

Designing and Building of E-Learning Applications For SMK Negeri 1 Gunung Talang

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Abstract

In this research, the design and manufacture of an e-learning learning system application at SMK N 1 Guntal was carried out using Moodle (Modular Object Oriented Dynamic Learning Environment), a software developed for internet and web-based learning activities that can create and manage courses, check student attendance and performance, managing quizzes or other assignments. This application is designed and created using the flipped classroom learning model or reverse learning where students before doing learning in class students first study the material at home according to the learning given by the teacher. By making e-learning media with this flipped classroom learning model, students can deepen the material provided by the teacher and increase creativity and train student independence. In addition, the application of this learning model certainly requires training and readiness of teachers, educational staff in designing learning materials before having face-to-face meetings in class. By learning using this e-learning application, it is hoped that conventional learning patterns can be improved or improved into learning that is in accordance with the development of the digital era as it is today.

Keywords: Application, SMK N 1 Guntal, Moodle, Flipped Classroom

1. Introduction

Realizing learning activities optimally with the massive development of information and communication technology today has resulted in the need for an IT-based learning mechanism & concept that has spread in the world of education. The learning process has a variety of learning methods and media that can be used. Media will also experience development from conventional to technology needed to facilitate the learning process. One type of technology that has great potential to be used as an information technology-based learning medium is the use of computer technology (Susanto, 2019). SMK N 1 Guntal is a vocational high school that has several majors, namely Light Vehicle Engineering, Computer Network Engineering, Multimedia, Poultry Livestock Agribusiness, Food Crop Agribusiness and Horticulture. Based on research at SMK N 1 Guntal majoring in Multimedia, the process of teaching and learning activities that are applied is still limited in schools. In addition, when the teacher is not present, the learning process stops and this can hinder student development. So to help overcome these problems, the authors design and create online learning media or what is called e-learning which can help learning become more effective, alternative and flexible. With the creation of e-learning media, it is hoped that it will be able to solve the problem of lack of student learning activity, so that students can be more active in the learning process in the classroom as well as outside the

school environment because using e-learning can facilitate the dissemination of material or knowledge for students. preparation for teaching and learning activities (Hartono, 2013). Learning systems can be developed using the Moodle platform (Modular Object-Oriented Dynamic Learning Environment) as a platform that is specifically suitable for creating learning communities where the Learning Management System (LMS) is software designed to help educators build quality online learning using the principles pedagogical principles that can help educators build effective online learning communities. Based on the multimedia principle, it can be concluded that in developing learning media in the form of e-learning, it should have content in the form of text, illustrations, graphics, animation, and composition in accordance with the material presented. In addition to the use of learning media, a learning model is also needed to support good student learning activities, namely applying a learning model that reverses the situation of traditional learning where students at home can do what is done in class, namely learning to understand the material that has been given by the teacher, and at home (Andri, 2018). class students do what students usually do at home, namely discussions and work on questions. With the creation of e-learning media with the flipped classroom learning model, it helps students to further deepen the material provided by the teacher. The teacher, before discussing the material to be taught, first gives

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assignments to students to study material that is already in the e-learning media and of course this can require students to be more independent because students study the subject matter first before there is a meeting in class. This Flipped Classroom model utilizes learning media that can be accessed online by students who are able to support their learning material (Bantala, 2010). This model emphasizes how to use time in class so that learning is of higher quality and can increase students' knowledge and critical thinking skills.

2. Literature Review

2.1 System definition

A system is a collection of components connected by well-defined boundaries that work together to achieve a goal by receiving inputs and producing outputs in a regulated transformation process. A System has several basic elements according to Kristanto (2018), which are as follows:

a) System Purposes

System goals are the goals of the system created. System objectives can be in the form of organizational goals, organizational needs, problems that exist in an organization or sequence of procedures to achieve the goals that the organization wants to achieve.

b) System Boundary

System limitation is something that limits the system in achieving system goals. System boundaries can be in the form of regulations that exist within an organization, aspects of costs incurred, people in an organization, good facilities as facilities and infrastructure and other limitations.

c) System Control

System control or supervision is supervision of the implementation of achieving the goals of the system. System control can be in the form of control over data entry (input), control over data output (output), control over feedback and so on.

