



The Development of TUDIAMIPA MOOCs as an Online Learning Solution

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The Development of TUDIAMIPA MOOCs as an Online Learning Solution

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Abstract: The government released policies, colleges, and universities implementing teaching and learning activities from home to minimize the spread of Covid 19. The learning process is undertaken online and focuses on knowledge of life skills. MOOCs come as a distance learning system capable of covering the needs to be accomplished with life skills. MOOCs are online learning systems that can be accessed through the internet network to allow learners to perform teaching and learning activities that are not constrained by time and space. This study produces a system of MOOCs that is designed with CMS WordPress using HTML and PHP and database with a Waterfall architecture model using MySQL. Quality testing of ISO 9126 standard based applications with 4 functions. For the precision and suitability sub-features, 100% feasibility level is displayed, it is declared safe from malware, blacklisting of the website, etc. for the device's security sub-features. The device can work well with 5 concurrent users, with an average time of 20 seconds and a performance rate of 99.78 % access. The system is considered feasible. 100% feasibility and usability level indicate very clear understanding of 84% feasibility level, meaning that the method is well accepted and easily understood by users.

1. Introduction

1.1. Background

At present, the Covid 19 pandemic is confronting the entire world. The government has provided a plan to predict and restrict the delivery of Covid 19, one of which is that teaching and learning practices from home be carried out by schools and universities. Circular Letter No.4 of 2020 was issued by the Ministry of Education and Culture, one of which addresses the learning process during the duration of Covid-19. In the process of teaching and learning practices, 1) the learning process is carried out online, 2) learning is based on the education of life skills, 3) learning activities may differ, and 4) input should be provided with proof or items from home learning activities. Qualitative inputs.

The learning process is carried out at home via online and offline facilities, based on the Ministry of Education and Culture Circular. Not all students and instructors, however, have the ability to optimally access the learning platform, as well as learning materials should also provide life skills so that problem-based and project-based learning is an alternative. Therefore, it is necessary to design a distance learning process that can include life skills. Massive Open Online Courses (MOOCs) are here to solve the problems faced during the Covid-19 pandemic.



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An alternative that can be used as an efficient alternative method is web-based learning media that is supported by a database. This web-based learning media consists of learning content, audio, and learning assessment [11]. Web-based learning media or e-learning, which is now becoming popular because its accessibility and reliability is a way to deliver online learning material that can be accessed from anywhere and at any time [4]. E-learning has been established in foreign countries, such as the US. Learning has been used in nearly 90% of universities that have more than 10,000 students [1].

Massive Open Online Courses (MOOCs) are online-based learning systems that can be accessed via the internet network so that students today can carry out teaching and learning activities not limited by time and space. In its use, students can take part in learning in other countries that provide these MOOC services. With these incentives, it is hoped that the MOOC will be used to collect learning data from other nations to the full degree, so that people have high competition with other countries. MOOC got a huge positive response at the start of its appearance. In 2011, one of the MOOCs taught by lecturers from Stanford University in England recorded that the number of applicants for one of its course materials reached 160,000 people from all over the world [13]. Some of the existing MOOCs platforms include Coursera, Udacity, edX, Khan Academy, and Duolingo [7]. In Indonesia, online courses are not very popular. A survey conducted by dailysocial.id shows that only about 21% of respondents who have used MOOC both speak Indonesian and English. The reasons for the respondents who did not use MOOC were that they had no spare time, minimal internet connectivity problems, and some subject matter costs. However the survey revealed that MOOC received a positive response stating that 91% of respondents agreed that MOOC will help participants to understand university topics [14].

Many researches regarding the development and use of MOOCs have been carried out, among others, Ivleva implements e-learning Massive Open Online Courses (MOOCs) at Reshetnev Siberian State Aerospace University (SibSAU). Learning becomes effective because of the participation of all students and teaching staff in MOOCs [6]. Furthermore, Dandache et al implemented MOOCs at the Faculty of Medicine, University of Manitoba. The use of MOOCs increases student activity and interest in the learning process [4]. Furthermore, Silvana analyzed the use of MOOCs-based e-learning systems in Indonesia. The MOOCs based e-Learning system in Indonesia has the potential to continue to higher education with several indicators. First, the majority of participants are women. Second, the latest education from most of the users is SMA or SMK. Finally, most of them have worked as employees [12].

