

# Development of Web-Based Assessment in Multimedia Assisted Economic Mathematics Course with Case-Method to Improve Students' Understanding

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## Abstract

Technological progress is something that we cannot avoid in this life, because technological progress will run in accordance with scientific advances. Therefore, this study aims to describe the development design of multimedia-assisted Web-based assessments with Case-Method, describe economic mathematics books with Case-Method, describe feasibility and attractiveness and describe students' level of understanding in answering questions through web-based assessments. This Web-based assessment development design is based on the pattern of research and development stages of the ADDIE (Analysis, Design, Develop, Implement, and Evaluate) model developed by Reiser and Mollenda. As for the product design model, this Web-based assessment follows the ASSURE model. This web-based assessment development can be accessed via the web anytime and anywhere. From the trials conducted, the development of this assessment can improve students' understanding of learning by presenting in the form of Case Method questions with the help of interactive media. The development of this web-based assessment is an evaluation tool used in learning economics mathematics courses that is effectively used to measure student understanding in attending lectures. With this web-based assessment, it can improve learning more effectively and efficiently. This research resulted in TKT 6 because it produced textbook products with the Case Method being tested on students, and it is hoped that this book will get more input from readers and validators so that it can be more perfect for marketing to TKT 7.

**Keywords:** Website, Multimedia, Interactive, Case-Method, Student Understanding.

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## Introduction

Technological progress is something that we cannot avoid in this life, because technological progress will run in accordance with scientific advances. Every innovation is created to provide positive benefits for human life. Provides many conveniences, as well as a new way of doing human activities. Especially in the field of technology, society has enjoyed many benefits brought about by the innovations that have been produced in the last decade. However, although it was originally created to produce positive benefits, on the other hand it is also possible to use it for negative things.

Facing the 21st century, UNESCO (1998) through the journal "The International Commission on Education for the Twenty First Century" recommends sustainable (lifelong) education which is carried out based on 4 pillars of the learning process, namely: learning to know, learning to do, learning to be, and learning to live together. To be able to realize these 4 pillars of the learning process, teachers are expected to be able to master and apply the field of Information and Communication Technology.

However, in reality in the field, technology is rarely used to its full potential. Especially in the overall learning process. Currently, what is developing is technology-based learning media. Especially for assessment, technology is still rarely used. Therefore, in this study, researchers want to use technology as a media assessment.

One of the technology products that can be used in the assessment is technology from Google sites to make it easier for teachers to carry out assessments of learning outcomes. This product is inspired by the concept of a web-based portfolio, where it is actually a transformation of a conventional portfolio into a digital portfolio with a website. Portfolio itself has the meaning as a collection of student work as evidence of the progress of learners or groups of learners, evidence of achievement, skills, and attitudes of learners. Based on that, the research wants to try to accommodate google sites to be used as websites and used in the process of assessing student learning outcomes.

Even though technological developments are very rapid and mushrooming everywhere and provide various facilities as described previously, including the availability of google sites. which can be used for free, but for

practice in the classroom this technology facility is still rarely used. The reason is of course the technological devices that must be available if they are to be adopted in the assessment such as computers or smartphones, the internet, and applications that can support not everyone has them. What's more, not everyone can operate technology, in fact there are still many teachers who still lack knowledge related to technology.

Many researchers have used the web in the learning process, as has been done by Zangyuan Own (2006) with the title "The Application of An Adaptive Web-Based Learning Environment on Oxidation-Reduction". in conducting learning experiments through applications, while researchers want to use the website in student research. Then the journal written by Yuliana et al (2019) with the title "A system for implementing web-based assessment information at SMA Negeri 1 Nanga Taman Sekadau Regency." The difference between Yuliana's journal and researchers is that Yuliana designed a website system for communication tools between parents and teachers, while researchers used the website. in the assessment or evaluation of students.

### Method

The research method used in this research is the development of the ADDIE model (Analysis, Design, Develop, Implement, and Evaluate) developed by Reiser and Mollenda. Research and development methods are research methods used to produce certain products, and test the effectiveness of these products (Sugiyono, 2017). Through this research, researchers are trying to develop a Web-based assessment instrument product that can be accessed from anywhere and anytime. The resulting product is an assessment web in learning as an alternative in assessing students which is easy to access and authentic in use.

While the web-based assessment development design model uses the ASSURE model developed by Sharon Smaldino, Robert Hanich, James Russell and Michael Molenda. ASSURE is actually an abbreviation of which the abbreviation describes the stages, among others; analyze learners, state objectives, select method, media and materials, utilize media and materials, require learner participation, evaluation and review. This model is also used by Amelia.R (2012) in writing the design of instructional media with the ASSURE model and Achmadi et al. (2014:37) also argues that the assure model is a reference for educators in teaching students in planned and structured learning systematically by integrating technology and media in learning.

