

E-Test: Alternative Online Assessment for Online Learning Classes in Vocational High Schools

Sri Rahayu¹, Friyatmi²

¹ Universitas Negeri Padang, Padang, Indonesia; riri_naras@yahoo.co.id

² Universitas Negeri Padang, Padang, Indonesia; fri.atmi@gmail.com

ARTICLE INFO

Keywords:

Developmen;
Online test;
Moodle

Article history:

Received 2022-02-10

Revised 2022-04-19

Accepted 2022-08-26

ABSTRACT

This study aims to develop a *moodle-based* online test to assess the student learning outcome in vocational high school. It is expected to help and facilitate the teacher in correcting the evaluation of learning at school. This study was research and development, which included 4 stages: define, design, develop, and disseminate. The subject of this research is accounting and institutional finance students in grade XI. The results of the research the *Moodle*-based online test, which was developed based on the validation results by IT experts, obtained a score of 5 with the criteria of 'Very Good' for the display and programming aspects. Meanwhile, for the practicality test, the application obtained a score of 88%, in the range of 81%-100%. So it can be concluded that the *Moodle* online test application developed is "Very Good" to be used to carry out the learning evaluation activities.

This is an open access article under the [CC BY-NC-SA](#) license.



Corresponding Author:

Sri Rahayu

Universitas Negeri Padang, Padang, Indonesia; riri_naras@yahoo.co.id

1. INTRODUCTION

The development of information technology in the era of globalization is currently experiencing very rapid development, so it indirectly impacts all areas of life in the world as well as in the field of education. To deal with technological developments, the world of education must constantly make adjustments to improve the quality of education. The current advances in information and communication technology have had many positive impacts on the world, especially education. Akbar & Noviani, (2019) explained that one of the applications of ICT in education is the use of multimedia facilities and internet media in the learning process. Marryono Jamun, (2018) stated that the impact on the development of information technology in education, especially evaluation, is the application of online exams.

The implementation of online exams in education was first used in the National Examination, which took place in the 2014/2015 academic year (Marta & Christanto, 2016). In that year, the Ministry of Education and Culture began using the National Examination online, and this is stated in the Regulation of the National Education Standards Agency Number: 0031/P/BSNP/III/2015 regarding the procedures for administering the National Examination for the 2014/2015 Academic Year. The exam

implementation is known as the Computer-Based National Examination (UNBK). Although for some areas, the implementation of the National Examination is still Paper and Pencil Based (UNKP). Until the implementation of the 2020 National Examination (For Vocational High Schools), the National Examination has always carried out online examinations by utilizing the Computer Based Test (CBT). Online learning challenges teachers to creatively manage PBM while remaining conducive and not passive (Prananda & Ricky, 2021).

The abolition of the implementation of the National Examination (UN) by the Minister of Education and Culture, Mr. Nadiem Anwar Makarim, which began in 2020, indirectly made the assessment or assessment centre the responsibility of the education unit. For this reason, it is hoped that each academic unit can develop its test application, such as the Computer Based Test (CBT), which can be used for evaluation needs in their respective schools. The advantage of Computer Based Test (CBT), according to Marta & Christanto (2016), is that it is found automatically in the scoring system, making it easier for respondents or test takers to take the test.

Implementation of online exams is growing and becoming a necessity in education. This is because exams utilizing online applications using computers and smartphones can make it easier for schools. After all, they do not require the preparation of complete stationery during the exam. The implementation of this online test is supported by the development of technology and information in the era of industrial revolution 4.0, which is currently developing rapidly. Arjon Sitio, (2020) explained that the efficiency of computer technology could save costs and time for conducting school exams, encouraging students to complete exams within the time required for simulation because national exams are often held online. According to Santi & Prajana, (2019) in many countries, the implementation of online and computer-based exams has become a standard in itself, and it is a must because online exams have many advantages, including easier direct reporting, reduced administrative costs and more accessible and flexible exam schedule arrangements.

