

THE EFFECTIVENESS OF INFORMATION TECHNOLOGY SYSTEMS OF E- LEARNING

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ABSTRACT

This study aims to generate the effectiveness of information technology system of e-learning in order to improve the quality of learning. This research is motivated by the vision and mission of UHAMKA. E-Learning is potential to make the learning process more effective because either students or teachers are significantly benefited in terms of place, flexibility, and enable learning activities anytime, anywhere, and can be repeated. It is more efficient so that the productivity of activities is more. Besides, it saves the cost of education, especially for students outside the city. In the e-learning, it is not required additional specific software on the computer, as long as the computer is equipped with an Internet connection.

Supporting theory used in this study are: theories about the effectiveness of the information technology system of e-learning as proposed by Iivary (2005), Reymond Mc Leod (2007), David Garvin, Jayce Rowe, Ralph Neal, (2000), Liu , Arnett (2000), Molla, Lickers (2001), Glossary (2001), Vaughan Waller (2001), Kamarga (2002).

This research was conducted by the research approach of multivariate statistical methods dependencies of Structural Equation Model (SEM). This research was conducted by using quantitative data and positivism approaches. The data collection was used survey techniques in the form of questionnaires. The population of this research is the students of Master of Education Administration, University of Muhammadiyah PROF. DR. HAMKA, total of 1117 people, and 102 people as sample which consisted of 45 females and 57 males.

The results showed that the effectiveness of the information technology system of e-learning significantly helps students in learning and acquiring learning outcomes higher ($P > 0.95$). E-Learning is able to improve the effectiveness of performance of faculty and students because of the utilization of space, time, cost, and energy was more efficient. Therefore, e-learning based model is effective to improve the quality of teaching and learning.

Keywords: learning systems, computer technology, information and internet.

INTRODUCTION

Educational institution in Indonesia is an organization that has a double orientation (Multiple Oriented), that is socially oriented educational organization which aims to improve the nation's intelligence and educational business orientation that is in maintaining the existence or operation must have adequate funds. Therefore, more people choose educational institutions that is sellable and marketable although it has to pay very expensive budget because to expect the educational institution to produce qualified graduates. That is why, it requires the information technology systems that support all management activities in the educational institutions.

For the information technology systems that will be created should be balanced between the

available technology infrastructure and the human resource capability so that inequality does not longer happen, and the system of technology information cannot be realized significantly in supporting the quantity and quality of basic education. The reliability of a system of information technology in an educational institution / organization lies in the link between the existing components so as it can generate useful, accurate, fast, relevant, and effective flow of information for the sake of the institutions themselves and public.

Some experts have tried to define e-learning according to their own viewpoints. (Kamarga, 2002) "physical separation of instructor and student and the use of some technological delivery system", hereinafter (Martin Jenkins and Janet Hanson, Generic Center, 2003), e-learning is a learning process that is facilitated with support through the use of techniques informatics.

Similarly the communication, though it is not directly face to face, but the lecture discussion forum can be done in online and realtime. E-learning system does not have time constraint access, this is what enabling the lecture to be done a lot more time. The lectures Activities offered to serve as regular lectures. The delivery of material is in the form of text or voice storage that can be downloaded. Besides, there is also a discussion forum. The lecturer can also give grade, task and announcements to students.

In e-education system, it is used client-server technology in which all the process will be done on the server side. A web server along with the data base integrated either lecturer with curriculum, or with administration staff into an e-education system that can be accessed by the user. To access e-learning system, users can simply use a web browser.

Therefore, a learning experience can be as e-learning when it meets the above conditions although for the process of communication, the parties involved in the learning process using students' correspondences that have self-learning demands.

