

## Research Article

# Application of Web-based Learning Media on Students' Cognitive Learning Outcomes in Digestive System Materials

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**Abstract.**

Learning is a very basic element in the implementation at all levels of education. The success of achieving educational goals depends on the success of the learning process carried out in schools and the support of the surrounding environment. The method used in this research is the pre-experimental method with the one group pretest-posttest design model. The results obtained are changes in the effectiveness of students' cognitive learning outcomes through web-based interactive learning media on the digestive system material before the pretest and after the posttest the application of the media. The benefit of this research is that students are more interactive in learning, so it affects the improvement of students' cognitive learning outcomes.

**Keywords:** web-based learning media, learning outcomes, digestive system materials

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## 1. INTRODUCTION

Learning is a very basic element in the implementation at all levels of education. The success of educational goals depends on the success of a learning process carried out in schools and the support of the surrounding environment. The learning process can occur due to a person's interaction with his environment which will result in a change in behavior in various aspects, including knowledge, attitudes, and skills. In teaching and learning activities in the classroom there is a judgment process that will determine the level of knowledge and measure the achievement of student learning. Learning outcomes are a very important factor, because the learning outcomes achieved by students are a tool to measure the extent to which students understand the material taught by the teacher. There are three factors that influence the success of the process and learning outcomes, namely internal factors (factors from within the individual),

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external factors (factors from outside the individual), and learning approach factors, namely the type of student learning efforts which include strategies and methods used by students to carry out activities study the subject matter [1].

We are currently in the midst of a rampant COVID-19 outbreak. Whatever form of activities carried out as usual were immediately stopped because of this outbreak. Initially, the spread of this epidemic greatly impacted the economic and social world, but now the impact is being felt by the world of education [2]. This condition has really affected all education systems, from the pre-school level to tertiary institutions to the point that it requires students to carry out their learning activities in their respective homes. The existence of distance learning causes the learning process of students in the classroom to be changed in its method by learning from home or learning from home. The government's decision to close all activities in education, forces the government and related educational institutions to provide alternatives and innovative educational processes for students who cannot carry out the educational process directly in educational institutions [2].

Natural science is a subject that often makes students confused and judges that this lesson is a difficult lesson, especially for physics. It states that many students ignore physics lessons because of the complexity of concepts that are difficult to understand and also biology lessons which are often abstract and cannot be understood simply by imagining it. To visualize complex concepts and abstract things, appropriate teaching materials are needed to be applied in the teaching and learning process [3].

The development of the world of education in Indonesia has changed from year to year. Where are the fundamental changes in terms of the curriculum for each level of education as well as in terms of the learning patterns applied to each school. The rapid development of the world of education can spur schools to apply educational patterns in various fields [4]. Education is developed by improving the technologies used in education. One of the results of technology that has been used in the world of education is media or tools and learning resources. Learning resources that are designed or deliberately created or used to assist the teaching-learning process. For example films, videos, slides, applications and others, all of which are deliberately designed for the benefit of teaching activities to convey information.

Teaching materials are an important part of the learning process. Educational website technology can be well developed to facilitate students to learn certain materials and to support or facilitate students in acquiring knowledge, competencies and skills. The younger generation is fully aware of the benefits of gadgets or computers, laptops, which even almost every student has access to the internet, especially for e-learning

and playing online games [5]. According to Seifert, boredom occurs due to the way the teaching materials are presented, and students are not fully engaged in class, thus losing motivation to study. This condition shows that a lot of traditional learning is boring and makes learning ineffective. Therefore, it is hoped that web-based learning can be one of the ways that can be done to arouse students' enthusiasm for learning in the midst of a pandemic so that the expected learning outcomes are created. We need to know that web-based learning media is a learning media that is created by utilizing web technology so that it can be accessed via an online network or can also be applied to a local network known as a LAN (Local Area Network) [6].

Learning Biology has a lot of material [7, 8] with physiological concepts that are abstract and require a lot of memorization [9]. The reasons why the concept of physiology is said to be difficult are the characteristics of the material, the method of teaching the material, and the students' initial capital. Biology learning which is synonymous with memorization in the end makes the teacher apply a way of teaching material using the lecture method with the hope that students can memorize it themselves, one of which is the Digestive System material.

## 2. RESEARCH METHOD

The research method used in this research is the Pre-Experimental method with the One Group Pretest-Posttest Design model. In this study, the independent variable is web-based interactive learning media, and the control variable is students' cognitive learning outcomes using indicators from Bloom. The population in this study were all class XI MAN 2 Garut for the 2021/2022 academic year. The sample used in this study was only class XI MIA 4, namely just 20 people.

