DOI TUNG E-LEARNING PLATFORM
FOR COURSE DELIVERY AND
ACADEMIC ASSESSMENT

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Abstract—This paper introduces the DoiTung E-Learning Platform, developed to make education more engaging, accessible, and adaptable in the digital age. Recognizing the limitations of traditional, one-size-fits-all education models, this platform provides personalized learning experiences through a broad subject range, interactive content, and flexible options. By enabling teachers to manage resources and track progress seamlessly, our platform offers a modern and scalable solution with potential benefits for both students and educators.

Index Terms—E-learning platform, Digital education, Personalized learning

I. INTRODUCTION

In the digital age, e-learning platforms are redefining the way communities access education, making learning opportunities more inclusive and adaptabel. Recognizing the potential of online education, the DoiTung organization has initiated the development of an e-learning platform to educate and empower the people within the community. This platform aims to provide accessible, quality educational resources that foster growth, skill development, and knowledge sharing within the community.

A. Research Problem

Historically, educational resources in the DoiTung region have been limited by traditional methods, which often fail to address diverse learning needs and local cultural integration. Current systems for delivering and assessing academic content can be time-intensive for educators, creating a barrier to consistent and impactful learning experiences. Addressing these challenges, this project focuses on developing a flexible and culturally relevant e-learning platform that meets the community's educational needs.

B. Significance of Research

Education is a transformative force for community development, opening doors to personal growth and new opportunities. By building the DoiTung E-Learning Platform, the organization seeks to strengthen the community's access to lifelong learning and knowledge sharing. The platform will not only support students in their academic journey but will also equip teachers with tools to manage and track student progress efficiently, ultimately promoting a sustainable and empowered learning environment in the DoiTung community.

II. LITERATURE REVIEW

E-learning relies on the use of telecommunication technology, the Internet, and non-Internet access. It is for this reason that motivation, system, and content design by the learner plays a significant role in effective learning. Online education has the flexibility that allows students to study at their own speed, thus having a significant impact on cognitive aspects.

The potential of Computer Based Trainings in teaching and learning environments has caught the attention of higher education. Universities are increasingly using a wide range of useful CBTs to support teaching, learning and assessment methods.

The use of technology by university students at the beginning of this decade showed that 25% of students in all types of institutions were already using CBTs, such as wikis, blogs, and social bookmarking tools, among others. Some students had decided to use these tools by themselves, whereas others used them upon request of their teachers. The study showed that some students were using this kind of tools for entertainment or for socializing, but a growing number of students were applying these tools for educational activities, especially those students who were in favor of collaborating among peers.[1]

Technology Acceptance Model has been applied to developed countries rather than developing countries. The educational circumstances of developing countries differ completely from those of developed countries. Furthermore, the personal characteristics, resources, internet access, accessibility, infrastructure, culture, social norms, and implementation policies of e-learning are the major factors of e-learning adoption and acceptance in developing nations.[2]

E-learning success hinges on various critical factors, with learner satisfaction playing a pivotal role. Sun et al. (2007) conducted an empirical investigation to identify these factors, providing a comprehensive framework for understanding what drives effective e-learning outcomes. The study highlights key elements, including instructor attitude, system functionality, and course content design, as significant contributors to user satisfaction and overall e-learning effectiveness.

A well-designed system interface that minimizes technical barriers and enhances usability emerged as a critical factor. Additionally, the study emphasizes the importance of timely feedback and instructor support, which fosters an engaging and interactive learning environment. Equally important is the alignment of course content with learners' expectations and goals, which sustains motivation and promotes meaningful engagement. These findings are instrumental for organizations and educational institutions seeking to design and implement robust e-learning platforms that cater to diverse learner needs while maximizing satisfaction and learning outcomes.[3]

III. OBJECTIVES

The primary objectives of the DoiTung E-Learning Platform are to address the educational needs of the DoiTung community by delivering a digital platform that supports accessible, high-quality learning experiences.

● To create a user-friendly E-learning website that allows admins to manage courses and set up exams while providing students with flexible access to courses, learning materials, assessments and academic reports anytime, anywhere.

● Promote educational opportunities that benefit individuals, and communities, enabling continuous growth and development.

● To ensure equal access to education, empowering individuals to grow, adapt, and expand their possibilities by making quality learning accessible to everyone, regardless of their background or location.

IV. SCOPE

The scope of the eLearning project defines the specific boundaries of what will be included and excluded. By clearly outlining these parameters, we aim to provide all stakeholders with a shared understanding of the project's deliverables and expectations, ensuring alignment throughout the development process.

In scope
● Integrating the system with security protocols to ensure the protection of user data with strong authentication mechanisms.
● Providing pre- and post-test to evaluate users' knowledge, attitude, and skills before and after the training.
● Awarding certificates to recognize their completion, achievements, and progress as they move through their coursework after the selected course has been done by users.
● Utilizing data analytical reports to ensure the effectiveness of eLearning programs and grade reports to encourage student growth mindset and progress in learning.
● Ensuring that all courses are accessible to users. Offering a system for users to enroll and browse in available courses. Provide learning road maps and recommendations after the user completed his applied course.
● Granting authorization to perform specific actions within the system based on different user roles, such as users, admins, and super users.
● Ensuring the system is scalable to support an increasing number of users, courses, and concurrent sessions.
● Supporting monetization options for paid courses. Integrate with payment gateways to handle transactions for course purchases or subscription-based access.

