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# The Effect of E-Learning on Students Learning of STMIK STIKOM Bali

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***Abstract*—E-Learning is described as distance learning that utilizes information technology so that it can facilitate interaction between lecturers and students effectively. This study examined the effect of e-Learning towards student learning, which uses quantitative methods by conducting sample surveys of the institution's student population. Sampling techniques are generally carried out randomly for all students as they took the same strata. This random sample used the Issac and Michael formulas with degrees of freedom (dk = 1) and a level of error of 10%. Data collection using research instruments, data analysis is quantitative in order to test the hypothesis set. The results of this study are the effect of e-Learning on student activity, e-Learning has a positive impact on learning, e-Learning effectiveness in accessing student assignments and the relationship between the appearance and ease of using e-Learning.**

***Keywords—e-Learning, quantitative method, learning effect***

## I. INTRODUCTION

These days, the development of information technology is growing very rapidly. Nearly all people or companies use information technology to facilitate their daily activities. At this stage, technology has also been used in learning systems in education fields. One of them is e-Learning. E-Learning is a distance learning that utilizing information technology to facilitate the interaction between lecturers and students effectively [1]. E-Learning is a broad term that encompasses many teaching approaches, type of technologies, and administrative practices [2]. In this study, we will examine the effect of e-Learning towards student learning, which uses quantitative methods by conducting sample surveys of the student population. A quantitative research method can be interpreted as a research method based on positivism philosophy, used to examine certain populations or samples, sampling techniques is generally done randomly, data collection uses research instruments, data analysis is quantitative in order to test hypotheses that set [3]. There are some key components of successful learning programs. Selecting only a few components to highlight is challenging and involves an examination of a broad range of issues with each interdependent upon the other [2]. The results of this study are the effect of e-Learning on student activity; e-Learning has a positive impact on learning, e-Learning effectiveness in accessing student assignments and the relationship between the appearance and the ease of using e-Learning.

## II. LITERATURE REVIEW

### A. E-Learning

There were lots of understandings about e-Learning. To mention few: e-Learning is a type of teaching-learning that allows the delivery of teaching materials to students by using internet, intranet and other computer network media [4], e-Learning is an educational system that uses electronic applications to support teaching and learning with internet media, computer network, and standalone computer [6], and e-Learning as any learning using electronic circuits (LAN, WAN or Internet) content of learning, interaction and guidance [7].

Further explained that e-Learning's function as a supplement, if learners have the freedom of choice, whether to utilize electronic learning materials or not. As a complement, the electronic learning material in e-Learning is programmed to become reinforcement material (enrichment) or a remedial for learners in following conventional learning activity. Last but not least, e-Learning as a substitution. Some universities in developed countries provide some alternative models of learning activities/lectures to their students. The goal is that students can flexibly manage their lecture activities in accordance with time and their other activities [8].

E-Learning can be concluded as learning and learning process that utilizes electronic information packages for learning and education purposes, accessed by learners, anytime and anywhere based on ICT [9].

### B. Digital Learning Experience Concept

The focus of digital learning experience is to create a learning ecosystem that can be used to improve student quality [7], in line with global progress that is supported by e-Learning ecosystem that encourages behavioral change, performance improvement, and skill set development, which plays the important role for a successful implementation of e-Learning itself, thus, students will get the chance to take maximum benefits from their e-Learning experience [2].

Educators have an important role to play in online network learning [10].

MOOCs, which are online courses held for unlimited participants and opened access via the web, have the potential to promote network learning using networks that enable technology. The content of effective learning required interactive, usable, and relevant information. It should be involving learners, where users need to be able to navigate through complex and rich information, as well as lead a searcher to its content and placing it in a logically designed

directory of related content ensure that learners find exactly what is needed [11].

## III. Research Methods

### A. Conceptual Model

The conceptual model of this study uses statistical science with a quantitative approach model. The data to be processed is population data by taking samples for two semesters. Sampling uses Isaac and Michael formulas with degrees of freedom (dk = 1) and an error rate of 10%. The number of student samples will be distributed questionnaires about the independent variables and the dependent variable that is packaged in the questionnaire [13]. The results of the questionnaire will be analyzed and the hypotheses that have been identified will be tested by using a non-parametric descriptive hypothesis [14], namely the chi-square (x2) and contingency C formulas to test the relationship between variables [15].