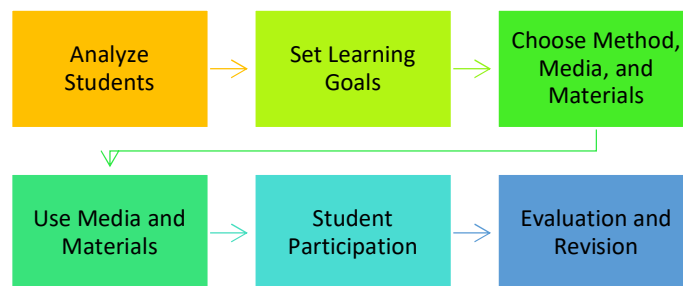


Fig. 1. ASSURE Model Chart

### Results and Discussion

The discussion in this study is aimed at the problems to be solved, these problems are then analyzed according to learning needs, this development designs an assessment website for lectures where in its implementation it first performs a needs analysis related to the innovations to be developed both analyzing the needs of students, lecturers and lectures.

The following is an explanation and discussion carried out in this research.

#### 1. The Process of Developing Economic Mathematics Assessment Instruments

In this process, the first thing to do is to analyze the needs of a website-based assessment on economic mathematics learning that has been carried out through an analysis of the learning needs of students, lecturers and lecture curriculum. For the analysis of student learning needs, 85.3% of the 80 students who took this economics mathematics course said that the web-based assessment was very much needed, considering that learning on campus is still limited to face-to-face. Analysis of learning needs by a lecturer in charge of economics mathematics said that this website-based assessment is very helpful and needed to support hybrid learning that is being implemented on the Unimed campus. In addition to supporting student learning, students can also do assessments from anywhere, lecturers easily correct the assessment results through answers that are directly collected in the lecturer's email.

The product design stage is in accordance with the needs analysis that has been done previously. Designing an assessment website application design that can improve student understanding or be used in learning.

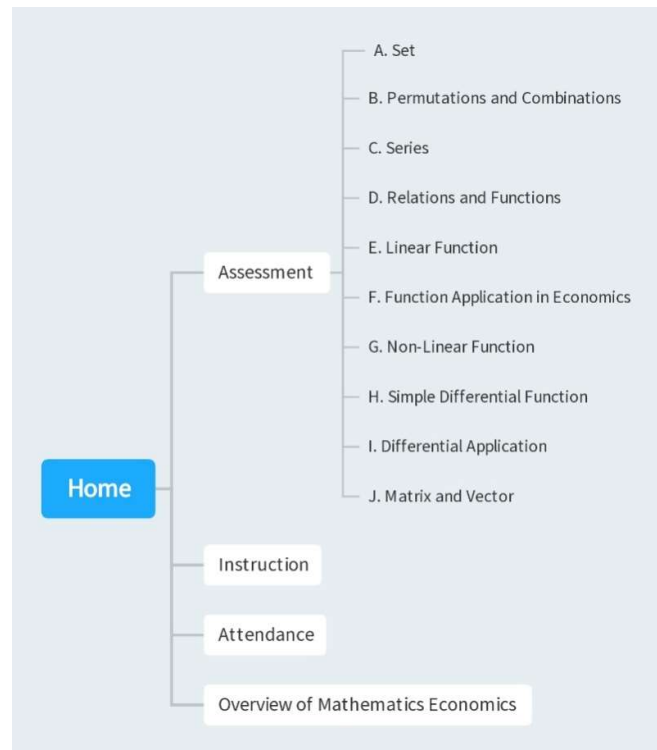


Fig. 2. Web-Based Assessment Design

The development stage is designed. Website-based assessment for learning needs by starting to develop case method-based economic math problems to be included in the designed assessment, then the questions are uploaded to the web assessment according to the learning subject. In this stage, all products are developed in accordance with the results of the analysis of student needs, lecturers and course learning designs, where all the products produced have been validated by validators who are competent in their fields ranging from media validation, materials, and applications. After being validated, it is then revised according to the input given by the validator.

