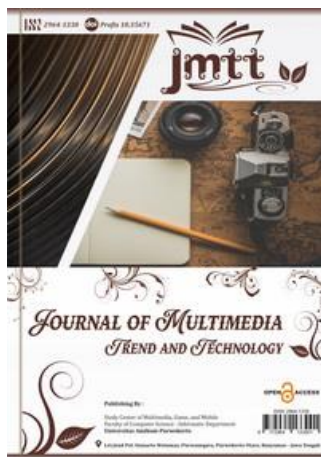


Development of Multimedia-Based E-Learning Models in Distance Learning Concepts

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ABSTRACT

Learning content is the most important thing in the teaching and learning process. In the distance learning model, content must receive important attention, because in distance learning, students get material with a greater proportion of reading content independently than face to face with the tutor. Moreover, currently the type of learning can be said to be developing with the help of information technology. The problem lies in the type of each person in implementing learning styles. Not everyone has a type as an active reader. The application of multimedia to distance learning content will help students absorb more learning materials. The method used is blended learning which combines conventional concepts with information technology to change the concept of learning to be more interactive. This is proven by the increase in learning outcomes of students who study using the blended learning concept using multimedia compared to those who study independently. In the current situation, namely the era of personalized learning, multimedia plays a very important role in the implementation of teaching and learning.

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INTRODUCTION

In a number of ways a system or idea in education known as "e-learning" makes use of information technology to facilitate teaching and learning. Learning that is intended to be supported by computer or electronic systems in order to facilitate learning [1].

In other words, the distance learning process combines the principles of the learning process with technology [2]. As well as the learning system used as a means for the teaching and learning process that is carried out without having to meet face to face between teachers and students [3][4]. In e-learning, content is the most important thing that underlies the success of the learning process on the internet media, in addition to content, interaction between users is also needed as a substitute for the face-to-face process, content or teaching materials on the internet can be in the form of text and presentations, but text content is still considered lacking in meeting learning needs [5][6]. Another problem is that the content that is widely used in the form of text or presentation slides has very minimal interaction so that some lessons, especially those that are practical, will be more difficult to convey [7][8].

In this study we try to develop multimedia-based e-learning and measure the effectiveness of learning outcomes with the application of multimedia in e-learning [9][10]. The concept of multimedia is the combination of two or more media elements consisting of text, images, photos, audio, video and animation in an integrated manner [11]. The advantages and benefits of delivering material with the concept of multimedia learning are that the learning process is more interesting, more interactive, the amount of teaching time can be reduced, the quality of student learning can be improved and the teaching and learning process can be done anywhere and anytime, and students' learning attitudes can be improved [12]. The implementation of multimedia in distance learning will further improve the quality of e-learning because the problem with e-learning is that the content is less able to explain the learning material because in general the content in e-learning only contains slides and materials in the form of pdfs that are less attractive [13].

Multimedia comes from the words multi and media. Multi means many, and media means a place, means or tool used to store information [14]. So based on the word, 'multimedia' can be assumed as a container or unification of several media which are then defined as elements of multimedia formation. These elements are: text, images, sound, animation, and video [15][16]. Multimedia is a new concept and technology in the field of information technology, where information in the form of text, images, sound, animation, and video is combined in a computer to be stored, processed, and presented either linearly or interactively [17].

E-learning stands for Enhance Learning, is a new way in the teaching and learning process that uses electronic media, especially the internet as its learning system [18]. E-learning is the basis and logical consequence of the development of information and communication technology. E-learning is any teaching and learning that uses electronic networks (LAN, WAN, or internet) to deliver learning content, interaction, or guidance [6][8]. E-learning refers to the use of internet technology to deliver a series of solutions that can improve knowledge and skills. E-Learning is a type of teaching and learning that allows the delivery of teaching materials to students using the Internet, Intranet or other computer network media [19]. E-Learning is an education system that uses electronic applications to support teaching and learning with the Internet, computer networks, or standalone computers [20].