d) Input

Input is an element of the system whose job is to receive all input data, where the input can be in the form of data type, frequency of data entry, and so on..

e) System Process

Process is an element of the system whose job is to process or process all input data into more useful information. For example, the production system will process raw materials in the form of raw materials into finished materials that are ready for use.

f) Output

Output is the result of input that has been processed by the processing section and is the ultimate goal of the system. This output can be in the form of graph reports, bar charts, and so on.

g) Feedback

Feedback is an element in the system whose job is to evaluate part of the output issued where this element is very important for the progress of a system. Feedback can

be interpreted as system improvement, system maintenance.

2.2 E-Learning

E-learning or electronic learning is a learning concept that is carried out through electronic media networks. Due to the advanced technological developments and globalization in this modern age, various activities have come to be carried out quickly and efficiently. E-learning was created to overcome the limitations between educators and students, especially in terms of time, space, conditions and circumstances. Through e-learning educators and students do not need to be in spatial and temporal dimensions. The educational process can occur at any time by ignoring these two things. E-learning is a teaching and learning mode that allows the delivery of educational materials to students via the internet, intranet or other computer network media. In addition, learning concepts can be combined with others depending on the needs to be met (Kole, 2021). There are several components in making this system namely:

a) e- Learning System

Software that virtualizes conventional teaching and learning processes. How is class management, material or content creation, discussion forums, assessment systems (reports), online examination systems and all features related to the management of the teaching and learning process. The software system is often called the Learning Management System (LMS).

b) e- Learning Content

Content and teaching materials in the e-Learning system (Learning Management System). This content and teaching materials can be in the form of Multimedia-Based Content (content in the form of interactive multimedia) or Text-based Content (content in the form of text like in ordinary textbooks).

c) E- Learning Infrastructure

E-Learning infrastructure can be in the form of personal computers (PCs), computer networks and multimedia equipment. This includes teleconference equipment if we provide synchronous learning services via teleconference. (Huda et al., 2021)

d) Learning management system

In the process of implementing e-Learning, a Learning Management System (LMS) is needed, which functions to regulate the governance of implementing learning in the e-Learning model. LMS is also often known as CMS (Course Management System), generally CMS is built on the web, which will run on a web server and can be accessed by participants via a web browser (web client). Servers are usually placed at universities or other institutions, which can be accessed from anywhere by the participants, by utilizing an internet connection. In general, basically CMS provides a tool for instructors, educators or educators to create an educational website and manage access control, so that only registered participants can access and view it (Gordon, 1995). In addition to providing control, CMS also provides various tools that make learning more effective and efficient, such

as providing services to make it easier to upload and share learning materials, online discussions, chats, organize quizzes, surveys, reports and so on.

Some of the benefits of e-learning include according to Rohmah (2016) (1) with e-learning it can shorten learning time and make study costs more economical (2) E-learning facilitates interaction between students and material, (3) Learners can share information with each other and be able to access learning materials at any time and repeatedly, with such conditions that students can further strengthen their mastery of learning material (4) With e-learning the process of developing knowledge does not only occur in the classroom, but with the help of equipment computers and networks, students can be actively involved in the teaching-learning process (Nurkhalik, 2014).

2.3 Databases

The definition of a database according to Margaet Rouse and Allan Leake states that a database is a collection of data and information (data that has been processed which is well organized, making it easier to access, manage, and update in. According to Meriem Webster's Dictionary, a database is a collection of pieces of data and information that are structured and well organized, which consists of tables, queries, objects, and the manipulation process in them (insert, view, delete, update).

According to Kadir and Triwahyuni (2013) a database is an organization of a set of data that are interrelated to make it easier for activities to obtain information (Kadir, 2013). The database is intended to address problems in systems that use a data-based approach. According to (Indrajani, 2011) a database is a collection of logically related data, and is an explanation of the data, which is designed to find the data needed by an organization. Dari semua pengertian yang telah dipaparkan sebelumnya, basis data (database) dapat dikatakan bahwa database merupakan tempat untuk penyimpanan data, penyimpanan informasi (data yang telah diolah), dan proses untuk manipulasi (pengolahan) data informasi, serta pengkasesan data dan informasi. Dalam database terdiri dari beberapa bagian yang diantaranya:

- a) Entity, is the person, place, event, or concept whose information is recorded.
- b) Attributes, each entity has an attribute or designation to represent an entity.
- c) Data value (value or data content), data value is the actual data or information stored in each data element or attribute.
- d) Record, is a collection of elements that are interrelated to inform about a complete entity. A record represents one data or information about a person.
- e) File, is a collection of records that are interconnected.

