



Effectiveness of the Use E-Learning: Course on Research Methodology Student of Electrical Engineering Education

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INFORMATION

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ABSTRACT

This research study focuses on the differences in effectiveness in the use of media e-learning during research methodology. This type of research is a quasi-experimental research design with post-test control group design. The populations of this study were all students majoring in electrical engineering education, Faculty of Technic, State University of Medan, batch 2017 and 2018. Sampling was done by random sampling technique. The research sample of the e-learning Schoology class was 42 students, and the e-learning web class was 40 students. From the research data, it was found that there was any difference in learning outcomes between the e-learning Schoology class and the e-learning web. For the effectiveness of using learning media, it was found that web e-learning was considered quite effective compared to e-learning Schoology.

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INTRODUCTION

Technological innovations that continue to develop rapidly in the era of the fourth industrial revolution, or Industry 4.0, the way the new generation learns and the way to effectively educate new students has changed [1]. By using sophisticated information and communication technology, new generations can, and even get used to, access information quickly anytime and anywhere. A situation like this encourages the need for innovation in education to achieve Education 4.0. One way to face the industrial era 4.0 is leading to the formation of Education 4.0. Education 4.0 is to use the method Blended Learning [2].

Blended Learning Is a learning method where there is a mixture of material from traditional classroom methods and class methods online using digital media [3]. By using blended learning, students can enjoy both the benefits of learning by teaching traditionally as well as learning through modern online platforms.

With blended learning, teachers can combine their teaching experience and abilities with technology facilities web containing visuals and audio that has been frequently accessed by new generation students [4]. The facilities that can be used to implement blended learning also take advantage of various technologies that drive the 4.0 industrial revolution, such as cloud computing and technology tools mobile. There are many models blended learning also flexible and adaptive, in other words, this model can adapt learning to the abilities and desires of students [5]. In addition, at the end of 2019 the whole world was shocked by the Coronavirus Disease (Covid-19) attack, making learning carried out fully online.

The covid-19 pandemic tragedy is a boomerang for all countries that have not been resolved. The spread that is so fast with a high risk of death for the elderly, people with comorbidities, toddlers and medical personnel has resulted in the implementation of a system lockdown. The record number of the last cases in Indonesia on January 12, 2022, there were 310 million positive, and 5.4 million deaths. Every day the number of positive patients with Covid-19 is increasing. To fight Covid-19, the Government has prohibited crowding, social distancing and physical distancing, wearing masks and always washing hands [6]. Through the Ministry of Education and Culture, the Government has prohibited universities from carrying out face-to-face (conventional) lectures and ordered them to hold lectures or learning online (Kemendikbud Dikti Circular Letter No.1 of 2020).

The form of lectures that can be used as a solution during the Covid-19 pandemic is online learning [7]. Online learning is learning that uses internet networks with accessibility, connectivity, flexibility, and the ability to generate various types of learning interactions. Online learning is learning that is able to bring together students and lecturers to carry out learning interactions with the help of the internet [8]. At the level of implementing online learning, it requires the support of mobile devices such as smartphones, laptops and computers that can be used to access information anytime and anywhere. Higher education institutions during WFH need to carry out strengthening of online learning [9]. Online learning has become a demand in the world of education since the last few years. Online learning is needed in learning in the era of the industrial revolution 4.0.

During the pandemic, learning is carried out fully online in all courses, including Research Methodology courses that are determined to be carried out online. This has sparked competition for the popularity of online applications that offer effective learning methods. Even social accounts have switched functions as online learning tools, such as YouTube, Instagram and WhatsApp. And also the use of applications e-learning such as google classroom, Edmodo, web, Moodle and Schoology [10].

With the use of e-learning teaching materials can be visualized in various formats and forms that are more dynamic and interactive so that learners or students will be motivated to be further involved in the learning process. In addition, the e-learning atmosphere can accommodate students to play a more active role in learning; students make designs and look for additional material on their own [11].

One of the LMS that needs to be considered is Schoology and the web [12] [13]. The use of Schoology and the web is still very few among universities even though the facilities available in Schoology and the web to support the learning process are very many, however, the use of computer facilities connected to the internet for learning activities is still very few. These problems make lecturers, educators only provide material to students with the direct method of giving

assignments to students without any explanation, the method can be said to be monotonous and tedious besides that the lecturers also cannot deliver learning optimally, so it does not foster stimulation of the enthusiasm for student learning. Low student enthusiasm for learning indicates that the quality of learning by educators is also low [14]. This situation can be found in the Research Methodology course which is a theory course.

The Research Methodology course at the Department of Electrical Engineering Education, Faculty of Engineering, State University of Medan is one of the subjects that is the basis for achieving key competencies in research methods science. This subject has the basic competencies of students being able to practice standard research concepts from making research proposals, conducting field research, processing data, analyzing data and reporting research. The purpose of this study was to compare student learning outcomes and the effectiveness of using e-learning.

METHOD

The research method used in this research is quasi experimental research. Experimental research is a series of activities to manipulate the variables in a study by keeping several other variables constant. With the research design used is "Posttest Control Group Design" with the assumption that both classes have the same pre-test score [15].

Table 1. Research Design

Class	Treatment	Post-Test
Schoolology	X	T ₁
Web	X	T ₂

Description:

X : Learning using Schoolology and Web

T₁ : Post-test Schoolology

T₂ : Post-test Web

Assumptions for class web:

1. Control class is selected from classes that have taken research methodology courses in the last semester, totaling 40 students.
2. In the last semester students studied using the e-learning web.
3. The final scores of the control class students that have been collected will be compared with the scores of students taking the current research methodology course.
4. The post-test used is also the same as the post-test used for students who are taking research methodology courses.