In their research, Bellotti, dkk., (2013) conclude that computer-based learning and tests have two objectives: fun and entertaining and educational and challenging. For this reason, Bellotti provides recommendations so that the implementation of computer-based tests and testing can be improved in the future. In their research, Riley & Carle, (2012) concluded that there are many advantages to using the computer-based test (CBT) compared to the paper and pencil test. One of the advantages that can be obtained by conducting the CBT test is that it is easy to assess, reducing the work of examiners and making it easier for test-takers to do the questions. Risnasari, (2020) concluded that the Computer Adaptive Test (CAT)-based test approach is excellent in providing a challenge for users in working on questions given in a software application. CAT that has been made well and on time.

One application that can be used to create CBT-based questions is the Moodle LMS online-based application. Moodle is a popular online platform used for educational purposes (Azis, 2017). Compared to other similar LMS such as Schoology or ATutor, Moodle is more prominent with a design that can be adapted to various tools so that it can be used effectively to create synchronous and asynchronous learning activities. This Moodle application is designed to implement online learning and is widely used by schools or universities in designing distance learning. Fernando, (2020) concludes that quiz activities in the Moodle application have advantages, including involving students in the content and form of questions offered in this application which are considered quite good and varied.

The research results by Barge & Londhe, (2014) stated that Moodle is a very interactive platform for teaching, learning and assessment. Moodle is also proven and very useful for internal and ongoing evaluation activities. Evaluation activities using Moodle will save administrative staff time in educational institutions in conducting internal evaluations. The evaluation of the Moodle application is considered quite complete. Because the features offered in making questions for evaluation activities in the Moodle application are quite a lot, there are at least 16 types of questions such as making multiple-choice questions, complex multiple-choice, short answers, description questions, true and false questions, drag and drop, matching and so on. The Moodle quiz application offers various possibilities to be developed into several questions as required by the learning evaluation.

Research and development of Computer-Based Tests (CBT) for evaluation have been carried out a lot, such as Karfindo & Mustafa, (2017) explaining the use of CBT in learning can help students and make it easier for teachers to conduct analyzes to see their students' abilities. In this study, Karfindo gave the idea of developing a computer-based test (CBT) application that schools could develop using the web engineering method. Candra Rolisca & Achadiyah, (2014) also developed an online learning evaluation media using Wondershare Quiz Creator software for accounting subjects in vocational high schools. Hidayah & Mucharommah Sartika Ami, (2021) also conducted development research based on the Computer Based Test (CBT), which was used in trade accounting subjects in the company's adjusting journal material. Friyatmi et al., (2020) developed a computerized question bank for the Computer Based Test. The question bank developed is web-based using PHP-MySQL. Balan, (2017) tries to develop a computer-based test (CBT) model using the Adobe Flash application in Vocational High Schools.

The difference between this research and the previous research is that the online test was developed using the Moodle application, where the application is designed to implement a Learning Management System (LMS), which has advantages such as mobile-friendly. In other words, this application can be run not only by using the computer but can also use smartphones owned by students. The product that will be developed is expected to be one of the solutions for implementing the online evaluation. Besides that, this product is expected to help teachers facilitate the implementation and correction of evaluation results.

The research objective in this study was to develop a moodle-based online test application to assess student learning outcomes in SMK and test the practicality of the Moodle-based online test application to assess student learning outcomes in SMK.

2. METHODS

This type of research is a type of research and development (Research and Development) that has an orientation on products developed in education, which aims to increase the effectiveness of the implementation of evaluation in learning. The product to be developed is expected to be an alternative in implementing evaluations that can be done online, making it easier for teachers to carry out evaluations. The product developed is in the form of an online test application using the Moodle application. The development model that will be carried out in this research is the 4-D (Four D) development model, a learning device development model. This model was developed by Sivasailam Thiagarajan, Dorothy S. Semmel, (1974). The development research model consists of 4 stages: define, design, develop, and disseminate stages. Triyono, (2010) adapted 4-D to 4P, namely definition, design, development and deployment.

This research was conducted at SMKN 2 Pariaman, and the subjects were class XI students of the accounting and institutional finance study program at SMKN 2 Pariaman on financial accounting subjects. This development activity includes the preparation of odd semester final exam questions, which are made and developed based on competency standards and essential competencies of class XI financial accounting subjects. Next, an online exam application was made using Moodle by following the 4-D (Four D) development stages.