1.2. Massive open online course (MOOC)

A Massive open online course (MOOC) is one of the e-learning platforms or online learning (online). When viewed from the point of view of the teaching and learning process, MOOC-based learning is not much different from conventional learning: having a lecturer/teacher, syllabus, teaching materials and materials, and exams. Some MOOC providers also provide a certificate as a token of completion at the end of the course. However, in general, three things distinguish it from conventional learning methods: (1) the learning process in MOOC is not done in class, but through a computer screen or smartphone. The entire learning material, be it the delivery of teaching materials, practice questions, and implementation of exams, is packaged online in a digital format. The delivery of teaching materials and materials is usually delivered through recorded videos, presentation slides, or textually; (2) MOOC is open, can be followed by anyone. Registration does not require specific qualifications or education graduates so all internet users are free to register and take part in lessons. The learning model in MOOC is informal, unlike the teaching and learning process at universities. And (3) MOOC is designed to accommodate an unlimited number of participants. Therefore, the interaction between teacher and participants is more collective and communal, not individual [3].

MOOCs were first introduced in 2006 and emerged as a popular mode of learning in 2012 [8]. MOOCs exist as a new model of education and learning, which uses the internet to deliver lecture materials in world universities and prestigious educational institutions, creating a kind of revolution and these people joining each other to undertake sustainable courses. This continuous learning model

is referred to as "Massive Open Online Courses" or abbreviated as "MOOCs" [10], which creates a learning model from various corners of the world available to anyone, every student can access to programs offered by various higher education institutions, educational institutions, and educational organizations. MOOCs are online-based learning models that can be accessed by everyone around the world for free [9]. Although there are concerns that this could bring about disruption and reduce the quality of education in higher education, MOOCs could redefine the concept of higher education by providing new learning opportunities for prospective students at faculties and universities to acquire the best possible skills.

2. Research Method

The research method used in this research is Research and Development / Research and Development (R&D). The R&D model that will be used in this research refers to the design developed by Borg & Gall: 1) Research and information collecting, 2) Planning, 3) Develop a preliminary form of product, 4) Preliminary field testing, 5) Main product revision, 6) Main field testing, 7) Operational product revision, 8) Operational field testing, 9) Final product revision, 10) Dissemination and implementation [2]. This research is limited to the seventh part of the ten sections because these seven steps can already answer the researcher's problem formulation.

2.1. Media Validation, Evaluation, and Revision

Media validation is a process to assess whether the product design of the MOOCs System being developed has been categorized as effective and efficient in increasing student interest and learning outcomes. In the initial product design validation stage, a team of experts consisting of material experts and media experts was consulted. The shortcomings or defects of the MOOCs media and system are obtained from this validation stage so that they can be corrected to make it better and more efficient. Product testing is an important aspect of research and development that is carried out after the completion of the product design. It was carried out for product testing by way of small group testing and field trials. After the product is validated by material and media experts and has been tested in small groups and field trials, it can be seen as the weaknesses of the product. These weaknesses are then corrected to produce a better product.

2.2. Data Collection and Analysis

Data collection techniques in this study using a questionnaire or questionnaire with a Likert scale. The questionnaire was given to media experts, material experts, and gave response questionnaires to physics education students taking the IT-Based Education Media Development Design course.

The data analysis technique in this study uses descriptive analysis techniques for functionality and usability analysis, uses a web testing tool, namely browserstack.com for portability analysis and WebServer Stress Tools software for Reliability analysis.

2.2.1 Functionality Analysis. Testing functionality is determined by calculating the percentage score for each instrument. On the System Expert validation sheet, answer each question item using the Guttman scale. For every function that runs well, the examiner will provide a checklist on the Yes tab, if the function does not work well, the examiner will provide a checklist on the No. The condition for a Yes answer is one, while the answer for No is zero. Answer each question item using the Guttman scale.

2.2.2 Usability Analysis. Usability analysis is done by analyzing User responses using a Likert scale with 5 choices. In the questionnaire, the answers to each question item used a Likert scale.

2.2.3 Portability Analysis. Portability testing is done by observing system usage on various browsers on PC / Desktop and mobile. Portability testing is done with the help of a web testing

tool, namely browserstack.com, where testing is done by cross-browser testing or checking the system using various browsers on the desktop.