Learner-centered is a concept which requires that the source of the initiative in the learning process is the learner and not the teacher. The role of the lecturer merely facilitates the learner to be directed to the purpose of lesson. Therefore in distance learning, the use of the word "facilitator" is more advisable than lecturers or instructors. Asynchronous is a learning process (and communication) in unreal time. A learner's question may only be answered in the next day after the facilitator opening messages containing questions into an e-mail. This also applies to the process of communication outside the learning activities, for instance the administrative processes such as when the learner registers or requests the values of the subjects that has been followed. One more thing that marks the application of distance learning is that anyone in the virtual class can learn from each other. Although in conventional class it is also done during a discussion between students, lecturer's presence will limit the discussion. In distance learning, the benefits of this collective learning become more pronounced because all the initiative to learn becomes the responsibility of the learner. From an examination of the characteristics of distance learning and the understanding of it, then it will be easier to understand the various definitions of e-learning.

RESEARCH QUESTIONS

Based on the background, the problems can be formulated as follows:

1. What are the factors affecting the information technology systems of e-learning?
2. How are the causal relationship models between the factors referred?
3. How are the significance of causal relationship degree between the factors referred?

4. What is the level of information technology systems of e-learning?

RESEARCH METHOD

This research was conducted by using quantitative data and positivism approach to observe the behavior of individuals who have a goal to find or convince existing possibilities, and ultimately can be used to predict the activity of human being (Neuman, 2000).

The research intends to prove the hypothesis that was built with the approach of Technology Acceptance Model (TAM). With this method, the researcher did an analysis of the factors affecting the information technology systems of e-learning. Data were collected using a survey method. The objective of this survey is to get an overview of the information technology system of e-learning. Data obtained from the survey through questionnaires will be analyzed with multivariate statistical methods, processed using AMOS software.

Population and Sample

The population of this research is postgraduate students of Education Administration, University of Muhammadiyah PROF. DR. HAMKA, the total were 1117 students. Determination of the number of samples based on the minimum required number of samples for SEM, namely 100-200 (Hair et al., 1998) using the ratio of the number of samples to the number of indicators. The sampling used purposive sampling method. Each population was taken equal as samples of 102 people, consisted of 45 females and 57 males.

Reliability Test

Reliability is a measure of internal consistency of the indicators of a variable formation which indicates the degree of each indicator as constructor a variable formations (Prabowo, 2007). (Nunally and Bernstein, 1994) provides guidance that the exploratory study, reliability was between 0.5 - 0.6 is considered to be sufficient to justify a study.

Validity test

Validity or confirmatory was performed on each variable by removing latent indicator variable that is not a valid constructor for a latent variable in the proposed structural model. If the estimate value of the loading factor (λ) of an indicator variable <0.5 then the indicator should be dropped (deleted) (Ghozali, 2004: 96).

Statistical hypotheses

The hypotheses in this study include universal and special hypothesis. Universal hypothesis model proposed in this research is supported by the facts. It can be indicated that the alleged variance-covariance matrix equal to the population variance-covariance matrix samples (observed data) or can be expressed

$$\sum_p = \sum_s.$$

While special hypothesis in this study are as follows:

1. H1: The higher the quality of information used the more satisfied users are using the system.
2. H2: The higher the quality of the system used the more satisfied users are using the system.
3. H3: The higher the quality of service used the more satisfied users are using the system.

4. H4: The higher the user satisfaction the more satisfied information technology systems of e-learning.

THEORETICAL REVIEW

Information Systems

Information Systems is management of people, data, processes, data representation and information technology that supports the needs of the user. The information system is an activity of organized procedures, when it is executed, it will provide information to support decision making and control in organizations (Henry C. Lucas in Jogianto, 2000: p.23). The role of the information system is to process data into information that can be used by the users, stakeholders, and managers. Next, the information is used to create/support decision, as feedback, as input to the next process, it is used to conduct an analysis on a system, and show new results.

Information Technology

The term 'information technology' began to be widely used in the mid of 80s. This technology is the development of computer technology combined with telecommunications technology. The definition of the word 'information' itself is internationally agreed as a 'result of the processing of data' which in principle has a value that is more than the raw data (Indrajit, 2003). Broadly speaking, information technology can be grouped into two parts: hardware and software. Hardware is physical devices such as memory, printer and keyboard while software is the instructions to set up the hardware to work in accordance with the purpose of these instructions.