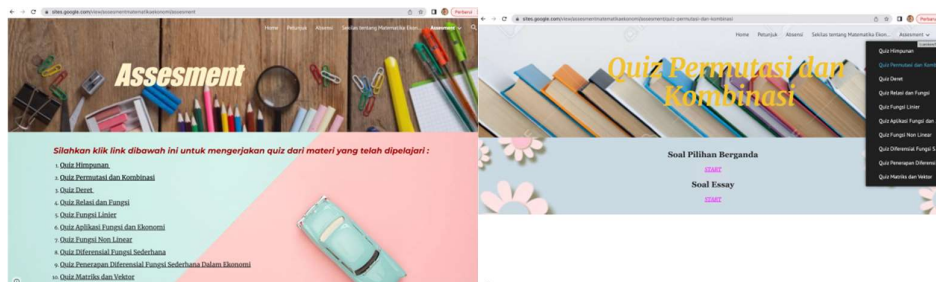
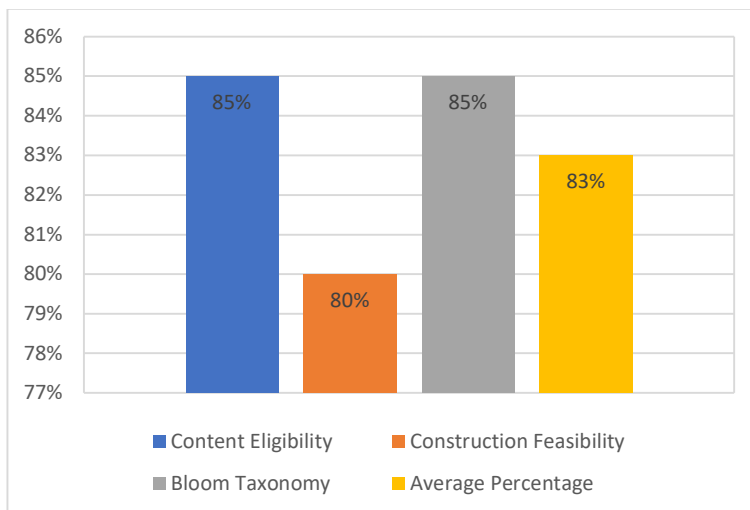


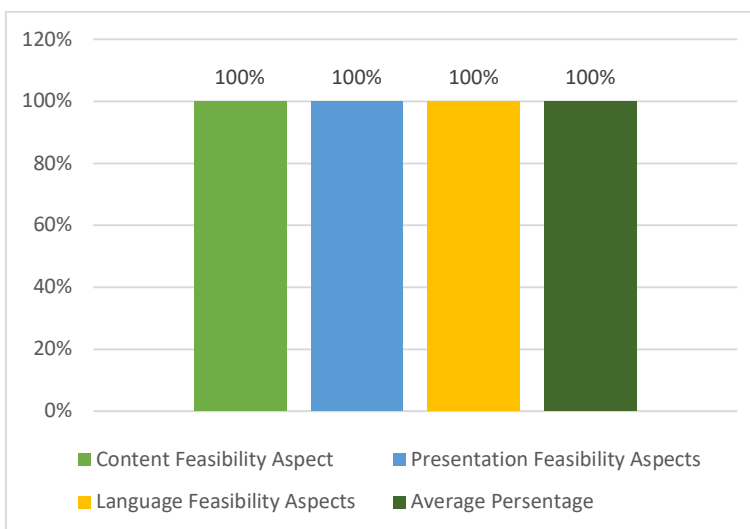
Fig. 3. Website Assesment Dashboard

Making a Web Assessment for the Mathematics of Economics course has been designed and produced Prototype I then made and developed according to the results of the needs analysis to improve student understanding. The validation of the assessment in the economic mathematics course with the case method is known as the content feasibility aspect with a percentage of 85%, construction feasibility aspect 80% and Bloom's taxonomy aspect 85%. The average percentage of the three aspects is 83% with the average percentage score of the three aspects is 83% with the "Very Eligible" category of 124 with a maximum score of 150. Seen in the following diagram:



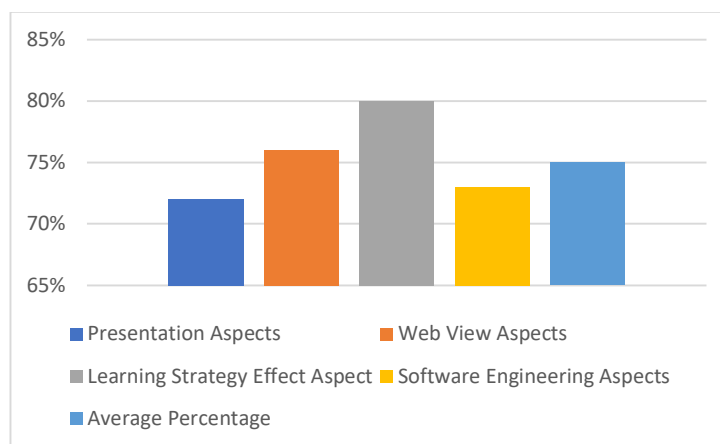
**Fig. 4.** Validation Results of Economics Course Assessment