2.4 Flipped Classroom Model

Flipped classroom is a model in which the teaching and learning process is not as usual (in the traditional method, namely in the learning process students learn subject

matter at home before class begins and teaching and learning activities in class in the form of doing assignments, discussing material or problems that have not been understood by students (Pitra, 2022).

According to Bennett, although there is a different approach to the traditional model, the flipped classroom model is considered to have effective characteristics as (1) Direct discussions are led by students with the content they bring, (2) discussions achieve higher critical thinking than usual, (3) work in groups, students discuss the needs they need, (4) discussions are always given context with the facts that students get, (5) students feel challenged during discussions with questions and answers, (6) the teacher only guides and learns spontaneously from the problems that arise. students get, (7) students are given freedom for the material they discuss to lead discussions without any teacher encouragement. (8) students have the right to ask exploratory questions, (9) students are directly involved in problem solving and do critical thinking to solve it, (10) students change from passive listeners to active learners.

2.5 Moodle (modular object-oriented dynamic learning environment)

Modular Object-Oriented Dynamic Learning Environment (or commonly called Moodle) is software designed for internet- and website-based learning activities. Moodle continues to develop the system and interface design to date (Puspitasari, 2015). Moodle is freely available and available as an open source product under the GNU license. Moodle is well suited as a learning tool in schools and universities. which has several features for managing courses such as grouping subjects into certain categories or sub-categories. In categories, users can have sub categories, where users can have courses. This means that several course groups can be combined into one category. The following are the advantages and disadvantages of moodle, namely as follows:

Excess moodle according to Rulianto (2009):

- a) Open Open source that can download the moodle application on the internet at the official website <http://www.moodle> .
- b) Suitable for online teaching media, Moodle is an implementation based on teaching and learning concepts and procedures that use web-based information technology.
- c) Practically used, Moodle is made in such a way that it is in sync with the needs of teaching and learning activities.
- d) The installation process is easy because it is in the web installation menu.
- e) The structure of the pedagogical material is neat and can be formed into several categories.
- f) Supports several types of archives that can be used in the teaching and learning process.
- g) There are quiz facilities, assignments and grades that can be adjusted according to needs.
- h) The capacity of many students or students.

- i) There are facilities for creating teachers for each category.
- j) Security is equipped with facilities and various site security techniques.
- k) The availability of language packages that can be selected according to needs.
- l) The ease of changing the appearance of the site is equipped with the change themes feature.

Lack of moodle according to Kurniawan (2009):

- a) Not being able to meet user needs caused by poor design of learning web applications so that they do not suit user needs, for example not user friendly, unreliable and unclear processes.
- b) The users do not know and are well acquainted with the system used due to weak socialization of the system (user hook).

Slow access times due to small bandwidth and poor design of content with large file sizes.

3. Methods

3.1 DevOps method

DevOps is a method that combines software development (Development or Dev) and IT operations (Operation or Ops). DevOps aims to shorten the system development cycle with high software quality. This method places more emphasis on communication, collaboration, and integration between developers and IT professionals, so that the development and operational sections work more closely. As previously mentioned, DevOps is a developer principle to coordinate between teams, namely the development team with the operations team effectively and efficiently. The mindset formed by DevOps is coordination between teams that can be done in a short way so it doesn't require a lot of questions. The operation or development team only needs to configure the required components through the procedures made.