Information technology has evolved into a worthwhile technology even determined the level of performance of an organization. With the help of information technology, work processes that occur within an organization can be done quickly and efficiently. Nowadays, almost all organizations around the world are in need of information technology to process data into information that is vital to the decision making process.

The role of information technology in human activity at this time is highly large. Information technology has become a major facilitator for business activities, contributed greatly to fundamental changes in the structure, operation and management of the organization. Due to this technology, people can perceive any kinds of easiness. withdrawing cash through an ATM (Automatic Teller Machines), transactions over the internet which is known as e-commerce, and transferring money via e-Banking are a number of examples of the information technology application.

E-Learning

E-learning is an electronic-based learning process. One of the media used is computer network. By computer network, it allows the computer to be developed in the form of web-based, then it is subsequently developed into an internet. That is why, e-learning system using the Internet is called internet enabled learning. E-learning is an effective learning process generated by combining the digital delivery of content consisting of support and service learning (Vaughan Waller, 2001).

There are at least three (3) functions of e-learning toward learning activities in the classroom (classroom instruction), namely; as a supplement to its choice/optional, complementary, or a substitution (Siahaan, 2003);

Supplement

The function of supplement is as an additional, if the students have the freedom to choose whether to take advantage of electronic learning materials or not. In this case, there is no obligation/requirement for learners to access e-learning materials. Even if it is optional, students who use it will certainly have additional knowledge or insight.

Complement

It can be said as a complement if the e-learning materials are programmed to complete the learning material that students receive in the classroom (Lewis, 2002). A complementary means that e-learning materials are programmed to be a reinforcement material or remedial for learners in following conventional learning activities. E-learning materials can be said as enrichment, if the learners can quickly master/ understand the lessons presented by lecturer/teacher in face to face class (fast learners). They are given the opportunity to access e-learning material that was specifically developed for them. The goal is to strengthen the mastery level of learners toward the materials presented by teachers in the classroom. E-learning can be said as a remedial program, if the learners who have difficulty understanding the material presented by teachers in the classroom (slow learners). They are given the opportunity to take advantage of e-learning material that was specifically designed for them. The goal is to make the students more easily understand the materials presented by lecturers/teachers in the classroom.

Substitution

Several universities in developed countries provide some alternative models of learning activities/lectures to their students. The goal is that the students can flexibly manage lecture activities in accordance with the time and other daily activities of students. Learning of based e-learning is to facilitate interaction between learners with learning materials. Similarly, the interaction between learners and lecturers as well as among learners. Learners can share information or opinions about various lessons relating to the lesson or the needs of self-development of students. Lecturers can put learning materials and tasks that must be done by the students in a particular place on the web to be accessed by the learners. As required, the lecturer may also provide an opportunity for students to access specific learning materials and exam questions that can only be accessed by students once and within a specific time as well (Kudos Website, 2002).

Therefore, the benefits of e-learning in organizational learning are as follows:

Increase productivities

Through e-learning course, time can be reduced so that the productivity of learners will not be lost due to the activities s/he has to do to obtain the learning process.

Accelerate the process of innovation

Human resource competencies can depreciate. The renewal of these competencies can be done through e-learning so that the competency always gives value through creativity and human resources.

Efficiency

Competency development process can be done in a relatively shorter and include a larger amount.

Flexible and Interactive

E-learning activities can be done at any locations as long as it has a connection with the source and directly or indirectly possible interactivity and complete visualization/multi media (Kamarga, 2002).

RESEARCH FINDINGS

Analysis Descriptive Statistics

Testing or analysis of descriptive statistics that provide an explanation in the form of the mean (average), standard deviation, variance, maximum, range, curtosis and scewness were processed using SPSS software 16. Retrieved data is the value of N (listwise) with a good level of completeness which amounted to 102 (100%), as well as other criteria contained in the descriptive statistical tests.

