Implementation of Interactive Learning in Linear Algebra Courses using HTML

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Abstract

Education or learning is essentially a process of optimizing a child's potential towards the achievement of certain abilities as a standard for learning outcomes, by the task of growth and development which is reflected in the selection of life skills. Generating motivation regarding the learning material will increase the interest of learners in participating in learning. Giving attention to learning can be through learning media. Learning media is very developed and continues to increase due to the use of computer information technology. The purpose of this project was to examine how HTML may be used to enable interactive learning in Linear Algebra courses. The experimental research method employed in this study was the One Group Pre-test Post-test Design. Data analysis in this study used the Wilcoxon test because the data were not normally distributed. The results indicate that student scores significantly improved between the pre-test and post-test. Interactive media affect online learning today, so it is hoped that teachers/lecturers will use interactive media more in learning.

Keywords: HTML, interactive learning, Linear Algebra

Introduction

The teaching and learning process is a separate communication process between teachers and students, where the teaching and learning process consists of three important elements, namely the teacher in this case the lecturer, the learner, in this case, is the student, and the teaching materials provided by the teacher. The teacher has the key as the control in effective and efficient communication. Students' participation in the teaching and learning process, resulting in one-way communication rather than two-way communication (Hidayat & Sudibyo, 2018a). Several attempts were made to tackle the challenges that arise during the teaching and learning process. The purpose of educational development is to assist instructors and students in overcoming obstacles in the classroom. One way to accomplish the growth of this education is to use interactive learning media (Nurcahyo et al., 2020).

Education or learning is essentially a process of optimizing a child's potential towards the achievement of certain abilities as a standard for learning outcomes, by the task of growth and development which is reflected in the selection of life skills (Zaitun et al., 2021). In the education process, humans are seen as subjects or actors as well as objects or targets. In the world of education, many problems arise in achieving educational output goals, starting from students, educators, educational interactions between students and educators, educational content, and contexts that affect the educational atmosphere. Along with the rapid

development of Indonesia's population and the rapid development of technology, followed by the increasing need for education and goods, it is necessary to be accompanied by the development of understanding of educational materials to achieve maximum output, namely the formation of quality graduates who are competitive in the world. work. The world of education needs information technology to support the learning system. Learning is a process of changing one's behavior towards certain situations caused by repeated experiences in that situation, changes in behavior are not explained based on innate responses, and so on. In learning, students are expected to be active so that there is an understanding of the knowledge being taught (Hidayat & Sudibyo, 2018b).

In teaching and learning activities there are things that educators must understand so that there is an understanding of the material. Understanding the material for students can be done by generating and maintaining students' attention by attracting and directing students' attention (Tinungki & Nurwahyu, 2020). Generating motivation regarding the learning material will increase the interest of learners in participating in learning. Giving attention to learning can be through learning media. Learning media is very developed and continues to increase due to the use of computer information technology (Lestari et al., 2018). Previous research related to the use of interactive media with documentary films, which affect learning (Asri & Junaid, 2021). Furthermore, the development of HTML-based interactive media is used in learning materials in schools (Lelilita & Zuhdi, 2016). The goal of this study is to use HTML to enable interactive learning in Linear Algebra courses.

Method

The One Group Pre-test Post-test Design was used as an experimental research method in this study. A total of 20 students from Duta Bangsa University were used as subjects in this study. The pre-test was carried out before the researcher gave treatment to the students. The treatment was carried out after the researchers got the initial data from the students. This treatment is the application of HTML-based interactive media. The post-test was carried out after the researcher gave treatment to the students.

A paired t-test was used to analyze the data in this study. When comparing two treatments on the same sample across time, the T-test with Paired Sample t-Test is utilized. So that from this treatment, two different kinds of sample data will be obtained, namely pretest data and posttest data. The obtained pretest and posttest data are next analyzed for normality to see if the data are normally distributed. If the data does not fulfill the assumptions, the Wilcoxon test, a non-parametric statistical test, will be applied.

Results and Discussion

The following are interactive media that have been developed previously. This interactive media is HTML-based, HTML is used because it can be accessed anywhere with the internet and is explained step by step. The Gauss-Jordan Elimination Method is explained in one of the chapters on Linear Algebra. Figure 1 is the main display of the interactive media.