The populations in this study were all students of Electrical Engineering Education Force 2018 Faculty of Technic, State University of Medan with 2 classes with a total of 98 students. Sampling in this study using random sampling technique. The numbers of samples in this study were 42 students. Testing the categorization of the effectiveness of using media was e-learning carried out using the N-Gain test . The following are categories of N-Gain effectiveness.

Table 2. Category Effective N-gain

Percentage (%)	Interpretation
0 < 40	Ineffective
40 - 55	Less effective
56 - 75	Quite effective
100 > 76	Effective

RESULTS AND DISCUSSIONS

Learning using e-learning in research methodology courses is said to be effective if it can produce results learning student research methodology achieves minimum learning criteria and makes students feel happy and comfortable in attending lectures. The following are the results of student learning tests:

Table 3. Student Learning Outcomes

Class	N	Std.Dev	Mean
Schoology	42	13.355	64.88
Web	40	4.382	84.08

Table 4. Calculation Results Normality Test

Class	K-S	α	Specification
Schoology	0.399	0.05	Normal
Web	0.749	0.05	Normal

Data post-test class Schoology and web normal distribution. This is evidenced by the Asymp value. Sig. (2 tailed) is greater than the α value.

Table 5. Calculation Results of Homogeneity Test

Class	Variance	F _{Count}	F _{Table}	Information
Schoology	13.354	3.047	3.24	Homogeneous
Web	4.381			

Because $F_{\text{Count}} < F_{\text{Table}}$, it can be concluded that the variance of the two groups is homogeneous (same). Testing differences in learning outcomes in research methodology courses between classes Schoology and the web was carried out by using the t test on the data post-test. Criteria for acceptance of the hypothesis when $t_{\text{count}} > t_{\text{table}}$.

Table 6. The results of the t-test

Variable	T test for Equality of Means		
	t _{count}	t _{table}	Dk
Learning Outcomes	9.6769	1.99006	80

Based on the table t-test results the value of t_{count} is 9.6769, which means that $t_{\text{count}} > t_{\text{table}}$. So it can be concluded that there are differences in learning outcomes. Besides that, it can be seen from the average post-test score of the web class of 84.55, which means that the learning outcomes of students in classes learning research methodologies using web e-learning are higher than those in classes learning research methodology using e-learning Schoology.

Testing the categorization of the effectiveness of using media was e-learning carried out using the N-Gain test. Based on the results of the calculation of the N-Gain score, the values obtained are as shown in the table below:

Table 7. The results of the calculation of N-Gain

Class	N-Gain (%)	Minimum (%)	Maximum (%)	Description Category
Schoology	12.20	-35.00	82.50	Not Effective
Web	60.18	30.00	82.50	Effective Enough

From the table above, it can be concluded that the use of e-learning Schoology media for research methodology courses is considered less effective because the calculation of the percentage of the N-Gain value is less than 40%, which is only 12.20%, while the use of media web e-learning for courses The research methodology is considered quite effective because from the calculation of the percentage of the N-Gain value it is obtained 60.18%.

CONCLUSION

This study aims to determine the difference in the effectiveness of using e-learning media in the research methodology subject in the Electrical Engineering Education Department, Faculty of Technic, State University of Medan. With the sample for the e-learning Schoology class, 42 namely students of class 2018 and for the class web e-learning, it was taken from students who had taken research methodology courses, namely students of class 2017 who previously used media web e-learning with the number of students 40 people. The pre-test for both classes is the same, the difference is the value of the post-test. So, what is analyzed is only the student's final score (post-test).

This study uses the t-test to see differences in student learning outcomes. While the N-gain test is used to see the effectiveness of the use of media e-learning in the research methodology course. Based on the results of the t-test, it is known that there are differences in student learning outcomes, and the results of the calculation of the mean value of the class web e-learning are better or higher than the e-learning Schoology class. For the effectiveness of using media e-learning, it was found that the class was web e-learning considered quite effective in its use compared to the e-learning Schoology class which was considered ineffective in its use.

The effectiveness of web e-learning is considered quite effective because the settings for e-learning are more flexible than e-learning Schoology. For the design of the e-learning web, it can be adjusted according to the characteristics of the user so that it can generate enthusiasm for student learning. The arrangement and addition of features on the e-learning web is more flexible, which

can be adjusted according to the wishes of the creator and user, it is different from the e-learning Schoology whose features are already available from its LMS. The use of e-learning web for research methodology courses is also considered easier than e-learning Schoology. For uploading material, quizzes, discussions and other e-learning, the web is more adequate and easier to use. Some of the reasons above can be reinforcement that web e-learning is more effective than e-learning Schoology. This is also in line with research conducted by [16] with the results that the e-learning web has advantages, namely flexible time in learning, features that support learning, an attractive display e-learning that can increase student enthusiasm for learning. Likewise, research conducted by [17] which explains that with the integration of computers, and especially web e-learning, into the education system, there has been a shift from centralized classroom-based education to distributed e-learning courses that can be taken at anytime and anywhere.

Based on the results of research and discussion, it can be concluded that there are differences in student learning outcomes, be it classes that study using e-learning Schoology media or e-learning web and there are differences in the average score results of students in classes learning with media e-Web learning is better or higher than the average score of the e-learning Schoology class. For effectiveness, it was found that the class was web e-learning quite effective compared to the e-learning Schoology class which was considered ineffective in its use.

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