Testing requirements analysis

Test of Validity

Tests on the validity of the latent variables was done by looking at the value of significance (Sig) obtained by each indicator variable, then compared with the value of α (0.05). If $Sig \leq 0.05$ then it rejects H_0 , meaning that an indicator variable is a constructor that is valid for a certain latent variables (Widodo, 59: 2006).

Latent Variables Exogenous

CSE (Computer Self Efficacy)

Table 1. Variable Parameter Test CSE

<i>CSE</i>	<i>Sig (≤ 0.05)</i>	<i>Hypothesis Results</i>	<i>Description</i>
X18	1.000	Reject H_0	valid construct
x19	0.000	Reject H_0	valid construct
X20	0.000	Reject H_0	valid construct

Each variable indicator X18 (can write address of URL e-learning information technologies), x19 (level response time of e-learning information technologies) and X20 (accuracy and consistency of the system as well as the flexibility to e-learning information technologies) were significantly a valid constructor (reject H_0) for the latent variables CSE. Evident from the value obtained x19 and X20 on parameter test measurement model CSE variables with significance (sig) / real level (α) 0:05 above a critical value ($sig \leq \alpha$). While the X18 measurement parameter set is 1. Because it was defined as priory, then the X18 parameter is not tested. As a result, the measurement variable X18 is a valid constructor for latent variables CSE. It can be said that the information technology systems of e-learning requires the ability to use the internet. System information e-learning technology, precision and consistency of system processes also the flexibilities of the information technology system of e-learning, and the teaching and learning of information technology systems of e-learning.

Latent Variables Endogenous

PEOU (Perceived Ease of Use)

An indicator variable Y1 (flexibility of the system is easily accessible from the campus) and

Y3 (easy to learn) were significantly a valid constructor (Reject H_0) for the latent variables of PEOU. Evident from the Y3 value obtained in the test parameter measurement model PEOU variables with significance (sig) / real level (α) 0:05 above a critical value ($\text{sig} \leq \alpha$).

Table 2. Variable Parameter Test PEOU

<i>PU</i>	<i>Sig (\leq 0.05)</i>	<i>Hypothesis Results</i>	<i>Description</i>
Y1	1.000	Reject H_0	Valid construct
Y3	0.000	Reject H_0	Valid construct

While the Y1 measurement parameter set is 1. As defined a priori, then the Y1 parameter is not tested. As a result, the measurement variable Y1 is valid constructor for latent variables of PEOU. It can be said that the information technology system of e-learning was flexible and easily accessible from the campus environment and facilities.

PU (Perceived Usefulness)

Table 3. Variable Parameter Test PU

<i>PU</i>	<i>Sig (\leq 0.05)</i>	<i>Hypothesis Results</i>	<i>Description</i>
Y5	1.000	Reject H_0	Valid construct
Y6	0.000	Reject H_0	Valid construct

Indicator variables of Y5 (level of student satisfaction in the reception given lesson by e-learning) and Y6 (facilitating the work or duties for faculty and students) were significantly a valid constructor (Reject H_0) for the latent variables of PU. Evident from the value obtained in the test model parameter Y5 variable measurement PU significance (sig) / real level (α) 0:05 above a critical value ($\text{sig} \leq \alpha$). While the measurement parameters specified Y5 is 1. As defined a priori, it was not at Y6 parameter test. As a result, the measurement variable constructor Y6 was valid for latent variables PU. So, it can be stated that using information technologies of e-learning can improve teaching, learning and students to administer and facilitate the work value or assessment tasks for faculty and students.