Material validation in the economic mathematics course with the Case Method is known as the content feasibility aspect with a percentage of 100%, the feasibility aspect of presenting 100% and the language feasibility aspect being 100%. The average percentage of the three aspects is 100% with the "very feasible" category out of 60 with a maximum score of 60. It can be seen in the following diagram:



**Fig. 5.** Results of Validation of Economics Course Materials

Media validation in the economic mathematics course with Case Method presentation aspect with a percentage of 72%, Web Display Aspect with a percentage of 76%, Aspects of learning strategy effects with a percentage of 80%, Software engineering aspects with a percentage of 73%. The average percentage of the four aspects is 75% with the "Eligible" category out of 60 with a maximum score of 80. Seen in the following diagram:



**Fig. 6.** Results of Media Validation for Economics Course

After completing the field trial, trying a web-based assessment of the mathematical economics course assisted by interactive media with the Case Method, then at the end of the trial the students were given a questionnaire by the researcher to see how far the student's response to the web-based assessment application that had been developed was. Multimedia-assisted web-based assessment application with Case Method in terms of student responses, the average student response to this assessment has a value of 89.1%. Thus, the high percentage of students who gave a positive response proves that this web-based assessment application can be said to be effective. In other words, the level of student understanding through indicators of calculating, determining solutions, generating answers, predicting, projecting, comparing and concluding where in all these indicators obtained an average of 78 with the "high" category. In other words, the level of understanding of students in learning is high on Web-Based Assessment of Economic Mathematics Subjects with the Case Method, research related to economic mathematics was also carried out by Tiur et al (2021) who stated that the Analysis of Economics Mathematics Literacy and Numeracy in Supporting the Implementation of Distance Learning.

## 2. Feasibility of the Economic Mathematics Assessment Instrument

Trial of the web-based assessment application as well as filling out the attractiveness response questionnaire, a post test was held to determine the ability of student learning outcomes. the average value of the control class is 52.8 and for the experimental class the average value is 73.6. Meanwhile, the median for the control class is 50 and the experimental class is 70. The mode or value that often appears in the control class is 30, while for the experimental class it is 60. From these data, it can be seen that the average control class and the experimental class are very much different.

The data normality test was carried out on two PSPM 21 A classes as the experimental class and the PSPM 21 B class as the control class. The attached data shows that the experimental class shows an average post-test of 73.6, standard deviation of 13.57 with L-count = 0.1582 and L-table = 0.1772. Because Lcount Ltable is accepted, it means that the data is normally distributed. For the control class, obtained an average of 52.8 standard deviation of 18.73 with L-count = 0.1452 and L-table = 0.1772. Because Lcount Ltable is accepted, it means that the data is also normally distributed. Then the data for each class can be declared normally distributed.

The homogeneity test used the Bartlett test in the experimental class and the control class. In the attached data, the experimental class variance value was 183.345 while the control class was 352,000. With F Count of 1.9031 and F of Table of 2.0144. Because F Count, the test decision H0 is accepted meaning that the data come from the same variance.

Based on the t-test that was carried out, it was concluded that 2,241 2,046, it can be stated that the average student learning outcome test using a web-based assessment application that was developed is not the same as the average student learning outcome test that does not use a web-based assessment application that was developed effectively and can be used in the learning process. Tiur et al (2020) also said Virtual Video Aid Web-Based E-Learning said From the test results, namely by giving the developed product to media experts and material experts, respectively, the scores were 80.3% and 86.7%, which means they were included in the "Very Good" category, in other words Learning using the Web is good for the teaching and learning process.

## Conclusion

Assessment used is learning media in the form of Case method-based teaching materials. With the Web-Based Assessment, student understanding is increasing in their learning, students are more aware of the learning being carried out because the learning provided is case-based and supported by Web-Based Assessment. From the validation results, it is stated that the instrument, learning media, and teaching materials are very suitable to be used, then the level of student understanding when implementing is in a high category. In addition, the advantages of Web-Based Assessment in economic mathematics courses assisted by interactive media with the Case Method are that it is equipped with a website-based assessment application, an attractive appearance, with efficient use of time, Web-Based Assessment can also help reduce paper usage and make it easier for users to access it through media. electronics such as computers, laptops, mobile phones, Blackberry, android, iPhone, iPad and other technologies.

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