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## APPLICATION E-LEARNING BASED ON CLOUD COMPUTING AT THE FACULTY OF ENGINEERING, BATAM UNIVERSITY

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### ABSTRACT

*The development of information technology and the increasingly widespread use of the internet has changed the learning process in higher education, especially during the COVID-19 pandemic, many higher education are conducting distance learning processes by implementing cloud computing-based e-learning. This is also in line with the government's recommendation that we apply health protocols to break the chain of the Covid-19 virus, such as studying and working from home. Batam University, in this case, the engineering faculty, includes those implementing cloud computing-based e-learning for distance learning The purpose of this research is to see how far the implementation of e-learning based on cloud computing according to users, in this case, are lecturers and students of the engineering faculty of Batam University, knowing the readiness of lecturers and students towards the process and products of e-learning itself and satisfaction from the lecturers and students. at the University of Batam at the engineering faculty during the e-learning implementation process. This research method uses a combination of quantitative and qualitative descriptive methods by distributing questionnaires to lecturers and students in the university environment at the engineering faculty which consists of 4 (four) study programs namely mechanical engineering, electrical engineering, civil engineering, and information systems After processing the data using the validity test, reliability test and qualitative analysis, it was*

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*obtained that the lecturer respondents agreed with the implementation of cloud computing-based e-learning by 41%, with an average Respondent Achievement Level (TCR) of lecturers of 81.82% in good category. Student respondents' answers strongly agree with the implementation of e-learning based on cloud computing of 44 with an average Student Achievement Level of Respondents (TCR) of 80.47% in good category.*

**KEYWORDS**

Application, E-Learning, Cloud Computing



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## INTRODUCTION

Creative and innovative learning models based on information technology in the industrial era 4.0 need to be developed to increase the effectiveness and efficiency of learning, especially during the COVID-19 pandemic. Things that seem less interesting, monotonous and boring must be avoided, so that the role of a media in learning becomes varied and not boring (Muhson, 2010). The use of e-learning based on cloud computing has an impact on changing the learning culture where students are required to be able to learn independently and have motivation and be able to regulate themselves in learning (al Ajmi et al., 2017). Lecturers and students are required to have expertise in developing knowledge and skills, as well as abilities in information technology (Aljena et al., 2011; Rajabion et al., 2019).

The implementation of learning models in the industrial era 4.0 is currently leading to online distance learning based on cloud computing and many are using it during the covid-19 pandemic, with expectation helping students in doing interactive, varied, constructive, effective, productive and fun learning that can be done anytime and anywhere (Ahmed, 2015; Wu & Plakhtii, 2021). This learning model is also very appropriate during the COVID-19 pandemic in line with the government's recommendation to continue working and studying from home (maintaining distance) and it is also possible to do it after the COVID-19 pandemic because of its advantages.

One of the internet-based information technologies that is quite popular in the world of education and learning is e-learning (Korucu & Alkan, 2011). E-Learning is one of the developments of information technology in the world of education which has the benefit of connecting lecturers and students to view schedules, send assignments given by lecturers, all of which can be done online (Bora & Ahmed, 2013; Jethro et al., 2012). The definition of e-learning is the process and activity of implementing web-based learning, computer-based learning, virtual classrooms, and/or digital classrooms (Arkorful & Abaidoo, 2015; el Mhouthi et al., 2018). The materials in these electronic learning activities are mostly delivered via the internet, intranet, video or audio tapes, broadcasting via satellite, interactive television and CD-ROM (Rusman, 2011). E-Learning is using internet technology to provide a solution with high knowledge and skills (Rosenberg, 2001). E-Learning is how to provide learning products in the form of CD-ROM or web or both. According to the authors of the expert opinions above, it can be said that e-learning is an electronic-based teaching and learning process (computers, tablets, gadgets) that is carried

out online but utilizes internet and is digital-based that can connect educators and students anywhere and anytime.

The engineering faculty of the University of Batam has implemented e-learning before the covid19 pandemic and became the main solution for lectures during the covid19 pandemic. This learning uses electronic devices and utilizes internet technology. In E-learning, lecturers not only upload lecture materials that can be accessed by students, but also evaluate lectures, communicate, collaborate, and manage other aspects of lectures. The learning process with cloud computing-based e-learning in its implementation there are still obstacles and shortcomings, however, since it has been used, there has never been an evaluation of the implementation use of cloud computing-based e-learning, so researchers are interested in seeing how far cloud computing-based E-Learning is used in the Faculty of Engineering, Batam University.