The portability test is determined from the calculation of the percentage score for each instrument. On the instrument sheet, answer each question item using the Guttman scale. For every function that goes well, the examiner will provide a checklist on the Yes tab, if the function does not work well, the examiner will provide a checklist on the No tab, provided that the Yes answer is worth one while the No answer is zero.

2.3 Reliability Analysis

Reliability testing is done with the WebServer Stress Tools software for stress testing, which aims to see the software's ability to work normally. Stress testing uses simulated visitors at a certain time to see the robustness of the software in handling heavy workloads.

3. Results and Discussion

3.1. Presentation of Product Development Results

a. System Access Rights

The needs analysis stage in this research process produces several functions that serve as a reference for building the system. Some of these functions include:

1. The access level consists of admin, lecturer, and student levels
2. Information that is managed by the system is related to information regarding Tudiampipa profiles, news, lecturer and student data, grades, class, and course data.
3. Lecturer and student accounts are registered by the admin.
4. Admin has full access to the system.
5. Lecturers can only see self-profile, student scores, and student attendance.
6. Lecturers can view, change, and print value data
7. Students can only see Tudiampipa profile, news, grades, and materials.
8. Students can score their respective grades.

b. Main Page Display

The users' main page includes menu options for procedures that can be performed by the system. The main page is a guest page with information to be accessed and there are many menus that can be viewed. There are several sub menus on the main page, namely: home, course, touch, login and registration. The Home menu reveals the system's starting page. The appearance of the Home menu is the same as the Main Page of the Tidiampipa Information System. The Course Form displays the types of courses that can be selected. This login form is on the main page of the information system. To log in, enter the username and password which can be obtained from the Admin. The registration form serves as a forum for students to register to take one of the courses.

3.2 Presentation of Test Result Data

Retrieval of test results data on the Tudiampipa System is carried out by Instrument Experts, System Experts, and Users. Retrieval of test result data by the User is carried out after the academic information system gets a proper assessment from the System Expert. The results of testing the Instrument Expert, System Expert, and User can be seen as follows:

- Test Results Data from Instrument Experts and Systems Experts
 - Expert Instrument Validation

Instrument validation data were obtained from the results of filling out a questionnaire by the Instrument Expert. Instrument validation was carried out by 3 validators. The instrument used to validate the system instrument consists of 8 statements. Comments and suggestions obtained on instrument validation are used as the basis for making revisions before the instrument is tested on

System Experts and Users. Data on the results of instrument validation are presented in Table 1 and Table 2.

Table 1. Data Validation Results of Functionality Instruments

Instrument Validator	Total Score	Expected Score	Percentage Eligibility	Category
V-1	40	40	100%	Very good
V-2	39	40	97.5%	Very good
V-3	40	40	100%	Very good
average			99%	Very good

Table 2. Data Validation Results of Usability Instruments

Instrument Validator	Total Score	Expected Score	Percentage Eligibility	Category
V-1	38	40	95%	Very good
V-2	35	40	87.5%	Very good
V-3	36	40	90%	Very good
average			90.8%	Very good

Based on Table 1 and Table 2, the results of the Descriptive Analysis are converted to the Value Conversion Table and the percentage of the feasibility of the Functionality instrument is 99%, while the results for the percentage of the feasibility of the Usability instrument are 90.8% with very good interpretation.

➤ System Expert Validation

• Functionality Characteristics

Testing the characteristics of functionality using the Black Box Testing method where the examiner assesses it based on an instrument in the form of a test case. The functionality testing instrument contains 126 questions that describe the suitability and accuracy sub-characteristics, for the security sub-characteristics using web testing tools software, while the software interoperability sub-characteristics are combined with the portability test because it has the same characteristics.

The instrument functionality was validated by 2 expert lecturers where after validation some input was given so that this system became more valid. For every function that runs well, the examiner will provide a checklist on the Yes tab, if the function does not work well, the examiner will provide a checklist on the No.

The two testers indicated that every test case that was conducted had outcomes that suited its intent. Using the Guttman scale, the functionality testing study uses descriptive analysis techniques. Based on the results of descriptive analysis of the test results data by the System Expert, then converted to the Qualitative Conversion Table of the Percentage of Feasibility and the results of the percentage of system feasibility in terms of functionality characteristics for suitability and accuracy sub characteristics are 100% and have very decent interpretation.