Learning content is the most important thing in the teaching and learning process. In the distance learning model, content must receive important attention, because in distance learning, students get material with a greater proportion of reading content independently than face to face with the tutor [21]. Moreover, currently the type of learning can be said to be developing with the help of information technology. The problem lies in the type of each person in implementing learning styles. Not everyone has a type as an active reader. The application of multimedia to distance learning content will help students absorb more learning materials. The method used is blended learning which combines conventional concepts with information technology to change the concept of learning to be more interactive. This is proven by the increase in learning outcomes of students who study using the

blended learning concept using multimedia compared to those who study independently. In the current situation, namely the era of personalized learning, multimedia plays a very important role in the implementation of teaching and learning [22].

Based on the research that has been done, several problems were found in this study, including first e-learning is less effective because the content as teaching materials is generally in the form of text and presentation slides so that it cannot provide visual understanding. Second, less interesting material can reduce the learning interest of participants. Third, text content does not provide support for practicum-based courses. Fourth, lack of interest in the material reduces effectiveness in learning activities.

METHOD

This type of research is field research, meaning that research is conducted directly in the scene or field where the symptoms occur. The method used is an experimental method using a "post test only control design" design, namely placing research subjects into two classes which are divided into experimental and control class categories. The experimental class was given treatment, namely learning with life skill learning strategies and the control class with conventional learning. The design pattern of this research is as follows:

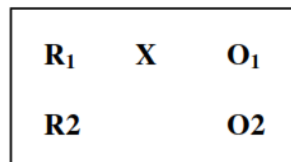


Figure 1. Research problem solving concept pattern.

Description:

R1 = Random (initial state of the experimental group).

R2 = Random (initial state of the control group).

X = Treatment.

O1 = Effect of giving treatment.

O2 = Effect of not giving treatment.

In this research, the subjects of the research were 1st semester students of the Faculty of Computer Science who took the Super Superior Training course, the experimental class was students of the informatics study program, and the control class was students of the information systems study program at Amikom University, Purwokerto.

Table 1. Population of respondents involved.

Class	Number of Experiment	Number of Control
Total	30	30

Population: 1A = 30, and 1C = 30 by taking from the FIK-UAP data source. From the population, the following sample data will be taken, Some formulas for determining the number of samples include using the Slovin Formula (1), namely:

$$n = \frac{N}{1+(N \cdot E^2)} \quad (1)$$

Description:

n = sample.

N = population.

e = error tolerance.

Calculation:

N = population 30 Students

e = error tolerance. (0.05)

Maybe: $n = \frac{30}{1+(30 \times 0.05^2)}$ result is: $n = 27.90$ By rounding the numbers, the number of samples in this study was 28 for each experimental and control class.

RESULT

Before discussing further, first see what has been displayed in the applied teaching and learning concept. The following multimedia learning implementation is an initial display of the previous use of e-learning.

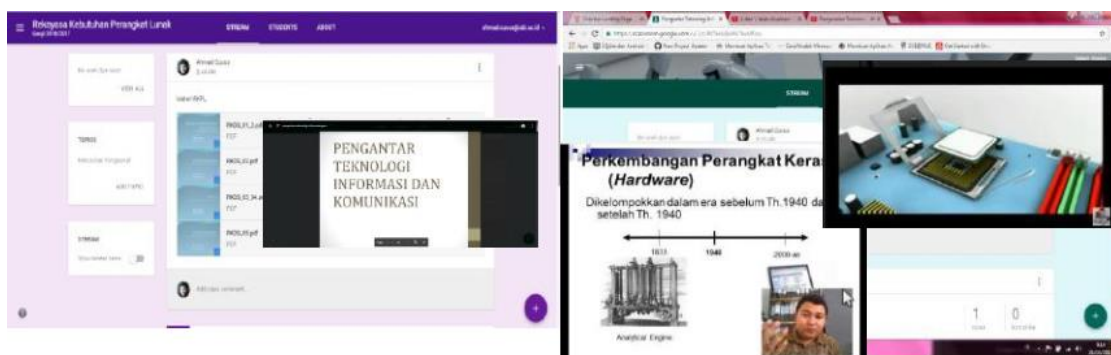


Figure 2. Display of applied multimedia-based learning.

The display aspect that has been implemented has been partially applied in several courses. The results in table 2 are the implementation in the Super Superior Training (PSU) course in semester 1. The results of the assessment of the Faculty of Computer Science, Amikom University, Purwokerto, which are divided into 2, namely the control class and the experimental class are:

Table 2. Results of the control and experimental class assessments.