## RESEARCH METHOD

This research is a mixed research, namely quantitative and qualitative research to determine the implementation of cloud computing-based e-learning in the engineering faculty of Batam University. Population is a generalization area consisting of objects/subjects that have certain quantities and characteristics determined by the researcher to be studied and then draw conclusions (D. Sugiyono, 2018). Where the population in this study are users of cloud computing-based e-learning in the engineering faculty of the University of Batam, which consists of lecturers and students. The sampling technique in this study is using the Non-Probability Side Accidental Sampling technique, which is a sampling technique that does not provide equal opportunities/opportunities for each element or member of the population to be selected as a sample (Prof. Dr. Sugiyono, 2019). The data collection methods used in this research are Questionnaire, Literature Study.

## RESULT AND DISCUSSION

Data analysis was performed using the instrument validity with the Product Moment Correlation technique. The software used for analysis is SPSS 20 version.

### A. Validity Test

#### 1). Lecturer Questionnaire Validity

Test the validity of the lecturer's questionnaire using the instrument validity test of Product Moment Correlation technique. Product Moment Correlation value is obtained from the calculation results of SPSS 20 and compared with  $r_{table}$  ( $df = N(19) - 2 = 17$  (0.456)). The value of the questionnaire calculation valid if  $r_{count}$  is greater than  $r_{table}$  and vice versa. Based on the results of the validity test of the implementation of cloud computing-based e-learning at the engineering faculty of the University of Batam which has been processed using SPSS Version 20, as shown in table 2 below:

Table 2. Validity Test of Cloud Computing-Based E-Learning Implementation (Lecturer)

Statement	R <sub>count</sub>	R <sub>Tabel</sub>	Description
P1	0,711	0,456	Valid
P2	0,819	0,456	Valid
P3	0,718	0,456	Valid
P4	0,665	0,456	Valid
P5	0,683	0,456	Valid
P6	0,636	0,456	Valid
P7	0,695	0,456	Valid
P8	0,516	0,456	Valid
P9	0,555	0,456	Valid
P10	0,468	0,456	Valid
P11	0,637	0,456	Valid
P12	0,648	0,456	Valid
P13	0,620	0,456	Valid
P14	0,719	0,456	Valid
P15	0,709	0,456	Valid
P16	0,760	0,456	Valid
P17	0,732	0,456	Valid
P18	0,662	0,456	Valid
P19	0,853	0,456	Valid
P20	0,793	0,456	Valid
P21	0,799	0,456	Valid
P22	0,573	0,456	Valid
P23	0,726	0,456	Valid
P24	0,868	0,456	Valid
P25	0,601	0,456	Valid
P26	0,674	0,456	Valid
P27	0,617	0,456	Valid
P28	0,715	0,456	Valid
P29	0,784	0,456	Valid
P30	0,598	0,456	Valid
P31	0,805	0,456	Valid
P32	0,773	0,456	Valid
P33	0,750	0,456	Valid

2) Student Questionnaire Validity

Test the validity of the students questionnaire using the instrument validity test of Product Moment Correlation technique. Product Moment Correlation value is obtained from the calculation results of SPSS 20 and compared with  $r_{table}$  ( $df = N (135) - 2 = 133 (0,169)$ ). The value of the questionnaire calculation valid if  $r_{count}$  is greater than  $r_{table}$  and vice versa. Based on the results of the validity test of the implementation of cloud computing-based e-learning at the engineering faculty of the University of Batam which has been processed using SPSS Version 20, as shown in table 3 below:

Tabel 3. Validity Test of Cloud Computing-Based E-Learning Implementation (student)