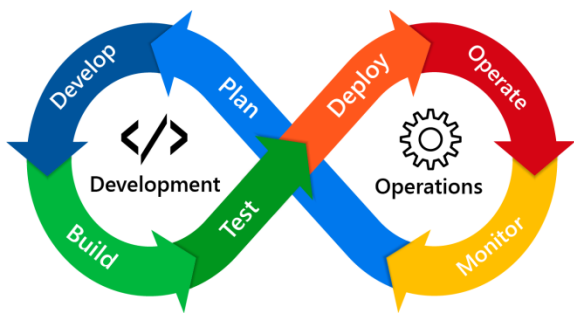


Fig. 1. DevOps Method

DevOps is a set of practices and principles that combines software development (Dev) and IT operations (Ops) to improve the efficiency, reliability, and speed of delivering software products. It aims to bridge the gap between development teams, responsible for creating and updating software, and operations teams, responsible for deploying and maintaining software in production environments.

DevOps aims to increase collaboration between the development team and the operations team from planning to delivering applications/features to users (Windyasari, 2020). All of that has to be done automatically in order to increase deployment frequency, increase time to market, lower failure rate on new releases, shorten fix time, increase recovery time. In designing this application, there are two parts to the way the DevOps method works, including the following:

a) Plan

This phase involves planning for all required workflows before the development team starts writing code. In this stage, the product manager and project manager will play an important role. They will work together to gather requirements and feedback from clients or stakeholders. This information will then be collected to build a product roadmap to guide the development process that will be carried out.

b) Code

Once a plan is created, the development team can start writing the code needed to develop the product. Developer teams will typically use a standard set of plugins installed in their development environment to aid the development process, help implement a consistent code style, and avoid common security flaws and anti-patterns.

c) Build

After the development team has finished writing the required code, they will include the code in the shared code repository. The developer will send a pull request, after which other developers will review the changes that have been made. If the code has no issues, then the developer will approve the pull request that was previously sent.

d) Test

The next step is to do the testing. If any issues are found in this phase, they will be sent back to the development team to be resolved.

e) Release

The release phase is an important milestone in the DevOps pipeline. At this stage, each code change has passed a series of tests and the IT operations team has confirmed that crashing and regression issues are properly resolved.

f) Deploy

The next stage is deployment. After the production environment is created and configured, the latest version of the development that has been done will be applied.

g) Monitor

At this last stage, the IT operations team will continue to work hard to monitor the infrastructure, systems and applications. This is done to ensure that the product or application being developed can run smoothly. They also collect important data from logs, analytics, monitoring systems, and look at user feedback to find out if there are problems with application performance.

3.2 System analysis

System analysis is the decomposition of a complete system into its component parts. The purpose of this system analysis is to identify and evaluate the problems and obstacles that occur and the necessary requirements exist in this system so that improvements can be proposed. Based on the initial data obtained from the field through observation and interviews, the following data and analysis results are obtained.

a) Running System Analysis

The current system analysis is a review or analysis of the system running at SMK N 1 Guntal, in which there are stages that explain the learning process, who is working on the process, and the parts of the work system that are currently running. Analysis of the running system is carried out by analyzing the objects needed for the system to be designed, intended to focus on the functioning of the running system, without focusing on the process flow of the system. And from the results of this analysis visualized and documented with UML through use case diagrams, use case scenarios and activity diagrams, the consideration of these diagrams is because they are considered to represent the overall running system that can be understood by the user.

b) Current System Flowmap

The running system flowmap is a process of relationships between users or actors in ongoing business processes, which can be seen in the following figure.