There are several tests carried out in the research on developing Moodle-based online test applications to assess the learning outcomes of these students. The tests are product validity tests and practicality tests for applications developed. The data collection techniques carried out consisted of two, namely: (1) non-test techniques in the form of product validation results on Moodle-based online test applications by IT experts, (2) test techniques carried out on product trials to students, then students were asked to fill out questionnaires regarding responses. Students on the practicality of the Moodle-based online test application developed.

3. FINDINGS AND DISCUSSION

Moodle-based online test development results

This research development aims to produce an online test application based on Moodle to assess learning outcomes in SMK. The product produced in this study is a moodle-based online test application that can assess student learning outcomes for financial accounting subjects at SMKN 2 Pariaman. To be able to develop a product, the following steps are carried out:

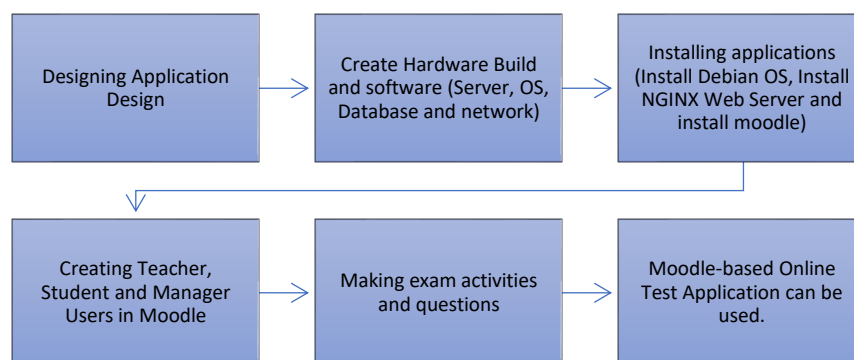


Figure 1. Moodle-Based Online Test Application Development Flowchart

From the picture above, it can be seen that the main activities of developing this online test are starting from designing the appearance of the application then preparing hardware which is like a complete computer set that will be used as a server for the application. Furthermore, it provides the software needed to develop online test applications. The prepared hardware consists of a set of computers that will later be used as application servers, and the software that needs to be provided is a network that functions as a tool to connect applications to users and prepares a user database for both students and subjects teachers. The next step is to install several applications, such as the Debian operating system application, which functions to stabilize the application, install the web server and finally install the Moodle application. To download the latest Moodle release can be accessed at the following address: [cd/tmpwgethttps://download.moodle.org/download.php/stable311/moodle-latest-311.tgz](https://download.moodle.org/download.php/stable311/moodle-latest-311.tgz).

From the development results carried out on the Moodle online test application that was developed, it was named E-Test. The E-Test application is placed on a web server with the address <http://us.smkn2prm.sch.id:81/>. With this URL, students can open the application through digital search engines such as Google. The following is the appearance of the E-Test application:

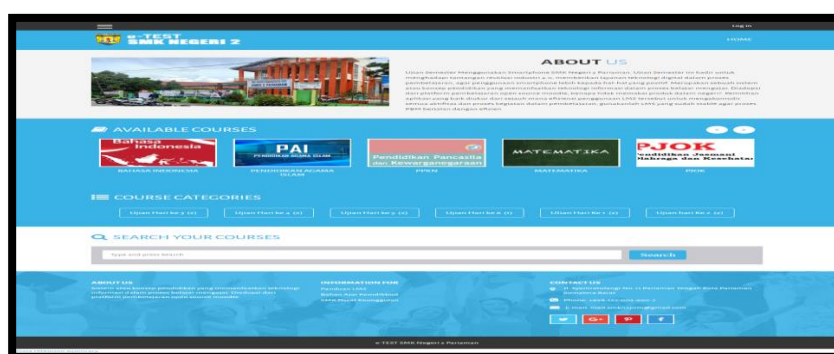


Figure 2. The Main Page of the E-Test Online Test Application

To enter the application, the application will ask for the username and password from the user. This page is called the home page. This page can only be accessed by users who are already registered in the application. The username and password of the previous user are already set up and added to the application. The following is the opening page for the E-Test online test application:

