Development of E-Learning Web for ITB AAS Indonesia Using CodeIgniter Framework

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With the rapid advancement of information technology, the need for effective educational platforms has become pressing. ITB AAS Indonesia has taken steps to meet this need by developing an e-learning system using the CodeIgniter framework. This paper discusses the development process of the e-learning platform designed to provide an enhanced learning experience for students and faculty. By adopting a user-centered approach and applying structured development methods, this system offers advanced features that support remote learning, user interaction, and educational content management. Evaluation results indicate that this platform enhances accessibility and efficiency in the teaching and learning process, significantly contributing to modern education in Indonesia.

Keywords : *Development, E-Learning, CodeIgniter, Framework*

I.   INTRODUCTION

In recent decades, educational institutions have seen a In recent decades, educational institutions have seen a marked shift from traditional classroom settings to digital learning environments. The proliferation of technology has catalyzed this change, transforming how education is delivered and accessed globally [1]. This digital transformation allows educational institutions to overcome geographical and logistical challenges, making learning accessible to a broader audience.

In the context of Indonesia, digital education initiatives have been particularly vital in addressing disparities in access to education across its vast archipelago. E-learning has proven to be an effective method of delivering quality education remotely, allowing students in both urban and remote areas to access the same curriculum and learning resources [2]. ITB AAS Indonesia, in line with these technological trends, has recognized the necessity of a robust e-learning platform that aligns with modern pedagogical standards and user expectations.

State of the Art, In developing e-learning platforms, previous studies highlight several frameworks and technologies, focusing on flexibility, scalability, and user experience as crucial success factors. Moodle, for example, is a well-known open-source platform frequently used due to its flexibility and broad feature set [3]. Moodle supports plugins and customization, but it can sometimes be resource-intensive and may require substantial hosting infrastructure, which can be a constraint for some institutions.

Another significant player in the e-learning landscape is Blackboard, widely used in North American institutions. Blackboard offers high customizability, an extensive set of features, and integration with various educational tools; however, it is often criticized for its high cost and complexity in deployment and maintenance [4].

In recent years, there has been a shift toward more lightweight frameworks, such as Laravel and Django, both of which offer robust security, scalability, and modular development features for building custom e-learning applications. These frameworks are particularly popular for institutions looking for more customizable solutions that do not rely on the extensive overhead of platforms like Moodle and Blackboard. CodeIgniter, in particular, has been increasingly recognized for its lightweight structure, ease of use, and speed, making it an attractive choice for institutions requiring a tailored, cost-effective, and manageable solution [5].

CodeIgniter's flexibility allows developers to integrate it with various tools and services, which makes it well-suited for building an e-learning platform with specific educational needs. It offers a modular system that helps in breaking down components into manageable parts, thus allowing ITB AAS Indonesia's development team to focus on a user-centered design and fast, efficient application processes that meet the needs of students and faculty alike [6].

Purpose of the Platform: The development of the ITB AAS Indonesia e-learning platform aims to create a learning environment that is not only user-friendly

and accessible but also highly efficient in managing content and user interactions. By using CodeIgniter, the platform offers streamlined functionalities such as course management, interactive discussion forums, assessment tools, and detailed user analytics. These features have been tailored to enhance engagement and accessibility, aiming to bridge the gap between traditional and digital education by creating an interactive and personalized learning experience for students and faculty [7].

II. RESEARCH METHODS

The research methodology applied in this development project involved six systematic stages designed to meet the specific needs of ITB AAS Indonesia's e-learning platform:

1. Needs Analysis: This phase began with an in-depth investigation into the needs and expectations of platform users, including students, faculty, and administrative staff. Surveys and structured interviews were conducted to gather information on the challenges faced by the users with existing e-learning tools, their preferences, and specific feature requests for an improved learning experience. This needs analysis was crucial for establishing the functional requirements of the platform [6].

2. System Design: After identifying the key requirements, the design phase focused on creating a blueprint for the platform. This included developing user interface (UI) prototypes and user experience (UX) designs to ensure an intuitive and accessible layout. The modular system architecture was designed to support scalable components and functionalities, allowing the development team to work on multiple modules independently. Tools like Figma and Adobe XD were employed to create and iterate on design prototypes until they aligned with user feedback from the needs analysis [7].

3. Implementation: During this phase, the development team utilized the CodeIgniter framework to build the core platform. CodeIgniter was chosen for its lightweight structure and its ability to support clean, structured code that could be expanded over time. The modular approach adopted in system design allowed separate teams to work simultaneously on different features such as course management, user authentication, discussion forums, and exam modules. Front-end development was carried out using HTML, CSS, and JavaScript to create a responsive, interactive user experience [3].