The test results of functionality for the security sub-characteristics can be seen in Table 3 below:

Table 3. Security Test Results

Security Type	Level of risk
Malware	Low
Website Blacklisting	Low
Injected SPAM	Low
Defacement	Low
Internal Server Errors	Low

8 It can be seen from the test results in Table 3 that website durability against Malware, Website Blacklisting, Injected SPAM, Defacements and Internal Server Errors have a low risk so there is no need for repairs.

- ReliabilityCharacteristics

The Stress Testing process is one of the measures for reliability in information systems. Stress Testing is a form of software testing that by testing it beyond standard use limits, defines a software's resilience. The aim of this test is to force a program to crash and figure out if this program will run again as soon as possible. Multiple requests for access from many users will cause crashes at the same time.

Testing using the Webserver Stress Tool with scenario rules for the number of users as many as 5 will access simultaneously within 60 minutes. The test report results obtained a total of 1,132 clicks on the system and a total of 3 errors were found.

- PortabilityCharacteristics

Testing the portability of this system using the help of the Web Testing Tool, namely browserstack.com, where testing is done by Cross Browser Testing or checking the system using various browsers on the desktop. Based on the results of testing using the Browser Stack, it can be seen that this system supports desktop and mobile applications, the system can run well with no errors found in applications with the Windows XP, 8, 7, 10, 31 android, Windows Phone and Macintosh operating systems, iOS. , Blackberry OS. These results can be seen in Table 4.

Table 4. Portability Variable Test Results

No.	Operating System	Type	Question	Result
1	Windows XP	Desktop	Can Tudiamipa run properly using the Mozilla Firefox browser?	No errors were found
2			Can Tudiamipa run properly using the google chrome browser?	
3	Windows 7	Desktop	Can Tudiamipa run properly using the Mozilla Firefox browser?	No errors were found
4			Can Tudiamipa run properly using the google chrome browser?	
5	Windows 8	Desktop	Can Tudiamipa run properly using the Mozilla Firefox browser?	No errors were found
6			Can Tudiamipa run properly using the google chrome browser?	
7	Windows 10	Desktop	Can Tudiamipa run properly using the Mozilla Firefox browser?	No errors were found
8			Can Tudiamipa run properly using the google chrome browser?	
9	Macintosh	Desktop	Can Tudiamipa run properly using the Mozilla Firefox browser?	No errors were found
10			Can Tudiamipa run properly using the google chrome browser?	
11	Android	Mobile	Can Tudiamipa run properly using the Mozilla Firefox browser?	No errors were found
12			Can Tudiamipa run properly using the google chrome browser?	
13			Can Tudiamipa run properly using	No errors were found

14	Windows Phone	Mobile	Can Tudiampipa run properly using the Mozilla Firefox browser? Can Tudiampipa run properly using the google chrome browser?	No errors were found
15	Blackberry OS	Mobile	Can Tudiampipa run properly using the Mozilla Firefox browser? Can Tudiampipa run properly using the google chrome browser?	
16	IOS	Mobile	Can Tudiampipa run properly using the Mozilla Firefox browser? Can Tudiampipa run properly using the google chrome browser?	No errors were found
17				
18				

➤ Data on System Trial Results by Users (Usability Characteristics)

User trials are carried out after obtaining valid results on trials that have been conducted by Instrument Experts and Systems Experts. This User Trial was conducted in August 2020. The User Trial 30s conducted by 30 people including 10 lecturers and 20 students. User trial results data can be seen in Table 5.

Table 5. The results of the usability percentage of respondents' responses to information systems

Category	Number of Respondents	Percentage (%)
Very good	26	86.67
Good	4	13.33
Enough	0	0
Less	0	0
Very less	0	0
amount	30	100

4. Conclusion

Tudiampipa MOOCs system was built using HTML and PHP programming languages with CMS WordPress and database using MySQL with the Waterfall design model. Testing software quality based on ISO 9126 standard with 4 characteristics, namely Functionality, Reliability, Portability, and Usability. The results of testing functionality for the accuracy and suitability sub-characteristics show a 100% feasibility level, for the security sub-characteristics of the system it is declared safe from Malware, Website Blacklisting, Injected SPAM, Defacement, and SQL Injection. Based on reliability, the system is declared feasible because the system can run well with 5 simultaneous users with an average time of 20 seconds and a success rate of 99.78% access. The portability test shows the feasibility level of 100% and usability shows the feasibility level of 84% with very good interpretation, meaning that the system is well accepted and easily understood by users.

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