ATU (Attitude Toward Using)

Table 4. Variable Parameter Test ATU

<i>ATU</i>	<i>Sig (\leq 0.05)</i>	<i>Hypothesis Results</i>	<i>Description</i>
Y7	1.000	Reject H_0	Valid construct
Y8	0.000	Reject H_0	Valid construct

Variable indicator of Y7 (the action of System information technology e-learning is a good idea), Y8 (using information technologies e-learning is beneficial action) significantly a valid constructor (Reject H_0) for the latent variables of ATU. Values obtained in the test Y8 variable parameter measurement model ATU significance (sig)/real level (α) 0:05 above a critical value ($\text{sig} \leq \alpha$). While the measurement parameters specified Y7 is 1. As defined a priori, then the parameter Y7 was not tested. As a result, the measurement variable constructor Y7 was valid for latent variables ATU. Based on this, it can be said that the use of technology systems information of e-learning was a good idea and beneficial because students could obtain up to date information value.

BITU (Behavioral Intention to Use)

Table 5. Variable Parameter Test Bitu

<i>ATU</i>	<i>Sig (≤ 0.05)</i>	<i>Hypothesis Results</i>	<i>Description</i>
Y9	1.000	Reject H ₀	Valid construct
Y10	0.000	Reject H ₀	Valid construct

The indicator variables of Y9 (productivity, the use of information technologies of e-learning), and Y10 (time spent) were significantly a valid constructor (Reject H₀) for the latent variables of BITU. Evident from the value obtained in the test Y10 variable parameter measurement model Bitu significance (sig) / real level (α) 0:05 above a critical value (sig ≤ α). While Y9 measurement parameter set was 1. As defined a priori, then the parameters were not in the test Y9. As a result, the measurement variable constructor Y9 was valid for latent variables of BITU. Based on this, it can be said that the users of information technology system will give information technologies of e-learning to students who have not used yet. In addition, to improve the function of e-learning system information technology in information technology systems implementation.

ASU (Actual System Usage)

Tabel6. Variable Parameter Test ASU

<i>ASU</i>	<i>Sig (≤ 0.05)</i>	<i>Hypothesis Results</i>	<i>Description</i>
Y11	1.000	Reject H ₀	Valid construct
Y12	0.000	Reject H ₀	Valid construct

Based on the table above, it can be seen that each indicator of Y11 variable (user fee system of information technology e-learning is very efficient), and Y12 (place in the use of e-learning anywhere as long as computers still connect to the Internet network) constitutes a significant constructor invalid (Reject H₀) for the latent variables of ASU. Values obtained in the test model parameter of Y12 variable measurement ASU significance (sig)/real level (α) 0:05 above a critical value (sig ≤ α). While the measurement parameter set Y11 was 1. As defined a priori, then the parameters were not tested Y11. As a result, the measurement variable konstruktur of Y11 was valid for latent variables of ASU. Therefore, it can stated that the cost and the e-learning are effective.

Test of Reliabilitas

Table 7. Test of Reliability

<i>Latent Variable</i>	<i>Composite Reliability</i>	<i>Variance Extracted</i>
CSE	0.947	0.855
PEOU	0.853	0.743
PU	0.836	0.718
ATU	0.842	0.727
BITU	0.880	0.785
ASU	0.828	0.708

In the above table, it shows that the CSE, PEOU, PU, ATU, BITU and ASU have a

composite reliability value above 0.70. CSE, PEOU, PU, ATU, Bitu and ASU meets the Variance Extracted value limit is ≥ 0.50 . Thus, it can be said that each variable has a good reliability.

Hypothesis Testing Results

Table 8. Hypothesis Testing Results

<i>Hypothesis</i>	<i>Sig</i>	<i>Hypothesis Results</i>
H ₁ (CSE – PEOU)	0.000	Reject H ₀
H ₂ (PEOU – PU)	0.000	Reject H ₀
H ₃ (PEOU – ATU)	0.000	Reject H ₀
H ₄ (PU – ATU)	0.000	Reject H ₀
H ₅ (ATU – BITU)	0.000	Reject H ₀
H ₆ (BITU – ASU)	0.000	Reject H ₀

Based on the table above, the description of analysis of the results of research hypothesis testing may be explained as follows.

