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Learning Management System (LMS) Application Design Using The Laravel Framework (Case Study: SMKS Bina Essa)

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Abstract

The advancement of information technology has profoundly influenced the education sector, especially in facilitating effective and efficient online learning methodologies. SMKS Bina Essa, as a vocational education institution, necessitates a system that enables teaching and learning activities to be conducted in a digital, integrated, and readily accessible manner for both educators and learners. This study seeks to develop a web-based Learning Management System (LMS) using the Laravel framework to improve learning management at SMKS Bina Essa.

The applied system development methodology is Object-Oriented Analysis and Design (OOAD), encompassing steps such as needs analysis, system modeling through use case diagrams, class diagrams, sequence diagrams, activity diagrams, and user interface design. This research culminates in the design of the LMS program, incorporating essential elements such as user management for administrators, educators, and learners; management of educational resources; assignment processing; online assessments; discussion forums; and grade summarization and reporting.

According to the results of black-box testing, all application functions meet user requirements. This application enhances the learning process at SMKS Bina Essa by making it more structured, engaging, and conducive to sustainable digital learning practices, while also supporting the deployment of blended learning within the school environment.

Keywords : *Learning System Management, Laravel, System Design*

INTRODUCTION

The Vocational High School (SMK) is vital in developing competitive human resources equipped with essential skills in their respective industries. SMK BINA ESSA offers two primary programs: Office Management (OTKP) and Motorcycle Engineering (TBSM). The school must establish an educational information system to enhance teaching and learning activities. This information system coordinates human resources, technology, and software that collaborate to convert data into valuable information, facilitating decision-making in planning and academic administration.

The Learning Management System (LMS) is a software application for creating, distributing, and administering educational content. This system assists educators in syllabus development, organizing instructional materials and student activities, and tracking grades and attendance. The LMS enables students to access learning content anytime, anywhere via a digital application, enhancing the learning experience. Prominent licensed Learning Management Systems (LMS) include Moodle, Dokeos, and Atutor.

The principal attributes of a Learning Management System (LMS) often encompass an intuitive interface, online enrollment, virtual classrooms, assessments, and discussion forums. Using an LMS prevents student ennui during the learning process, as diverse methodologies can improve engagement and achieve desired learning outcomes. This system amalgamates

technology, software, and human resources to facilitate educational activities.

Despite the implementation of computerization in education at SMK BINA ESSA, specific disciplines remain underdeveloped in terms of digital integration. Educational activities require assistance from a dedicated program that enhances the learning experience. This program should facilitate students' comprehension and integration of the Merdeka Curriculum, which prioritizes the enhancement of both soft and hard skills via project-based learning.

The educational approach at SMK BINA ESSA predominantly follows a conventional model, characterized by direct engagement between educators and learners. While this approach is not wholly deficient, advances in contemporary technology necessitate a more dynamic framework that facilitates cooperative and participatory teaching and learning. The presence of a Learning Management System (LMS) tailored to facilitate the efficient implementation of the Merdeka Curriculum is anticipated to enhance the learning process, making it swifter, more precise, and more accurate, thereby easing students' academic endeavors.

LITERATURE REVIEW

A. Definition of System

"A system is an integrated arrangement of multiple functional components, each with distinct roles and responsibilities, that are interconnected and collaborate to achieve a specific process." Widiyanto, 2022

"A system is a compilation of multiple sets of elements that interact, connect, collaborate, and unify to accomplish specific goals or objectives." Agung Feby Prasetya et al., 2021

B. Definition of Information System

"An information system comprises four primary components: software, hardware, structured devices, and human resources." Agung Feby Prasetya and colleagues, 2021

An information system comprises a set of components that interact to accomplish a specific objective. The system processes data to generate valuable information for individuals. Adiyanti et al. (2021)

C. Design

"Design entails the application of diverse techniques and principles to meticulously delineate a tool, process, or system, facilitating its tangible realization." The objective of design is to fulfill user requirements and deliver a comprehensive representation that culminates in a complete design for computer programming and other technical professionals engaged in system development. Adiyanti et al. (2021)

D. Definition of Application

An application is software that serves as the interface for a system, converting data into valuable information for users and associated systems. The term 'application' derives from the English word, which means 'application' or 'utilization'. An application is a program designed for immediate use that serves a specific function for users. Budiyanto, 2023

"An application is a tool that streamlines and accelerates work processes without imposing a burden on its users." (Syabania & Rosmawani, 2021)