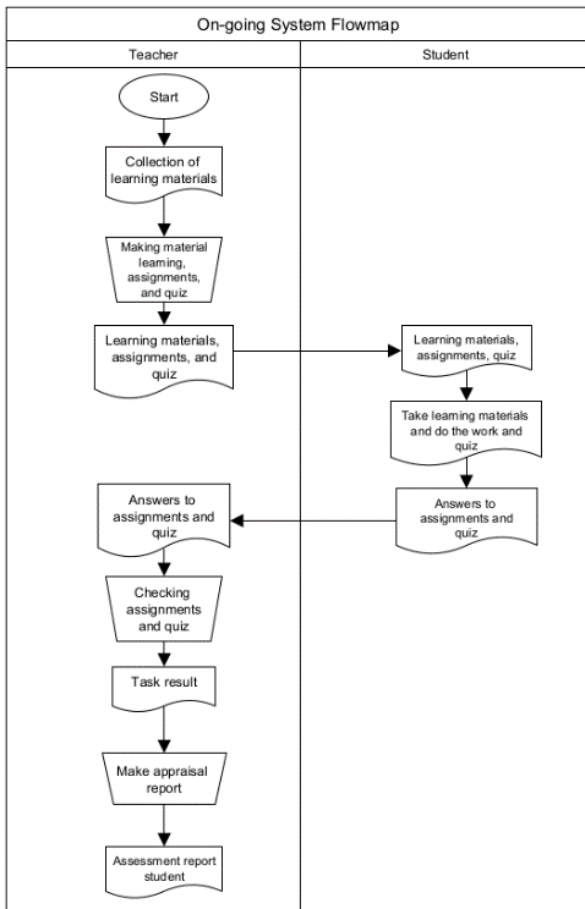


Fig 2. Running system flowmap

c) Proposed System Flowmap

Flowmap is a specific depiction that shows the sequence of steps and procedures in a system. Based on the current system, a new system is designed like the flowmap below.

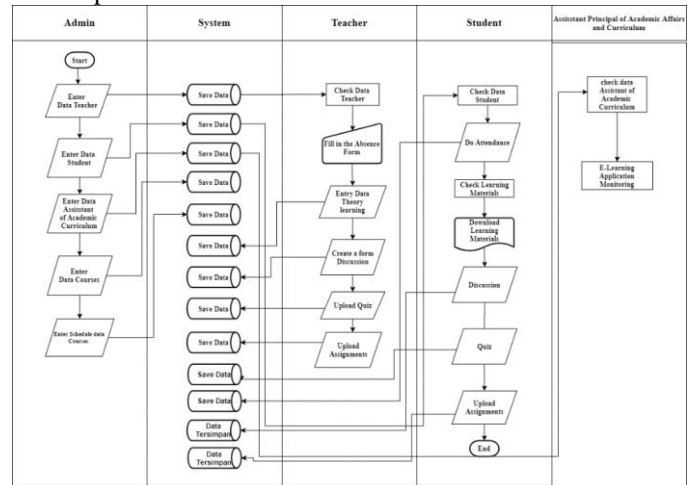


Fig 3. Proposed system flowmap

In the picture above admin is the highest user in this system. Admin has the task of managing the system and entering user data. Another admin task is to enter subject list data and subject schedules. After the user gets access rights, the user can view their respective data. In the system proposed for this e-learning application, the teacher can create a student absence form and then input learning material, then the material can be seen by students and then can also be downloaded by students. After the learning material has been delivered, the teacher uploads assignments or creates quizzes, and these assignments can be done by students and also uploaded by students. All activities of the e-learning application system are monitored by the deputy head of the curriculum.

Present addresses can be inserted using a normal footnote (on the 'Text' menu). After having listed all authors' names, you should list their respective affiliations. Link authors and affiliations using superscript lower case letters.

4. Results and Findings

The result of this research is an e-learning application that can be used at SMK N 1 Gunung Talang. This application can facilitate teachers and students in the learning process where the process can be carried out online without having to meet face to face (Huda et al., 2020).

4.1 Home page

The home page is the main page displayed by the system after opening the website as shown below.

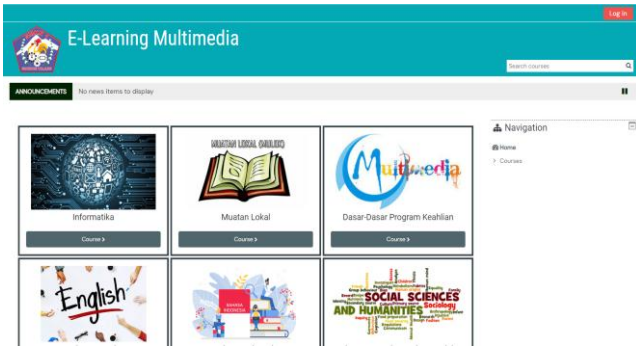


Fig 4. Home Page

In the picture above, there is a display of the home page, where this page has a home navigation menu and user login navigation. In addition, there is also content which contains a search form for users to search for data.