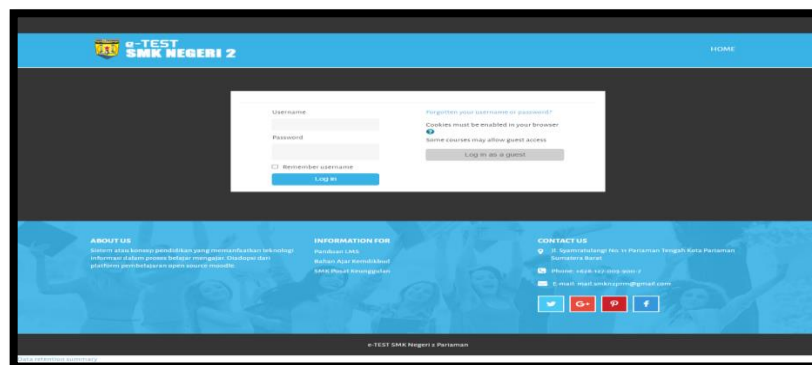
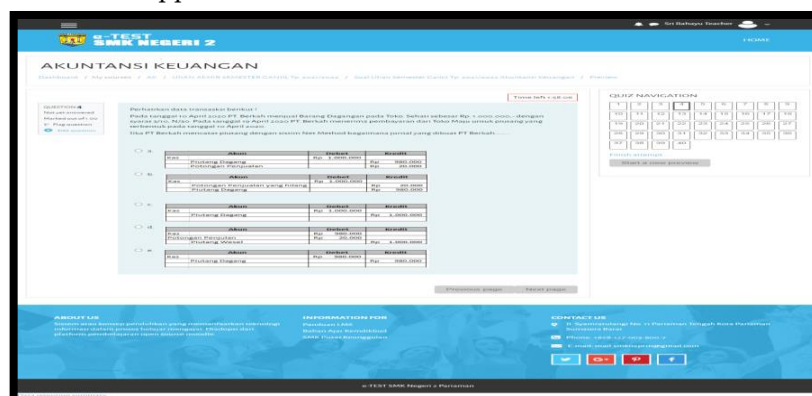


Figure 3. E-Test Online Test Application Opening Page

If the teacher user enters the application, the application will display the subjects taught by the teacher. Meanwhile, the application will display all the subjects studied by students in that semester for student users. Here is what the application looks like when students take the exam



Gambar 4. Tampilan Soal Pada Aplikasi Tes Online

Product Validation by IT Expert

Product Validation (expert appraisal) is a logging validation process carried out by experts in their fields. Product validation is carried out before the trial's implementation, and the product trial results will be used to revise the initial product. This validation activity is carried out through expert judgment, or an expert validator will assess the product in the form of an online test application developed through a validation sheet. The validator will provide suggestions and comments based on observations made on the application that has been developed. IT experts carry out validation activities for Moodle-based online test applications. In this study, the researchers involved two IT expert validators in electronics and informatics engineering from Padang State University. The validation carried out involves two aspects: the display and the programming aspects.

Based on the validation and assessment carried out by IT experts, a score was obtained indicating that the product developed was classified as "Very Good", both for the application display aspect and the programming aspect. From the two aspects of obtaining the average score of the overall good aspects of the expert validator 1 and the expert validator 2, an average value of 5.00 means that the product developed is in the "Very Good" criteria. The validator also concludes that this product is feasible for field trials without revision. The results of the product validation of the Moodle-based online test application can be seen in the following table:

Table 1. Product Validation Results by IT Experts

Aspect	Validator 1	Validator 2	Average	Criteria
Appearance	5	5	5	Very Good
Programming	5	5	5	Very Good