Statement	R <sub>count</sub>	R <sub>Tabel</sub>	Description
P1	0,887	0,169	Valid

<b>P2</b>	0,862	0,169	Valid
<b>P3</b>	0,732	0,169	Valid
<b>P4</b>	0,802	0,169	Valid
<b>P5</b>	0,787	0,169	Valid
<b>P6</b>	0,882	0,169	Valid
<b>P7</b>	0,805	0,169	Valid
<b>P8</b>	0,737	0,169	Valid
<b>P9</b>	0,817	0,169	Valid
<b>P10</b>	0,860	0,169	Valid
<b>P11</b>	0,384	0,169	Valid
<b>P12</b>	0,474	0,169	Valid
<b>P13</b>	0,712	0,169	Valid
<b>P14</b>	0,769	0,169	Valid
<b>P15</b>	0,786	0,169	Valid
<b>P16</b>	0,771	0,169	Valid
<b>P17</b>	0,806	0,169	Valid
<b>P18</b>	0,751	0,169	Valid
<b>P19</b>	0,815	0,169	Valid
<b>P20</b>	0,730	0,169	Valid
<b>P21</b>	0,891	0,169	Valid
<b>P22</b>	0,858	0,169	Valid
<b>P23</b>	0,887	0,169	Valid
<b>P24</b>	0,842	0,169	Valid
<b>P25</b>	0,429	0,169	Valid
<b>P26</b>	0,452	0,169	Valid
<b>P27</b>	0,815	0,169	Valid
<b>P28</b>	0,875	0,169	Valid
<b>P29</b>	0,905	0,169	Valid
<b>P30</b>	0,864	0,169	Valid
<b>P31</b>	0,870	0,169	Valid
<b>P32</b>	0,880	0,169	Valid
<b>P33</b>	0,760	0,169	Valid

b. Reliability Test

1) **Lecturer Questionnaire Reliability**

The reliability test using Alpha Cronbach was carried out by comparing the Alpha coefficient values obtained from calculations using the SPSS Version 20 program. The results of the Alfa Cronbach assessment of reliability on the implementation of cloud computing-based e-learning learning at the engineering faculty of the University of Batam were processed using SPSS Version 20 as shown in table 4 below:

Tabel 4. Reliability Test of Cloud Computing-Based E-Learning Implementation

<b>Cronbach's Alpha</b>	<b>N of Items</b>
.968	33

2) **Student Questionnaire Reliability**

The reliability test using Alpha Cronbach was carried out by comparing the Alpha

coefficient values obtained from calculations using the SPSS Version 20 program. The results of the Alfa Cronbach assessment of reliability on the implementation of cloud computing-based e-learning learning at the engineering faculty of the University of Batam were processed using SPSS Version 20 as shown in table 4 below:

Tabel 5. Reliability Test of Cloud Computing-Based E-Learning Implementation

<b>Cronbach's Alpha</b>	<b>N of Items</b>
.979	33

c. Qualitative Analysis

Based on the results of a questionnaire regarding the implementation of cloud computing-based e-learning at the engineering faculty of the University of Batam, it was conducted by distributing questionnaires to 19 lecturer samples and 135 student samples representing the population of cloud computing-based e-learning users consisting of active lecturers and students. sample test using Non-Probability Sampling technique. the recapitulation of respondents' answers is presented in table 6 as follows:

Tabel 6. Recapitulation of Respondents' Answers to the Implementation of Cloud Computing-Based E-Learning

<b>Response</b>	<b>%</b>	<b>Result</b>				
		<b>STS</b>	<b>KS</b>	<b>N</b>	<b>S</b>	<b>SS</b>
<b>Lecturer</b>	%	0%	2%	19%	41%	37%
<b>Student</b>	%	5%	6%	14%	31%	44%

Based on table 6 above, it shows that lecturer respondents agree with the percentage value of 41% and student respondents strongly agree with the percentage value of 44% on the implementation of cloud computing-based e-learning at the engineering faculty of Batam University.

Respondents' Level of Achievement (TCR) implementation of cloud computing-based e-learning at the engineering faculty of the University of Batam is shown in table 7 as follows:

Tabel 7. Respondents' Level of Achievement (TCR) on the Implementation of Cloud Computing-Based E-Learning (Lecturers)

<b>Responden</b>	<b>Total TCR (%)</b>	<b>Kategori</b>
<b>Lecturer</b>	81,82 %	Good
<b>Student</b>	80,47 %	Good

Based on table 7 above, it shows the Respondent Achievement Level (TCR) of lecturers on the implementation of cloud computing-based e-learning at the engineering faculty of the University of Batam, with an average Respondent Achievement Rate (TCR) of lecturers 81.82% and Respondent Achievement Rate (TCR) students is 80.47% with good category.

## CONCLUSION

The result of lecturer respondent and student for the implementation of cloud computing-based e-learning in the engineering faculty of the University Batam are significant positive. Respondents' Level of Achievement (TCR) on the Implementation of Cloud Computing-Based E-Learning of Lecturers 81,82%, and TCR of student 80,47% with Good Category.

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