Hypotheses are assumptions about a matter that is made to explain that which is often required to check [16]. The following were the hypotheses that can be put forward:

1. Learning with e-Learning systems for the students is very influential on learning seen from the active access of lecture material by students.
2. Learning combined with e-Learning system has a positive impact on facilitating student learning.
3. Learning with e-Learning system is more effective in accessing assignments given by lecturers.
4. The connection between the Ease of Using features provided by the e-Learning and its attractive appearance [17].

### B. Systematic Research

This research, systematically done into the following stages [18], [19]:

1. Research Problem
   The initial step in the research flow is guided by the Research Problem that has been framed to find an answer or solution for the problem at hand
2. Theoretical Framework
   The second step is the Theoretical Framework, studying research methods that allow us to find suitable methods applied in this study.
3. Research Hypothesis
   The third step is the determination of a temporary hypothesis from the Research Problem outlined in the study.
4. Data Collection
   Data Collection is the fourth step. This has been done by distributing questionnaires to students concerning the e-Learning. Simple random samplings from the student population for all classes were taken.
5. Data Analysis
   Next step is the Data Analysis, to determine the variables, namely the e-Learning interface, student's active access of e-Learning and the effectiveness of e-Learning, itself. From there, the data were analyzed using quantitative calculations while the hypothesis was tested using the chi-square formula [20].
6. Conclusions and Recommendation
   Conclusions and Recommendation are drawn based on the data analysis' result.

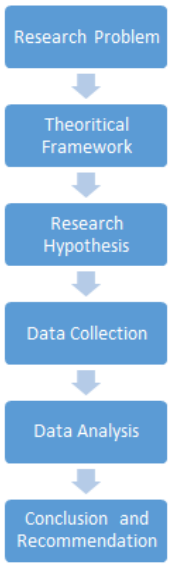


Fig. 1. Research Flow.

## IV. Research Results and Discussion

### A. Result and Discussion on the First Study

In this subchapter, the results of the first study of the influence of e-Learning about learning are seen from the access of lecture material by students. The first variable of this study is the Effect of e-Learning and the second variable is Access to Lecture Material. The research results of each variable can be seen in the following table.

TABLE I. The Actual Frequency (fo) of the Respondents in the First Study

| Access to Material | The Effect of e-Learning | | Total |
|---|---|---|---|
| | Yes | No | |
| Often | 136 | 20 | 156 |

Next, test the hypothesis using the chi-square formula.

$$X^2 = \sum \frac{(fo-fh)^2}{fh} \quad (1)$$

The result of calculating the expected frequency (fh) with the actual frequency (fo) is in the following table.

TABLE II. The Results of the Chi-Square Calculation for the First Study

| Frequency | Access to Material | The Effect of e-Learning | | The Effect of e-Learning | | The Effect of e-Learning | | $\frac{(fo-fh)^2}{fh}$ |
|---|---|---|---|---|---|---|---|---|
| | | | | fo-fh | fo-fh | $(fo-fh)^2$ | $(fo-fh)^2$ | |
| | | Yes | No | Yes | No | Yes | No | |
| fo | Often | 136 | 20 | 15 | -12 | 225 | 144 | (225/121)+ (144/32) =1,86+4,5 =6,36 |
| fh | | 121 | 32 | | | | | |
| fo | Sometimes | 77 | 20 | -2 | -1 | 4 | 1 | (4/79)+ (1/21) =0,05+0,05= 0,1 |
| fh | | 79 | 21 | | | | | |
| $\sum \frac{(fo-fh)^2}{fh}$ | | | | | | | | 6,46 |

The next step is calculating the contingency coefficient C. Contingency C is used to prove the existence of an association (associative) between variables if the data are nominal. In this study, the relationship was tested between the variables of e-Learning influence on learning seen from the activity of students accessing material in e-Learning.

Contingency C's Formula

$$C = \sqrt{\frac{X^2}{N+X^2}}$$

N = number of samples
$X^2$ = value of chi-squared

$$C = \sqrt{\frac{6{,}46}{253+6{,}46}}$$

$$C = \sqrt{\frac{6{,}46}{259{,}46}}$$

$$C = \sqrt{0{,}025}$$

$$C = 0{,}16$$

So, the magnitude of the coefficient between the influence of e-Learning and the frequency of material access by respondents is 0.16. It means that between two variables, there is a relationship because the value of C ≠ 0.