Product Trial

A practical test of the Moodle-based online test application is also carried out in product testing activities. In this test, students are asked to respond to the developed application so that later it can be concluded whether the Moodle online test application is suitable for use or not. The results of the product testing activities will be processed to see the quality of the Moodle-based online test application developed. From this trial activity, improvements will be made to the application and questions if the results are not under the desired results. The practical analysis is obtained by analyzing the responses of students' responses through a questionnaire. The questionnaire given to students is a questionnaire that contains aspects of the appearance of the application, aspects of the menu and navigation, and aspects of the content of the developed online test application. The questionnaire uses a Likert scale for the following calculation in each statement item that has been given using the formula:

$$P = \frac{f}{N} \times 100\%$$

Note :

- 1 Percentage Number
 - 1 Raw Score earned
 - 1 Highest score in the questionnaire
- (Arikunto, 2010:44)

The list of questions contained in the questionnaire concerns three aspects, namely aspects of appearance, aspects of menus, and navigation, as well as aspects of content. From the results of the questionnaire given to students, data about student responses to the Moodle-based online test application were obtained as follows

Table 1. Product Validation Results by IT Experts

Aspect	Average Score	%	Criteria
Appearance	337	87	Very Good
Menu and Navigation	331	87	Very Good
Content	345	91	Very Good
Average		88	Very Good

Looking at the data contained in the table, it can be seen that the students' responses to the Moodle-based online test application developed were in the range of 81%-100%. So it can be concluded that the Moodle online test application developed "Very Good" to be used to carry out learning evaluation activities.

4. CONCLUSION

From the development results, an online test application based on Moodle is named E-Test, and this application can be accessed via the internet network. This application can be used for online tests using students' smartphones. The results of the developing moodle-based online test application to assess learning outcomes in SMK (Vocational Schools), then the researchers obtained as follow: (1) the data of the developed online test application obtained a good score of 5 for the display aspect as well as for the programming aspect. Based on this score, the Moodle-based online test application developed has an average score of 5, which means that the Moodle-based online test application can be categorized as "Very Good". (2) To test the practicality of the Moodle online test application, it is done by analyzing the data on the questionnaire that has been distributed. Based on the analysis of the data in the questionnaire, the percentage for the Moodle online test application is 88%. This shows that the Moodle online test application developed can be categorized as "Very Good".

It is highly recommended for other researchers or educators interested in using online test applications. In addition, in developing this Moodle online test application, the server used should be a server that has a strong network quality because, in the exam questions, there are many forms of images so that if the internet network connection to the server is strong, then this will facilitate the exam process so that the test can run effectively and efficiently. Further product development can be done by developing a moodle-based online test application in different classes and subjects as well as schools.

REFERENCES

- Akbar, A., & Noviani, N. (2019). Tantangan dan Solusi dalam Perkembangan Teknologi Pendidikan di Indonesia. *Prosiding Seminar Nasional Pendidikan Program Pascasarjana Universitas Pgri Palembang*, 2(1), 18–25.
- Arjon Sitio, A. S. (2020). PEMANFAATAN IT DALAM PELAKSANAAN UJIAN BERBASIS KOMPUTER PADA SMA NEGERI 2 PERBAUNGAN. *ABDIMASYA: Jurnal Pengabdian Pada Masyarakat*, 1(1), 1–9.
- Azis, A. A. (2017). Pengembangan Media E-Learning Berbasis LMS Moodle Pada Matakuliah Anatomi Fisiologi Manusia. *Jurnal Pendidikan Biologi*, 7(1), 1–8. <http://journal2.um.ac.id/index.php/jpb/article/view/712>
- Balan, Y. A. (2017). Pengembangan Model Computer-Based Test (CBT) Berbasis Adobe Flash untuk Sekolah Menengah Kejuruan. *Innovative Journal of Curriculum and Educational Technology*, 6(1), 36–44. <https://doi.org/10.15294/ijcet.v6i1.15574>
- Barge, P., & Londhe, B. R. (2014). From Teaching, Learning to Assessment: MOODLE Experience at B'School in India. *Procedia Economics and Finance*, 11(June 2015), 857–865. [https://doi.org/10.1016/s2212-5671\(14\)00249-4](https://doi.org/10.1016/s2212-5671(14)00249-4)
- Bellotti, FrancescoBill Kapralos, Kiju Lee, Pablo Moreno-Ger, and R. B. (2013). Long-Term Effects of Conservation Training with Educationally Subnormal Children. *Journal of Special Education*, 8(3), 237–245. <https://doi.org/10.1177/002246697400800304>
- Candra Rolisca, R. U., & Achadiyah, B. N. (2014). Pengembangan Media Evaluasi Pembelajaran Dalam Bentuk Online Berbasis E-Learning Menggunakan Software Wondershare Quiz Creator Dalam Mata Pelajaran Akuntansi Sma Brawijaya Smart School (Bss). *Jurnal Pendidikan Akuntansi Indonesia*, 12(2). <https://doi.org/10.21831/jpai.v12i2.2706>
- Fernando, W. (2020). Moodle quizzes and their usability for formative assessment of academic writing. *Assessing Writing*, 46(October), 100485. <https://doi.org/10.1016/j.asw.2020.100485>
- Friyatmi, Mardapi, D., Haryanto, & Rahmi, E. (2020). The development of computerized economics item banking for classroom and school-based assessment. *European Journal of Educational Research*, 9(1), 293–303. <https://doi.org/10.12973/eu-jer.9.1.293>
- Hidayah, N. &, & Mucharommah Sartika Ami. (2021). JKPI: Jurnal Kajian Pendidikan IPA. *JKPI: Jurnal Kajian Pendidikan IPA*, 1(2), 53–61.