4. Testing: Testing was conducted in two stages – initial testing and user testing:
a. Initial Testing: This included unit testing for individual modules to ensure each functioned correctly and met the specified requirements. Functional testing was also conducted to validate that the features operated as intended within the system.

b. User Testing: A beta version of the platform was then shared with a group of students and instructors for feedback on usability, functionality, and performance. Feedback collected during this stage was used to make adjustments and refine UI/UX elements based on real user interactions. Security testing was also conducted to ensure data integrity and user privacy [1].

5. Deployment: Once the testing phase was complete and all necessary adjustments were made, the platform was officially launched. The deployment process involved setting up a secure server environment and optimizing the platform for high availability and minimal downtime. Training sessions were conducted for faculty and students to familiarize them with the platform's features, ensuring smooth integration into the existing academic workflow [2].

6. Maintenance and Updates: Post-deployment, a routine maintenance plan was established to keep the system up-to-date and to implement ongoing improvements based on user feedback. Regular feedback collection from the users was used to guide continuous enhancements and feature updates, ensuring that the platform remains aligned with user needs and the latest technological standards[5].

III. RESULT AND ANALYSIS

The development of the ITB AAS Indonesia e-learning platform, using the CodeIgniter framework, produced a robust and user-centric educational tool. The platform was evaluated based on several key aspects: usability, functionality, system performance, and user satisfaction. Below is a detailed breakdown of each feature, along with feedback from preliminary user testing and insights gathered during the initial deployment phase.

Figure 1. Main e-Learning page

1. User Management

The User Management feature allows students, faculty, and administrators to create and manage profiles. This module supports secure registration and login, ensuring that users can easily access their accounts and track their academic activities. User data is securely stored, with role-based access to ensure that only authorized users can access specific sections of the platform.

Feedback: Initial testing showed high satisfaction with the login and profile management processes. Users appreciated the simplified registration and clear user dashboard that allowed them to navigate their personal information and settings efficiently. Feedback highlighted the platform's ease of use, with minimal technical difficulties reported during account setup.
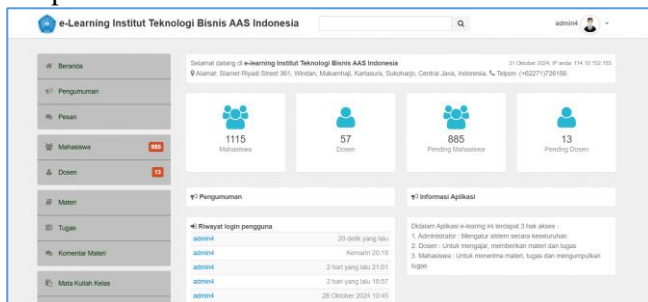

Figure 2. System Administrator page

2. Online Classes and Content Management

The Online Classes module provides tools for creating and managing courses. Faculty members can upload lecture materials, set up and manage schedules, create assignments, and give feedback. The content management system allows faculty to organize course materials, including multimedia resources, assignments, and supplementary content.

Feedback: Faculty members expressed that the content uploading and assignment submission features were easy to navigate and intuitive. The ability to structure courses in modules and update materials in

real-time was particularly appreciated. Students also found it easy to access course resources, review materials, and submit assignments. This module was rated highly for its ability to centralize resources, improving access to learning materials.
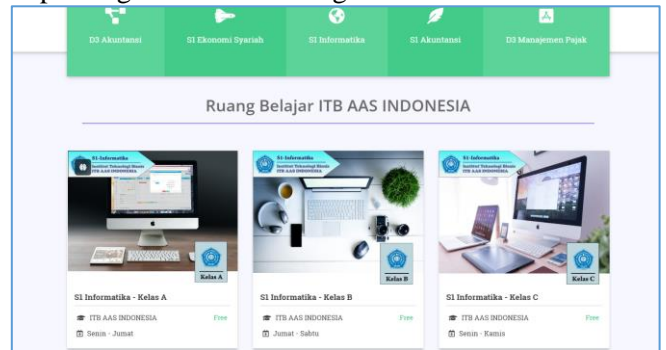

Figure 3. Faculty and Study Program Page

3. Discussion Forum

The Discussion Forum is an interactive feature where students and instructors can engage in discussions, ask questions, and share additional resources. This forum aims to replicate classroom interaction, fostering a collaborative learning environment.