To test the significance of the coefficient C can be done by comparing the price of chi-squares calculated with the price of the chi-square of the table on the degree of freedom (dk) and the level of a particular error.

dk = (k-1) (r-1)
= (2-1) (2-1)
= 1

Information k states the influence variable of e-Learning on learning in 2 categories yes (there is influence) and no (no effect). While r states the material access variables with 2 categories, often and sometimes.

The level of error that has been set is 10%, the chi-square of the table, can be seen in Fig. 3 is 2.706. Because chi-squared is greater than chi-square table which is 6.46 > 2.706, learning with the e-Learning systems is very influential. This can be seen from the active access of lecture material by students. So the hypothesis is acceptable.

In this study we will discuss the effect of e-Learning on the activeness of students in accessing the lecture material that provided on the e-Learning system. This hypothesis states that e-Learning is very influential on the activity of students in accessing lecture material and the hypothesis has been verified by using the chi-square formula.

The statement proved to be acceptable by looking at the results of a study of 253 respondents/students who answered questions at a distributed questionnaire. Respondents who answered that e-Learning was very influential on the activeness of access to 201 lecture material or around 79.4% when compared to respondents / students who answered e-Learning did not affect as many as 52 respondents or around 20.6%, so it can be concluded that most respondents/students stated that e-Learning had an effect on the active access of lecture material. For the next variable is access to lecture material in the categories "often" and "sometimes", from the results of the study more respondents/students answered often access a number of 153 or around 60.5% and those who answered sometimes numbered 100 people or 39.5%. So it can be concluded that the more often students access lecture material the higher the influence of active e-Learning access.

### *B. Result and Discussion on the Second Study*

On the second study, it describes the effects of e-Learning systems. The variables used are variables from e-Learning, which are positive and negative impacts, and the second variable is facilitating learning. The results of the study can be seen in the following table.

TABLE III. ACTUAL FREQUENCY (FO) IN THE SECOND STUDY

| Make it easy learning. | Positive | | Negative | |
|---|---|---|---|---|
| | Yes | No | Yes | No |
| Easy (Yes) | 236 | 0 | 40 | 196 |
| Not Easy (No) | 17 | 0 | 9 | 8 |

Then the hypothesis is tested by calculating chi-squared. The result of calculating the expected frequency (fh) with the actual frequency (fo) is in the following table. Chi-squared calculation in the second study.

TABLE IV. CHI-SQUARED CALCULATION IN THE SECOND STUDY

| Frequency | Make it easy learning. | Positive | | Negative | |
|---|---|---|---|---|---|
| | | Yes | No | Yes | No |
| fo | Easy (Yes) | 236 | 0 | 40 | 196 |
| fh | | 229 | 0 | 45,8 | 183,2 |
| (fo-fh) | | 7 | 0 | -5.8 | 12.8 |
| $(fo-fh)^2$ | | 47 | 0 | 33.64 | 163.84 |
| $\frac{(fo-fh)^2}{fh}$ | | **0.2** | **0** | **0.7** | **0.9** |
| fo | Not Easy (No) | 17 | 0 | 9 | 8 |
| fh | | 24 | 0 | 4,8 | 19,2 |
| (fo-fh) | | -7 | 0 | 4.2 | -11.2 |
| $(fo-fh)^2$ | | 49 | 0 | 17.64 | 125.44 |
| $\frac{(fo-fh)^2}{fh}$ | | **2.04** | **0** | **3.7** | **6.5** |
| $\sum\frac{(fo-fh)^2}{fh}$ | **0.2 + 0 + 0.7 + 0.9 + 2.04 + 0 + 3.7 + 6.5 = 14.04** | | | | |

Next is calculating the contingency coefficient C. Contingency C is used to prove the existence of an association between variables if the data is nominal. In this study tested the relationship between learning variables combined with e-Learning systems has a positive impact on facilitating student learning.