4.2 Login page

The login page is a verification page for users before exercising access rights into the system according to the access rights of each user. The implementation of the login page for teacher, student, and deputy curriculum users is as follows.

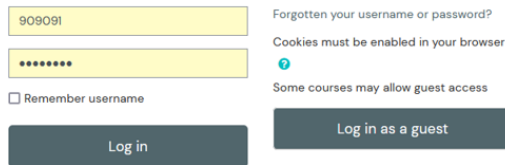


Fig 5. Login page

On the login page, teacher, student, and curriculum assistant users must enter their username and password if they want to access the system. During the login process if the username and password are correct then it will immediately go to the main page display.

4.3 Teacher dashboard

The teacher dashboard is the user's initial display page on the teacher on the system after the teacher logs in as shown in the image below.

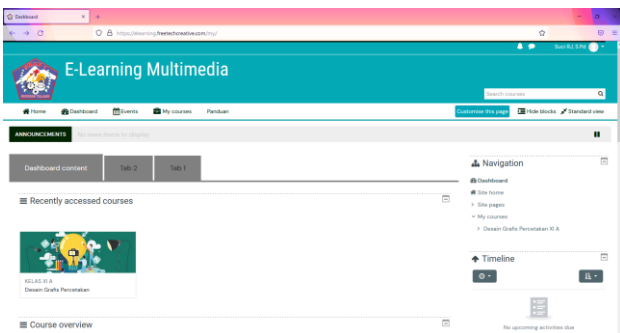


Fig 6. Teacher dashboard

This teacher's dashboard page displays a form containing the subjects taught by the teacher. In addition, there are

also various settings menus according to teacher access rights.

4.4 Page adding learning activities

The page for adding learning activities is a system page that contains various functional features for adding learning activities as shown in the image below.

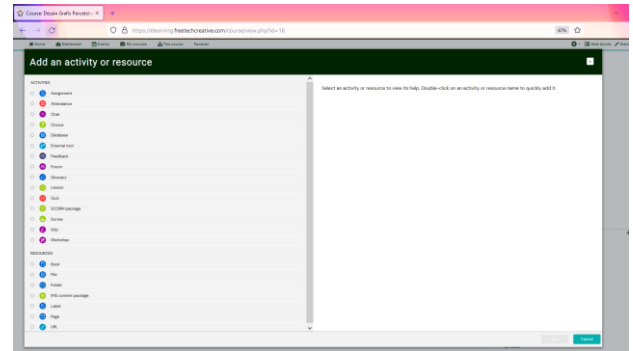


Fig 7. Adding Activity

The activities that can be carried out in this application for teacher users are uploading material, creating discussion forms, creating quizzes, and adding assignments.

4.5 Student dashboard

The student dashboard is a display on the system after the student has successfully logged in. The student dashboard page display is as shown in the following figure.

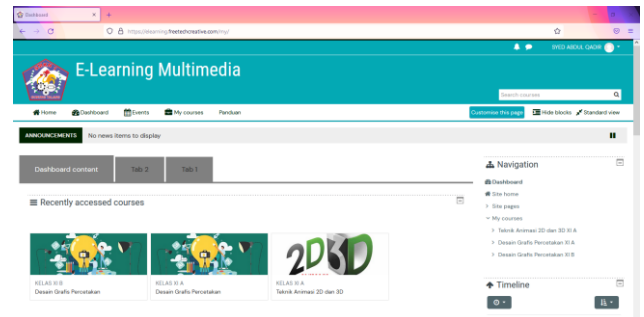


Fig 8. Student dashboard

This student's main page is the student's main page when students successfully log in. This page will display a form that displays a form that contains the subjects in the class the student is participating in. The activities followed by students are filling in absences, downloading material, doing assignments, filling out quizzes, and participating in class discussions with teachers and other students.

5. Conclusion

Based on the results of the previous research and discussion, the conclusion is that this application system is designed using the Moodle LMS where the design uses the DevOps method. Based on the analysis, this e-learning system will help SMK N 1 Gunung Talang as a tool in the learning process between teachers and students. E-

learning made with Moodle software is developed to have a system in the form of materials, assignments, quizzes, discussion forums, and other learning resources that can be accessed and downloaded which can be done online.

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