Feedback: The forum received positive responses from both students and faculty. Students noted that it enhanced their sense of connection to their peers and instructors, particularly in a remote learning environment. Instructors valued the ability to respond to questions directly within the course context, enhancing engagement. The feature also enabled peer-to-peer learning, as students could answer each other's questions and share resources.
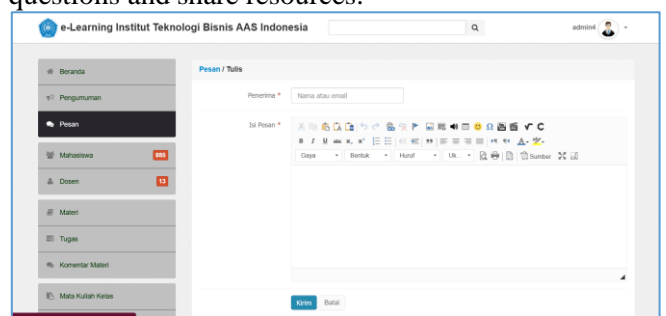

Figure 4. Page for Discussion

4. Exams and Assessments

The Exams and Assessments module enables instructors to create, schedule, and manage online exams. It includes customizable question types and grading features, allowing flexibility in assessment methods. The system also provides instant grading

options for objective-type questions, saving instructors' time.

Feedback: The exams module received strong praise for its versatility and ease of use. Instructors noted that the ability to create question banks and schedule exams was beneficial for their workflows. Students reported that they experienced minimal lag during timed tests, and the platform's design helped reduce test anxiety by presenting a simple and intuitive interface.
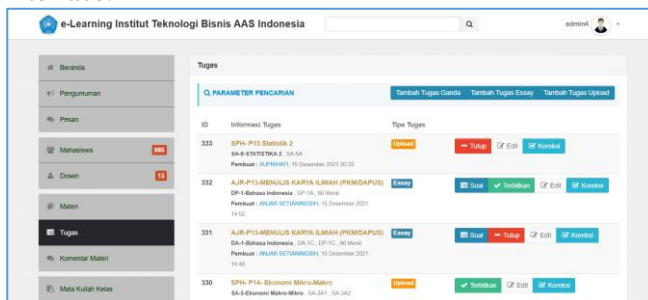

Figure 5. Page for Managing Tasks

5. Reporting and Analytics

The Reporting and Analytics feature provides insights into user activity, learning outcomes, and performance trends. This data is essential for faculty and administrators, enabling them to evaluate student progress and identify areas where students may need additional support. The analytics dashboard is user-friendly, providing customizable reports that can be filtered by course, student, and activity type.
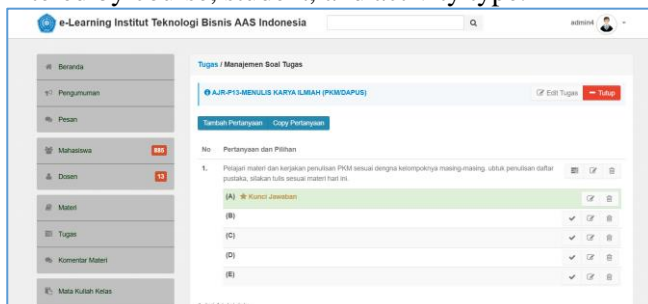

Figure 6. Analysis Report Page

Feedback: Faculty and administrators praised the analytics tools for their depth and clarity. The reporting feature allowed instructors to track student engagement, identify inactive users, and tailor support based on individual needs. Data insights provided by the platform were instrumental in enabling data-driven decisions for both teaching approaches and content enhancement.

Summary of User Feedback and Performance Evaluation Overall, the ITB AAS Indonesia e-learning platform achieved high user satisfaction ratings across all modules. Key findings from the user testing included:

a. Usability: Users found the platform easy to navigate, with a clean and intuitive interface that made it simple for students and faculty to find needed resources and complete tasks.

b. System Performance: The platform demonstrated consistent performance with minimal downtime during peak usage hours. CodeIgniter's lightweight structure contributed to fast load times and efficient data processing.

c. Security: The system's secure user management and data storage protocols were highlighted as a critical strength, particularly in protecting student records and assessment data.

d. User Engagement: Features like the discussion forum and assignment feedback mechanisms significantly enhanced engagement, leading to increased participation in course activities.

These findings support the platform's success in meeting ITB AAS Indonesia's objectives for creating an accessible, flexible, and interactive e-learning environment. The platform's modular structure also positions it well for future updates, ensuring it can adapt to evolving educational needs and integrate new features as user feedback and technology advance.

VI. CONCLUSION

The development of the ITB AAS Indonesia e-learning platform using CodeIgniter has successfully met the demands of modern education. Through comprehensive features and an intuitive interface, the platform enhances both teaching and learning experiences. This initiative not only improves access to educational resources but also fosters an interactive and collaborative learning environment, aligning with ITB AAS Indonesia's mission to provide high-quality, inclusive education. Future efforts will focus on incorporating artificial intelligence for personalized learning experiences and integrating innovative technologies to further enrich the platform

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