## 3. RESULTS AND DISCUSSION

The results of the description of the Normality analysis test in Biology learning for MAN 2 Garut students from Class XI IPA 4 who apply learning using interactive web-based media are as follows:

1. Test distribusi is normal
2. Calculated from data
3. Liliefors Significance Coreccction

TABLE 1: Normality test analysis (Kolmogorov-Smirnov).

		Pretest	Posttets
N		15	15
Normal Parameters <sup>a,b</sup>	Mean	58.57	94.28
	Std. deviation	25.38	9.38
Most extreme differences	Absolute	0.196	0.372
	Positive	0.196	0.271
	Negative	-0.178	-0.372
Test statistic		0.196	0.372
Asymp. Sig. (2-tailed)		0.148 <sup>c</sup>	0.000 <sup>c</sup>

Results The description of the N-gain analysis from the pretest and posttest taught by applying learning using web-based interactive media is as follows in Table 2.

TABLE 2: N-Gain test analysis.

Statistic	Statistical value of class XI IPA 4	
	Pretest	Posttest
Sample	15	15
Min. Score	30	70
Max. Score	100	100
Total	780	1220
Average	58.6	94.3
Gain	77.14	

The results of the statistical analysis of the paired sample t-test from the pretest and posttest taught by applying web-based interactive media are as follows:

TABLE 3: Analysis of paired samples t-test (pretest dan posttest).

Paired samples test		
Paired differences		
		Pair 1
		Pretest-Posttest
Mean		-35.71429
Std. Deviation		24.08775
Std. Error Mean		6.43772
95% Confidence Interval of the Difference	Lower	-49.62214
	Upper	-21.80643
t		-5.548

In measuring the results of the cognitive competency test of students which aims to find out student learning outcomes with a summative evaluation, it consists of 15 students from MAN 2 Garut from class XI IPA 4 who are taught by applying Web-based learning media to digestive system material. According to Ruseffendi and Sanusi (1994:92), in descriptive research the minimum sample is 10-20% of the population, and in experimental research that is tightly controlled, maybe 15 people are sufficient. Based on the results of the Normality test on the pretest and posttest shown in Table 1. above shows that the value of students' biology learning comes from a group with a normal distribution. normal. after the prerequisites have been fulfilled the research continues to test to find out the answers to the problem formulation. This tester uses the normality gain test (N-Gain) which aims to determine the increase in pretest and posttest scores as shown in table 2. where the average value of biology learning outcomes in pretests is 58.6 and the average value of biology learning achievement in the posttest of 94.3 with the highest score categorizing students' biology learning achievements in the pretest and posttest in the high category compared to the lowest score in the pretest in the low category compared to the posttest which is in the high category. So it can be concluded that there is an increase in the results of achievement scores in the biology learning process of students before and after the implementation of web-based interactive media learning.

Statistical analysis data Paired sample t-test to find out the average difference between two interconnected samples where it can be seen that the t-value is - 5.548 with a probability of 0.000 because the probability is  $<0.005$ , so the two population means are not identical (average- the mean pretest and posttest scores were significantly different). Based on table 3 data, there is an increase in students' competence in understanding concepts by comparing pretest and posttest scores and the t-test analysis shows low pretest scores when compared to posttest scores. If the positive effects of using online Biology learning media in the learning process can increase the competence of students, this is proven by looking at the results of the pretest and posttest after learning. So that the learning process using Web-based biology learning media can improve students' competence or understanding of biological material concepts.

Learning with the application of web-based interactive media that changes students' cognitive learning outcomes for the better. The application of this media can make students even more enthusiastic in the learning process because it is related to the technology they are used to using. Research of Tondang and Arwita concluded that learning that utilizes smartphones/laptops as a medium for utilizing the internet (web)

as a source of biology learning in accordance with the teacher's directions is in the "good" category [10]. Another study was also carried out by Putri that the website-based multimedia learning of biology learning accompanied by contextual examples on vertebrate material showed very good student learning outcomes and was feasible to use [11]. Meanwhile, the research results of Safira et al. concluded that biology students' learning outcomes using web-based learning media showed very good results. Changes in the value of these learning outcomes change because the learning process is new for students. According to S. Nasution learning outcomes are a change that occurs in individuals who learn, not only changes regarding knowledge, but also knowledge to form skills, habits, attitudes, understanding, mastery, and appreciation in individuals who learn [12].

## 4. CONCLUSION

Based on the data analysis and calculations that have been described, it can be concluded that web-based learning media shows very good results at MAN 2 Garut. Learning with the application of web-based interactive media that changes students' cognitive learning outcomes for the better. The application of this media can make students even more enthusiastic in the learning process because it is related to the technology they are used to using.

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