Picture 1. The Main Display of The Interactive Media

In the main view, students are asked to enter the number of linear equations in the problem. For example, three linear equations will be entered in the interactive media in Picture 2.

Picture 2. Three Linear Equations in The Interactive Media

After clicking "Hitung" it will display the steps of the Gauss-Jordan elimination method along with the completion of the three linear equations. Figure 3 is the result of the completion of the Gauss-Jordan elimination method using the HTML programming language.
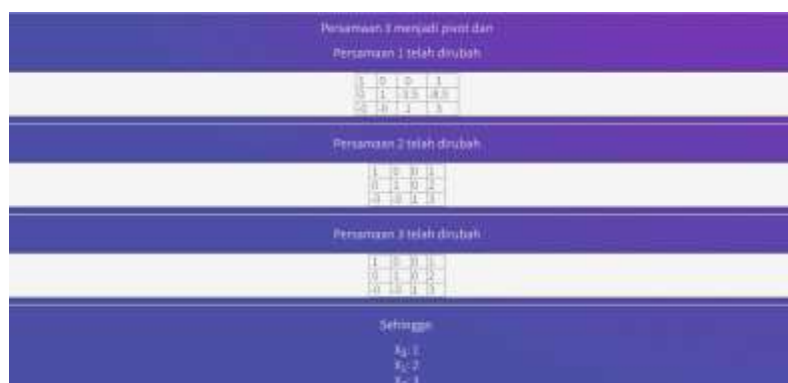
Picture 3. The Gauss-Jordan Elimination Method using HTML

After being given interactive media treatment with HTML programming language. The following is a descriptive analysis of the pre-test and post-test outcomes that were previously conducted. Table 1 presents the result of the descriptive analysis of the pre-test and post-test datasets.

Table 2. Statistical Descriptive Analysis

	Mean	Std. Deviation	N
Pre-test	55,75	5,684	20
Post-test	62,25	6,172	20

The average pre-test is 55.75 and the standard deviation is 5.684, while the average post-test is 62.25 and the standard deviation is 6.172.

The normality test, which is required for the paired t-test, is listed below. Pre- and post-test data will be subjected to normality testing. Table 2 shows the pre-test and post-test data normality test results.

Table 2. Normality test

	Shapiro-Wilk		
	Statistics	Df	Sig.
Pre-test	0,903	20	0,046
Post-test	0,873	20	0,013

Table 2 shows that the probability value (Sig.) less than 0.05, indicating that the data is not normally distributed. As a result, non-parametric statistics, such as the Wilcoxon test, will be used. The Wilcoxon test was performed, and the results are shown in Table 3.

Table 3. Wilcoxon test

	pretest-posttest
Z	-3,839
Asymp. Sig (2-tailed)	0,000

The computed Z value in the Test Statistics table is -3.839, whereas the Z table value with an alpha of 5% (just adjust the negative sign depending on the output of Z count). While the Asymp value. Sig (2-tailed) obtained 0.000.

H_0 is rejected because Z count > Z table (-3.839 > -1.645) or Sig value 0.000 < 0.05, we use a statistical test to determine what we should do. As a result, between the pre-test and post-test, student scores have increased significantly. The study's findings are consistent with previous research (Santosa et al., 2020), who explained interactive media have an effect on online learning today. It is hoped that interactive media will be reproduced so that it can motivate students (Suprihatiningsih & Sudibyo, 2020).

HTML-based media is thought to be very beneficial at this time, when students cannot be separated from their gadgets or the internet (Hidayat & Sudibyo, 2018b). Furthermore, teachers and lecturers are encouraged to use interactive media more frequently. On the one hand, because of the numerous benefits that students experience, it takes time and effort to create (Nurcahyo et al., 2020)

Conclusion

As a result, between the pre-test and post-test, student scores have increased significantly. The study's findings are consistent with previous research, who explained interactive media have an effect on online learning today. Learning media is very developed and continues to increase due to the use of computer information technology. It is hoped that interactive media will be reproduced so that it can motivate students. HTML-based media is thought to be very beneficial at this time, when students cannot be separated from their gadgets or the internet. Furthermore, teachers and lecturers are encouraged to use interactive media more frequently. As a result of this (blended learning), students who have a hard time learning will be more motivated to learn

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