- Karfindo, K., & Mustafa, F. (2017). Pengembangan aplikasi computer based test (Cbt) untuk sekolah menengah atas (sma). *Register: Jurnal Ilmiah Teknologi Sistem Informasi*, 3(1), 42–48. <https://doi.org/10.26594/register.v3i1.715>
- Marryono Jamun, Y. (2018). Dampak Teknologi Terhadap Pendidikan. *The Journal of Pendidikan Dan Kebudayaan*, 1(10), 48–52.
- Marta, R. F., & Christanto, H. (2016). ANALISIS PENILAIAN PERILAKU KOMUNIKASI PESERTA DIDIK SEKOLAH MENENGAH PADA PELAKSANAAN UJIAN NASIONAL. *Jurnal Komunikasi*, 10(1), 81. <https://doi.org/10.21107/ilkom.v10i1.1842>
- Prananda, G., Kharismadewi, Y., Ricky, Z., & Friska, S. Y. (2021). The COVID-19 Pandemic Impact on Elementary Students Online Learning Motivation. *Elementary: Jurnal Ilmiah Pendidikan Dasar*, 7(2), 153-160.
- Riley, B. B., & Carle, A. C. (2012). Comparison of two Bayesian methods to detect mode effects between paper-based and computerized adaptive assessments: A preliminary Monte Carlo study. *BMC Medical Research Methodology*, 12(May 2014). <https://doi.org/10.1186/1471-2288-12-124>
- Risnasari, M. (2020). Implementasi Algoritma Fuzzy Dalam Computerized Adaptive Test (CAT) Berdasarkan Taraf Kesukaran Soal. *Jurnal Infomedia: Teknik Informatika, Multimedia & Jaringan*, 5(1), 48–53. <http://e-jurnal.pnl.ac.id/index.php/infomedia/article/view/1919>
- Santi, M., & Prajana, A. (2019). Analisis Implementasi Ujian Nasional Berbasis Komputer Dengan Ujian Berbasis Kertas Di Smpn 3 Ingin Jaya Kabupaten Aceh Besar. *Cyberspace: Jurnal Pendidikan Teknologi Informasi*, 2(2), 84. <https://doi.org/10.22373/cj.v2i2.3997>
- Sivasailam Thiagarajan, Dorothy S. Semmel, dan M. I. S. (1974). (1974). *Model Pengembangan dan Pembelajaran*. <https://Ayahalby.Files.Wordpress.Com/2012/10/Konsep-Pengembangan-Danpembelajaran-Modul.Pdf>.
- Triyono, A. (2010). Model penelitian pengembangan. In *Semarang: Undip Press*.