- a. H₁: it is suspected that the perception abilities toward computer (Computer Self Efficacy / CSE) significantly affected the ease of use of the information technology system of e-learning (Perceived Ease of Use / PEOU). So, it is concluded that H₁ is accepted.
- b. H₂: it is suspected that the perceived ease of use of the information technology system of e-learning (Perceived Ease of Use / PEOU) significantly affected the perception of the usefulness (Perceived Usefulness / PU). So, it is concluded that H₂ is accepted.
- c. H₃: it is suspected that the perception of the usefulness of information technology systems of e-learning (Perceived Ease of Use / PEOU) significantly affected the attitude (Attitude Toward Using / ATU). So, the conclusion: H₃ is accepted.
- d. H₄: it is suspected that perceived ease of use of information technologies e-learning (Perceived Usefulness / PU) significantly affected the attitude (Attitude Toward Using / ATU). The conclusion: H₄ is accepted.
- e. H₅: Suspected attitudes of the users of information technology e-learning (Attitude Toward Using / ATU) significantly affect user behavior (Behavioral Intention to Use / Bitu). So the conclusion: H₅ is accepted.
- f. H₆: it is suspected that the users behavior information technology systems of e-learning (Behavioral Intention to Use/Bitu) significantly affect actual usage (Actual System Usage/ASU). So the conclusion: H₆ is accepted.

Based on the hypothesis testing above, it can be explained that the use of information technologies of e-learning is affected by the 5 latent variables namely Computer Self Efficacy (CSE), Perceived Ease of Use (PEOU), Perceived Usefulness (PU), attitude Toward using (ATU), behavioral intention to use (Bitu), and Actual usage system (ASU). Then Perceived Usefulness causal relationship variables did not significantly affect the

Actual Usage System (ASU) or the actual usage of the system. While a causal relationship variables Computer Self Efficacy (CSE) has no effect on Actual System Use(ASU).

CONCLUSION AND RECOMMENDATION

Based on the interpretation of the results and discussion outlined above, it can be drawn the following conclusions:

- a) Factors that influence from three independent variables are 1) the quality of information; 2) the quality of service and 3) the quality of system toward students' satisfaction of information technology systems of e-learning. In the process of teaching and SIM courses in Master of Educational Administration PROF. DR Hamka Muhammadiyah Jakarta which is currently running has been approved by the MAP UHAMKA for the 2009/2010 academic year by using e-learning system, because in accordance with the development of the course SIM and results of this study also provides beneficial answer for the development of students in learning on those variables.
- b) Model of Information Technology Systems of e-learning which is developed through this research is a modification of the model Computer Based Instruction (CBI). In the e-learning, it does not change the basic form, but e-learning is already implemented. Model of information technology systems of e-learning is distinctive because the e-learning faculty with technology that s/he cannot use this model for e-learning because BAAK processes these data into an integrated e-learning based. Progression model of the information technology system of e-learning in the learning process aims to improve the quality of teaching and learning processes in SIM course. E-learning obviously has good control that improves the effectiveness and efficiency of teaching and learning, facilitates active learning, keeps the consistency in learning that is oriented to students.
- c) From relationship of quality information to the satisfaction of the students gives a very positive relationship, while the quality of service hubunganya very positively to student satisfaction from the satisfaction of the students gives a very positive relationship to the information technology systems of e-learning.
- d) In fact, the degree of information technology system of e-learning was so positive. The uniqueness of this reserach was that the students were from education administration background.

RECOMMENDATION

The results of this model development of information technology of e-learning can be one of the alternatives to optimize the teaching nad learning process. For that reason, the most important thing to be mastered by the lecturers is the ability to design systematic and interesting activities of teaching and learning process. The results of this research and development also give an indication that the models of information technology system of e-learning are effective to improve the quality of teaching and learning process by utilizing e-learning.

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