/publications/survey/online_nation

Bandura, A. (2006). Guide for constructing self-efficacy scales (Vol. 5). Greenwich: Information Age Publishing.

Daryanto. (2013). Inovasi Pembelajaran Efektif. Bandung: Yrama Widya.

Davis, F. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly.

Goodyear, P. (2002), Psychological Foundations for Networked Learning, In C. Steeples & C. Jones (Eds), Networked Learning: Perspectives and Issues. London: Springer-Verlag.

Hiltz, Starr Roxanne. (1994). Collaborative Learning in Asynchronous Learning Networks: Building Learning Communities. New Jersey: New Jersey Institute of Technology.

Johnson, Richard D. (2008). An empirical examination of factors contributing to the creation of successful e-learning environments. International Journal of Human Computer Studies.

Kadir, Abdul & Triwahyuni, Terra. (2003). Pengenalan Teknologi Informasi. Yogyakarta: Andi.

Kaplan-Leiserson. (2000). E-learning glossary. [online]. http://www.learningcircuits.org [20 September 2015]

Means, Barbara, et al. "The effectiveness of online and blended learning: A meta-analysis of the empirical literature." Teachers College Record 115.3 (2013): 1-47.

Nazir, Moh. (2009). Metode Penelitian. Bogor: Ghalia Indonesia

Ningrum, Ika Kurnia Retno. (2011). Analisis Implementasi E-Learning Dengan Menggunakan Assessment Model, Studi Eksplanatif E-learning Jurusan Sistem Informasi (JSI) ITS Surabaya. Skripsi Sarjana Fakultas sosial politik UNAIR: Tidak Diterbitkan.

Selim, H. M. (2007). Critical success factors for e-learning acceptance: Confirmatory factor models. Computers & Education.

Sekaran , U., and Bougie , R. (2003). Research Methods for Business. 5th edition. John Wiley & Sons Ltd, United Kingdom.

Short, J., Williams, E., & Christie, B. (1976). The Social Psycology of Telecommunication. NY: John Wiley & Sons Ltd.

Telkom University. (2015). Sosialisasi IDEA, Aplikasi Pembelajaran Jarak Jauh di Telkom University. [online]. http://students.telkomuniversity.ac.id [accessed 23rd of September 2015].

Warsita, Bambang. (2011). Pendidikan Jarak Jauh. Bandung: PT Remaja Rosdakarya

QUESTIONNAIRE: (adapted from Johnson, 2008)

No.	Questions	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
1	I can respond to the question or statement posted via online discussion					
2	I can post a question or a statement through online discussions					
3	I can work on and complete the exam module (Quiz)					
4	With Distance Learning program, my productivity is increased					
5	With Distance Learning program, I can feel the effectiveness of classroom experience					
6	I think that the program is very helpful					
7	The materials in lectures are					

	supported by multimedia					
8	Lecturer quickly provide responses to questions					
9	I am actively involved in online discussions					
10	Socialization of the Distance Learning program is sufficient					
11	The atmosphere of the Distance Learning program is going well					
12	The atmosphere of the Distance Learning program is active					
13	My ability to think critically about the course material increases					
14	My ability to critically analyze issues increases					
15	I learn to always appreciate different viewpoints					
16	Lecture material can be absorbed properly					
17	My knowledge of the course material increases					

18	My curiosity about the course material increases					
19	I am satisfied with the way of learning					
20	I am satisfied with the course material coverage					