Research Object	Control Class	Experiment Class	Research Object	Control Class	Experiment Class
Object 1	72	90	Object 15	60	70
Object 2	76	90	Object 16	64	70
Object 3	52	80	Object 17	80	80
Object 4	64	70	Object 18	60	60
Object 5	52	70	Object 19	52	90
Object 6	60	90	Object 20	40	80
Object 7	56	90	Object 21	64	90
Object 8	60	80	Object 22	8	80
Object 9	72	100	Object 23	44	100
Object 10	68	80	Object 24	52	70
Object 11	64	70	Object 25	56	90
Object 12	80	80	Object 26	64	80
Object 13	48	90	Object 27	68	80
Object 14	60	90	Object 28	64	80

Then the data in table 2 is processed using SPSS (Statistical Product and Service) with the Paired Samples Test technique to determine which hypothesis is accepted in this study.

Table 3. Paired Samples Statistics.

Pair 1	Mean	N	Std. Deviation	Std. Error Mean
Experiment	81,7857	28	9,83327	1,85831
Control	59,2857	28	14,07087	2,65914

Table 3 explains that the standard deviation of the values in the first variable (according to the mean of 81.7857). Standard deviation measures the spread or variability of data around the mean value. A value of 9.83327 indicates that the data for this variable has a spread of about 9.83 units from its mean. The larger the standard deviation, the greater the spread of the data. Then the standard error of the mean (SEM) for the first variable. SEM measures how accurately your sample mean estimates the true population mean. SEM is calculated by dividing the sample standard deviation by the square root of the sample size (N). A smaller SEM value indicates that the sample mean is likely closer to the population mean.

Table 4. Paired Samples Correlations.

Pair 1	N	Correlation	Significant
Experiment Control	28	,010	,961

Table 5. Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Experiment - Kontrol	21,50000	17,08909	3,22953	15,87354	29,12646	6,967	27	,000

In the first output, namely Paired Samples Statistics, it can be seen that the average value obtained from the control class and the experimental class increased from 59 to 81. N shows the number of data (students) who took the assessment. The standard deviation shows the heterogeneity that occurs from the control class and the experimental class is 14 and 9, while the standard error of mean from the control class and the experimental class is 2.6 and 1.8.

In the second output, namely Paired Samples Correlations, it shows whether there is a relationship between the average value of the control class and the experimental class. It can be seen that the Sig value (0.961) > α (0.05) so it can be concluded that there is no significant relationship from the results of the implementation of this learning media application. It can also be seen that the strength of the correlation shows a very low correlation (0.010).

The third output of the Paired Samples Test can be interpreted as follows:

- a. Hypothesis:
 - H0: $\mu_1 = \mu_2$ (average of control class)
 - H1: $\mu_1 \neq \mu_2$ (average of experimental class)
- b. Significance Level, (α) = 5%
- c. Critical Region, If Sig. < α : reject H0
- d. Test Statistics:

- Sig. = 0.000, $\alpha = 0.05$
 - Sig. (0.000) < α (0.05)
- e. Test Decision Because the value of Sig. < α then the decision is to reject H0.
- f. Conclusion so with a significance level of 5% it is concluded that the average of the control class and the experimental class are not the same / significantly different

CONCLUTIONS

After the researcher conducted an analysis of the learning activities of Introduction to Information Technology for Students of the Faculty of Computer Science, Amikom University, Purwokerto, it was concluded that the use of e-learning media with content built in multimedia can improve student learning outcomes, this was obtained from measurements carried out in the control class and the experimental class between students in the informatics engineering study program and students in the information systems study program, the initial hypothesis regarding this study was, H0: There is no significant influence in the application of multimedia to the e-learning module for the effectiveness of independent learning. H1: There is a significant influence in the application of multimedia to the e-learning module for the effectiveness of independent learning. From the results of the statistical test, the following results were obtained, Sig. = 0.000, $\alpha = 0.05$ and Sig. (0.000) < α (0.05) with the decision to reject H0 which means accepting H1 which means there is a significant influence in the independent learning model using e-learning based on multimedia content.

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Author Contributions

Analysis: H.D.B, Writer: N.I.D.C, Validation: H.D.B, & N.I.D.C, Translation: N.I.D.C.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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