$$C = \sqrt{\frac{X^2}{N+X^2}}$$

N = number of samples
$X^2$ = value of chi squared

$$C = \sqrt{\frac{14.04}{253+14.04}}$$

$$= \sqrt{\frac{14.04}{267.04}}$$

$$= \sqrt{0.053}$$

$$= 0.23$$

So the magnitude of the learning coefficient combined with e-Learning systems has a positive impact on facilitating student learning is 0.23. It means that between two variables, there is a relationship because the value of C ≠ 0. To test the significance of the coefficient C can be done by comparing the price of chi-squares calculated with the price of the chi-square

of the table on the degree of freedom (dk) and the level of a particular error.

dk = (k-1) (r-1)
= (4-1) (2-1)
=3.1
= 3

Information k states the positive impact variable on learning with 2 categories yes and no and seen from the negative impact category there are 2, yes and no, so the number of categories of the variable is 4 variables. While r states the variables facilitate learning with 2 categories, which are easy and not easy. The level of error that has been set is 10%, then the chi-square of the table can be seen in Fig. 3 is 6.251. Because chi-squared is greater than chi-squared table, which is 14.04 > 6.251, the learning hypothesis combined with e-Learning system has a positive impact on facilitating student learning. From the results of the study it has been seen that in dominant terms students answer e-Learning has a positive impact, but it is necessary to prove scientifically to more accurate statements, in the second hypothesis testing sub-chapter it turns out the e-Learning system hypothesis has a positive impact on facilitating learning can be accepted by showing the value of chi-squares is greater when compared with chi-squared tables. So the conclusion is that e-Learning has a negative impact but is more dominant to have a positive impact and is very helpful in the student learning process.

### *C. Result and Discussion on the Third Study*

In this study described the use of e-Learning, whether effective or not in terms of giving (uploading and downloading) assignments by lecturers to students. The variables used are effective variables and task access variables.

TABLE V. ACTUAL FREQUENCY (FO) IN THE FOURTH STUDY

| Access to Assignment | Efektif | | Total |
|---|---|---|---|
| | Yes | No | |
| Yes | 229 | 24 | 253 |

The next step is to calculate the chi-square based on the actual frequency table (fo) and the expected frequency (fh).

TABLE VI. CHI-SQUARED CALCULATION IN THE THIRD RESEARCH

| Frequency | Access to Assignment | Effective | |
|---|---|---|---|
| | | Yes | No |
| fo | Easy | 229 | 24 |
| fh | | 222,3 | 22,23 |
| (fo-fh) | | 6,7 | 1,77 |
| $(fo-fh)^2$ | | 44,89 | 3,1 |
| $\frac{(fo-fh)^2}{fh}$ | | **0,2** | **0,1** |
| fo | Not Easy | 0 | 0 |
| fh | | 5,4 | 0,54 |
| (fo-fh) | | -5,4 | -0,54 |
| $(fo-fh)^2$ | | 29,16 | 0,29 |
| $\frac{(fo-fh)^2}{fh}$ | | **5,4** | **0,54** |
| $\sum\frac{(fo-fh)^2}{fh}$ | **0,2 + 0,1 + 5,4 + 0,54 = 6,24** | | |

Based on Table VI, the calculation of chi-squared in the third study is 6.24. The next step is to calculate the contingency coefficient C. Contingency C is used to prove the existence of an association (associative) between variables if the data is nominal. In this study tested the relationship between learning variables with e-Learning system was more effective in accessing assignments given by lecturers.

$$C = \sqrt{\frac{X^2}{N+X^2}}$$

N = number of samples

$X^2$ = value of chi squared

$$C = \sqrt{\frac{6,24}{253+6,24}}$$

$$C = \sqrt{\frac{6,24}{259,24}}$$

$$= \sqrt{0.024}$$

$$= 0.16$$

The learning scale with e-Learning systems is more effective in accessing assignments given by lecturers is 0.16. It means that between two variables, there is a relationship because the value of C ≠ 0. To test the significance of the coefficient C can be done by comparing the price of chi-squares calculated with the price of the chi-square of the table on the degree of freedom (dk) and the level of a particular error.