E. Definition of Learning Management System

A Learning Management System is a web-based software application designed for the management, documentation, monitoring, reporting, administration, and distribution of educational content, training programs, technical manuals, instructional films, or digital library resources, along with learning and development initiatives. The LMS is designed to assist educators in providing learning resources, overseeing online interactions between students and instructors, and streamlining administrative functions such as task assignment, response collection, and grading. Agripina Shafa, 2024

"LMS is software designed for online activities or e-learning programs that encompass educational materials and training conducted online." (Apriati et al., 2022)

F. Laravel

"Laravel is a PHP-based framework for web application development." This framework aims to streamline web app development by offering a range of practical features and tools. Laravel employs the Model-View-Controller (MVC) design pattern to methodically partition application logic into three essential components: Model (manages data), View (manages presentation), and Controller (regulates application flow). (Riza et al., 2024)

"Laravel is a PHP-based web development framework utilizing the MVC architecture, designed to enhance software quality by minimizing initial development and maintenance expenses, while improving user experience, resulting in expressive, clear, and timely applications." Firmansyah et al. (2022)

METHOD

This research uses the Unified Modeling Language (UML) as its system development methodology. UML is a collection of tools intended to abstract a system or object-oriented software, hence enabling the ongoing development of applications. It functions as a tool for creating systems and represents a standardization of modeling languages in computer science and software engineering. Purnama et al. (2021)

The UML methodology encompasses various stages, including Activity Diagram, Use Case Diagram, Class Diagram, and Sequence Diagram, among others. (Viktoria, 2022) This is an elucidation of the UML phases:

Utilization Case Diagram

The Use Case Diagram is a visual depiction of several players, use cases, and their interactions that define a system. It delineates four principal procedures executed within the fundamental framework of the Monitoring Information System to be constructed.

Class Diagram

The Class Diagram illustrates the system's static class architecture. A class denotes an item managed by the system and can interrelate with others through several mechanisms: association (a class relies on another class), specialization (one class is a derivative of another), or packaging (consolidating classes into a single unit).

Sequence Diagram

The Sequence Diagram depicts interactions among several objects and the times at which they are used to demonstrate the order of messages exchanged between objects, along with

the interactions that occur at specific moments within a system.

Activity Diagram

The Activity Diagram represents the operational operations of a system. It elucidates program activities without engaging in code or aesthetics. The diagram employs symbols, each of which has distinct meanings and functions. The illustrated actions should solely reflect the subsystems without elaborating on every facet. Excessive detail would result in an elaborate and protracted diagram.

RESULTS AND DISCUSSION

a. Usecase Diagram

The following is a use case diagram for the LMS at SMKS Bina Essa:

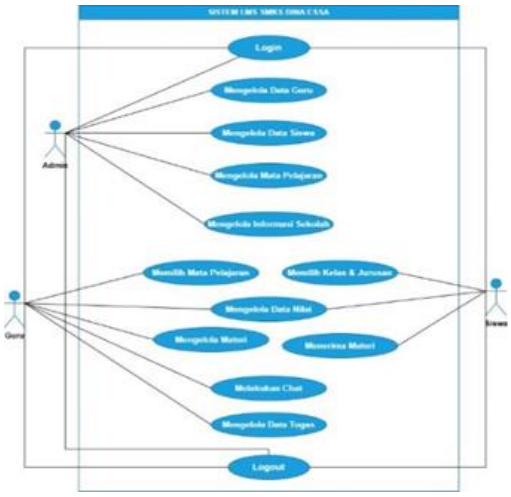

Figure 1. Usecase Diagram

b. Activity Diagram

The following is an activity diagram for student data management for the LMS at SMKS Bina Essa:

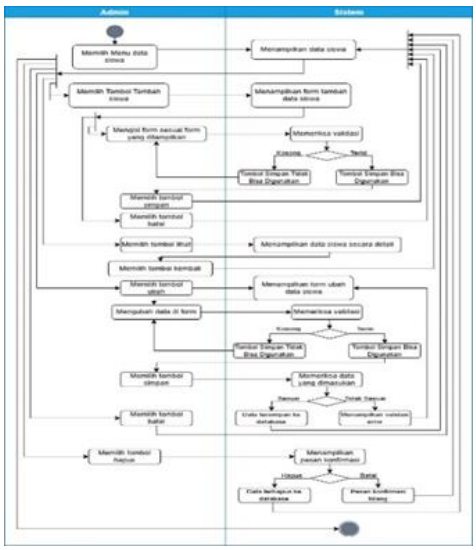

Figure 2. Activity Diagram

c. Sequence Diagram

The following is a sequence diagram of student data management for the LMS at SMKS Bina Essa:

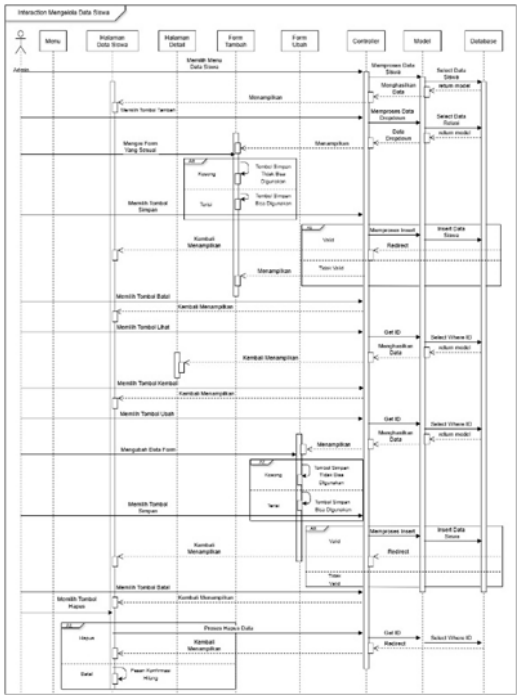

Figure 3. Sequence Diagram

d. Class Diagram

The following is a class diagram for student data management for the LMS at SMKS Bina Essa:

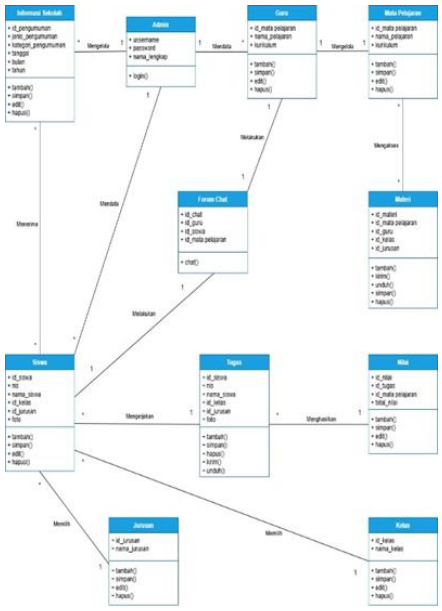

Figure 4. Sequence Diagram

e. Application Display Results

The subsequent output of the LMS program at SMKS Bina Essa is as follows:

Figure 5. Login View

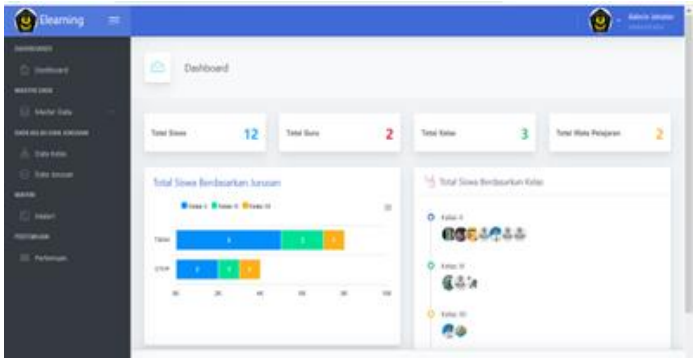

Figure 6. Dashboard View

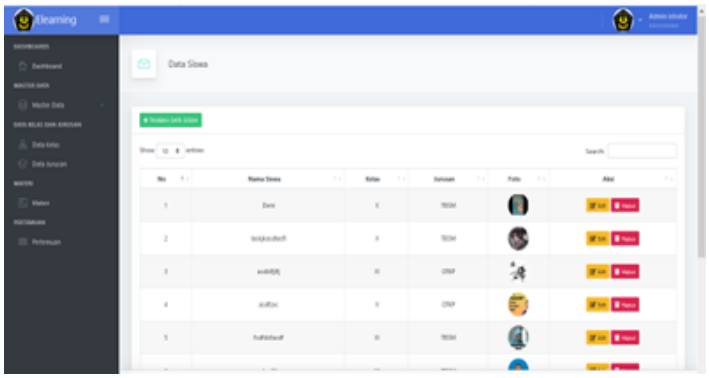

Figure 7. Student Data Display

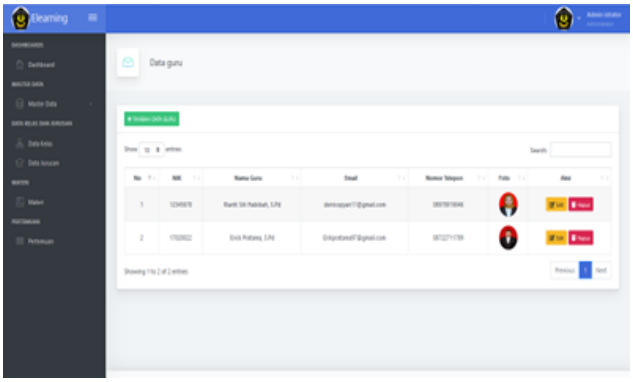

Figure 8. Teacher Data Display

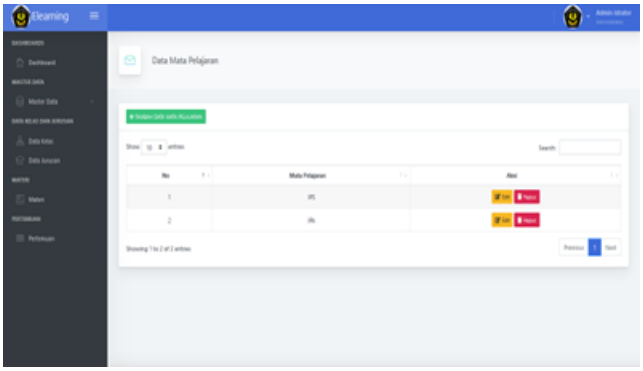

Figure 9. Subject Data Display

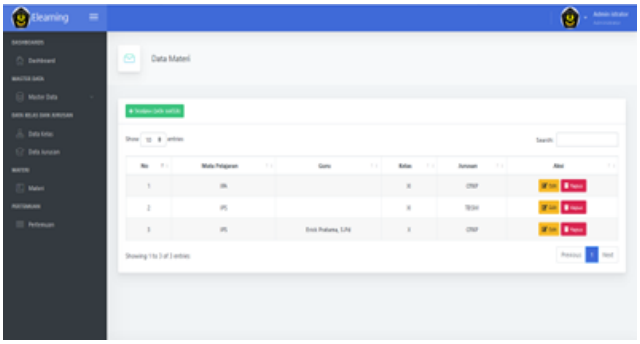

Figure 10. Material Data Display

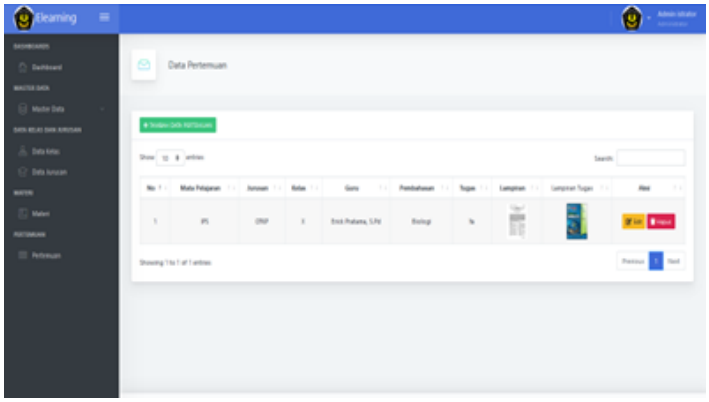

Figure 11. Meeting Data Display

Figure 12. Student List View to LMS

Figure 12. Student Dashboard View

Figure 13. Student Assignment Display

CONCLUSION

The research findings and design process of the Learning Management System (LMS) application, developed with the Laravel framework in the case study of SMKS Bina Essa, indicate that this system substantially enhances the effectiveness and efficiency of learning activities within the educational setting.

The design was executed in phases: requirements analysis, system architecture design, implementation, and testing, using the Object-Oriented Analysis and Design (OOAD) methodology. This methodology enables systematic system creation and promotes future maintenance.

The resultant LMS application offers essential functions such as class management, learning material administration, assignments,assessments, and communication channels for interaction between educators and students. The incorporation of these characteristics facilitates a more structured learning progression and reduces dependence on manual procedures. Educators can provide materials and assignments electronically, allowing students to access them flexibly, independent of spatial and temporal limitations.

The incorporation of a digital assessment system streamlines the evaluation of learning outcomes and produces more precise academic results, accessible in real time. Selecting the Laravel framework enables the creation of a secure, scalable application aligned with established web development best practices. Laravel provides a structured workflow with an MVC design, effective routing mechanisms, and middleware functionalities that improve data access security. This expedites the development process and ensures the system can be subsequently enhanced to accommodate the school's future requirements.

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