dk = (k-1) (r-1)
= (2-1) (2-1) =1

Information k states the effective variable with 2 categories yes and no. While r states the task access variable with 2 categories, namely yes and no. The level of error that has been set is 10%, the chi-square of the table, can be seen in Fig. 3 is 2.706. Because chi-squared is greater than chi-squares table, which is 6.24 > 2.706, the learning hypothesis with e-Learning system is more effective in accessing assignments given by lecturers can be accepted. From the results of these studies, it can be concluded while that those who answer effectively in accessing tasks more, means that e-Learning is more effectively used in accessing coursework, but that statement requires proof of the hypothesis. This proof uses the chi-square formula and the relationship between variables using the contingency coefficient C. The test results show that the value of chi-squared is greater than the chi-square of the table and the contingency value C is not equal to 0, indicating that the hypothesis is acceptable. So the conclusion is to use an e-Learning learning system more effective for students in accessing assignments given to lecturers so that students can immediately do their assignments with a certain time limit and the results of their assignments can also be uploaded to the e-Learning system so that lecturers can see it and not limited by time.

### *D. Result and Discussion on the Fourth Study*

In this subchapter, the results of the fourth study are discussed, namely the relationship of display / e-Learning interfaces with the ease of using features provided by the institution's e-Learning. Variables used are e-Learning display variables and easy-to-use variables. The results of research on the appearance of e-Learning can be seen in the following table.

TABLE VII. ACTUAL FREQUENCY (FO) IN THE FOURTH STUDY

| Easy to Use | Attractive Interface | | Total |
|---|---|---|---|
| | Yes | No | |
| Easy | 229 | 20 | 253 |

The next step is to calculate the chi-square based on the actual frequency table (fo) and the expected frequency (fh). The following are the results of the calculation in Table VIII.

TABLE VIII. CHI-SQUARED CALCULATION IN FOURTH RESEARCH

| Frequency | Easy to Use | Attractive Interface | |
|---|---|---|---|
| | | yes | no |
| fo | Easy | 229 | 20 |
| fh | | 224,1 | 22,41 |
| (fo-fh) | | 4,9 | -2.41 |
| $(fo-fh)^2$ | | 24,01 | 5,8 |
| $\frac{(fo-fh)^2}{fh}$ | | **0,1** | **0,3** |
| fo | No Easy | 0 | 4 |
| fh | | 3,6 | 0,36 |
| (fo-fh) | | -3,6 | 3,64 |
| $(fo-fh)^2$ | | 12,96 | 13,3 |
| $\frac{(fo-fh)^2}{fh}$ | | **3,6** | **36,8** |
| $\sum \frac{(fo-fh)^2}{fh}$ | **0,1 + 0,3 + 3,6 + 36,8 = 40,8** | | |

Based on Table VIII, the calculation of chi-square in the fourth study is 40.8. The next step is to calculate the contingency coefficient C. Contingency C is used to prove the existence of an association (associative) between variables if the data is nominal. In this study tested related connectedness between easy to use features provided by the institution's e-Learning with an attractive appearance.

$$C = \sqrt{\frac{X^2}{N+X^2}}$$

N = number of samples
$X^2$ = value of chi squared

$$C = \sqrt{\frac{40,8}{253+40,8}}$$

$$= \sqrt{\frac{40,8}{293,8}}$$

$$= \sqrt{0.139}$$

$$= 0.37$$

So, the magnitude of the relationship between the easy to use features provided by the institution's e-Learning and its attractive appearance is 0.37. It means that between two variables, there is a relationship because the value of C ≠ 0. To test the significance of the coefficient C can be done by comparing the price of chi-squares calculated with the price of the chi-square of the table on the degree of freedom (dk) and the level of a particular error.

dk = (k-1) (r-1)
= (2-1) (2-1)
=1

Information k states interesting display variables with 2 categories, yes and no. While r states the variables are easy to use with 2 categories, which are Easy and Not Easy.

The level of error that has been set is 10%, the chi-square of the table, can be seen in Fig. 3 is 2.706. Because chi-squared is greater than the chi-square of the table, which is 40.8> 2.706, the relationship hypothesis is related between the ease of using the features provided by the institution's e-Learning and an attractive appearance acceptable.

The results concluded that the institution's e-Learning looks attractive and very easy to use, but it needs to be verified by testing the hypothesis. When tested using the chi-square formula, the results of the calculation of chi-squared are 40.8, while the chi-square value of the table is 2.706, while if tested the relationship between the variables is contingency C is not equal to 0, so it can be concluded that there is a relationship between features Easy to use e-Learning with an Attractive Interface. The e-Learning system not only looks in terms of its Attractive Interface, but is also Easy to Use. If the Interface is attracting but difficult to use, the e-Learning system is not effective in being used.

TABLE IX. CHI-SQUARED VALUES TABLE

| dk | Significance Level | | | | | |
|---|---|---|---|---|---|---|
| | 50% | 30% | 20% | 10% | 5% | 1% |
| 1 | 0,455 | 1,074 | 1,642 | 2,706 | 3,481 | 6,635 |
| 2 | 0,139 | 2,408 | 3,219 | 3,605 | 5,591 | 9,210 |
| 3 | 2,366 | 3,665 | 4,642 | 6,251 | 7,815 | 11,341 |
| 4 | 3,357 | 4,878 | 5,989 | 7,779 | 9,488 | 13,277 |
| 5 | 4,351 | 6,064 | 7,289 | 9,236 | 11,070 | 15,086 |
| 6 | 5,348 | 7,231 | 8,558 | 10,645 | 12,592 | 16,812 |
| 7 | 6,346 | 8,383 | 9,803 | 12,017 | 14,017 | 18,475 |
| 8 | 7,344 | 9,524 | 11,030 | 13,362 | 15,507 | 20,090 |
| 9 | 8,343 | 10,656 | 12,242 | 14,684 | 16,919 | 21,666 |
| 10 | 9,342 | 11,781 | 13,442 | 15,987 | 18,307 | 23,209 |
| 11 | 10,341 | 12,899 | 14,631 | 17,275 | 19,675 | 24,725 |
| 12 | 11,340 | 14,011 | 15,812 | 18,549 | 21,026 | 26,217 |
| 13 | 12,340 | 15,19 | 16,985 | 19,812 | 22,368 | 27,688 |
| 14 | 13,332 | 16,222 | 18,151 | 21,064 | 23,685 | 29,141 |
| 15 | 14,339 | 17,322 | 19,311 | 22,307 | 24,996 | 30,578 |
| 16 | 15,338 | 18,418 | 20,465 | 23,542 | 26,296 | 32,000 |
| 17 | 16,337 | 19,511 | 21,615 | 24,785 | 27,587 | 33,409 |
| 18 | 17,338 | 20,601 | 22,760 | 26,028 | 28,869 | 34,805 |
| 19 | 18,338 | 21,689 | 23,900 | 27,271 | 30,144 | 36,191 |
| 20 | 19,337 | 22,775 | 25,038 | 28,514 | 31,410 | 37,566 |
| 21 | 20,337 | 23,858 | 26,171 | 29,615 | 32,671 | 38,932 |
| 22 | 21,337 | 24,939 | 27,301 | 30,813 | 33,924 | 40,289 |
| 23 | 22,337 | 26,018 | 28,429 | 32,007 | 35,172 | 41,638 |
| 24 | 23,337 | 27,096 | 29,553 | 33,194 | 35,415 | 42,980 |
| 25 | 24,337 | 28,172 | 30,675 | 34,382 | 37,652 | 44,314 |
| 26 | 25,336 | 29,246 | 31,795 | 35,563 | 38,885 | 45,642 |
| 27 | 26,336 | 30,319 | 32,912 | 36,741 | 40,113 | 46,963 |
| 28 | 27,336 | 31,391 | 34,027 | 37,916 | 41,337 | 48,278 |
| 29 | 28,336 | 32,461 | 35,139 | 39,087 | 42,557 | 49,588 |
| 30 | 29,336 | 33,530 | 36,250 | 40,256 | 43,775 | 50,892 |

## V. CONCLUSION

Based on the research that has been done, it can be concluded that learning with e-Learning systems is very influential in the learning process. This can be seen from the students' active access to lecture material. The use of e-Learning system has a more dominant positive impact on facilitating student learning and effectiveness in accessing assignments given by lecturers. The relationship between Easy to Use features provided by the institution's e-Learning with an Attractive Interface is much related. If the Interface is attracting but difficult to use, then the e-Learning web is very ineffective.


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