Out of scope

● Need for human contact : Web-based training is a good alternative for independent, self-motivated students, but the need for human contact limits its usefulness for students with other learning styles.

● Technical issues: Students connecting virtually often must use their own devices to attend online classes and complete assignments. Connecting and staying connected requires the right devices and network access that all students might not have.

● Lack of transparency: The quality and credibility of the content aren't always clear and transparent on every e-learning platform.

V. METHODOLOGY

The development of the DoiTung E-Learning Platform follows the Agile development methodology, specifically leveraging the Scrum framework to ensure flexibility, stakeholder involvement, and iterative progress. This approach allows for continuous feedback and timely delivery of features, aligning the project with evolving user needs and expectations. The development process consists of distinct yet interrelated phases to ensure a structured workflow while accommodating adaptability throughout the project lifecycle.

Fig. 1. Scrum framework process flow.

The first phase, **Planning and Requirement Gathering**, focuses on defining the scope and objectives of the platform. In this phase, detailed stakeholder interviews are conducted to gain a comprehensive understanding of the project's goals and gather explicit requirements. These insights are transformed into actionable user stories, complete with clear acceptance criteria. This process ensures that all platform needs are well-documented and communicated. The identified features and functionalities are then prioritized to allow phased implementation, ensuring that the most critical elements are addressed early in the development process.

The next phase, **UI/UX Design**, emphasizes crafting an engaging user experience and intuitive interface. The design process involves creating interactive prototypes using Figma to visualize the platform's functionality and aesthetics. These prototypes include detailed wireframes and high-fidelity mockups, showcasing a user-centered design approach. Extensive usability testing and feedback loops ensure the interface aligns with user needs and expectations, fostering seamless interactions and accessibility. This meticulous attention to UI/UX not only enhances the platform's appeal but also establishes a strong foundation for subsequent development.

The **Implementation** phase utilizes a technology stack comprising MySQL, Express.js, React, and Node.js, following an iterative and incremental development approach to ensure consistent value delivery. The process is organized into manageable sprints, each focused on delivering specific features or enhancements. Daily stand-up meetings are conducted to track progress, address any challenges, and maintain alignment among team members.

During the implementation stage, the frontend of the platform is developed using React. The designs created in Figma are translated into functional components, encompassing features such as course catalogs, user registration, dashboards, and user management. Special attention is given to creating responsive and intuitive interfaces that enhance the user experience. The frontend also integrates authentication mechanisms, enabling users to securely sign up and log in. These functionalities connect to the backend via RESTful APIs, which validate user credentials and enable seamless data exchange. Advanced features, such as course registration, viewing content, submitting assignments, and taking tests, are implemented to meet the needs of diverse user groups, including students and educators.

The backend of the system is built with Node.js and Express.js to create efficient APIs that enable seamless communication between the frontend and backend. These APIs manage essential tasks such as course enrollment, assignment submissions, and user authentication. The backend also includes logic to track user progress, manage assessments, and evaluate performance. For analytics, the system integrates tools

like Google Analytics or custom solutions utilizing libraries such as Chart.js, D3.js, or Apache Superset to generate and visualize valuable insights. The analytics module is designed to monitor user activity and provide meaningful data-driven insights.

MySQL serves as the database for storing user data, course information, interactions, and assessment results. Its structured schema design ensures data integrity and supports complex relationships between entities like users, courses, and assignments. MySQL's relational model is ideal for maintaining the platform's data consistency, offering efficient data retrieval through optimized queries. MySQL's scalability and support for advanced querying make it a reliable choice for the evolving requirements of the platform.

To ensure the platform's quality and reliability, the **Testing and Feedback** phase includes comprehensive testing procedures. Black box testing is performed to identify and resolve functionality errors, with active participation from both developers and stakeholders. Integration testing ensures smooth interaction between the frontend, backend, and database. Feedback from stakeholders is incorporated to refine features, followed by rigorous retesting for validation. User Acceptance Testing (UAT) is conducted with real users to verify that the platform meets their needs and is easy to navigate. Additionally, load testing is carried out to confirm that the platform can handle high volumes of users and requests without performance degradation. System downtime is also monitored during testing to ensure the platform can recover quickly and maintain reliability during any disruptions or maintenance periods.

The final phase, **Launch**, ensures that the platform is fully operational and accessible to users. The platform is deployed on Google Cloud Platform, leveraging its scalability and reliability. Continuous monitoring tools are set up to track system performance, error logs, and user activity in real-time, allowing for prompt issue resolution. A rollback plan is also in place to quickly revert the platform to a stable version in the event of critical issues post-launch, minimizing disruption to users. Detailed training and documentation are provided to facilitate user onboarding, enabling stakeholders to make the most of the platform's features.

VI. WORK PLAN FOR THE ENTIRE PROJECT

1. Planning

Timeline: Last Week of October 2024 – 1st of November 2024 (1 Week)

Activities include identifying project scope, requirements gathering, and finalizing the timeline.

2. Design Process

Timeline: 1st of November 2024 – 1st of December 2024 (4 Weeks)

Activities include creating Figma UI/UX designs, use cases, and sequence diagrams.

3. Front-End Development

Timeline: 7th of December 2024 – End of January 2025 (6 Weeks)

Activities include building the user interface, ensuring responsiveness, and integrating designs.

4. Back-End Development

Timeline: Start of February 2025 – Start of April 2025 (12 Weeks)

Activities include developing server-side logic, database management, and API integration.

5. Testing and Error Handling

Timeline: 1st of April 2025 – 1st of May 2025 (4 Weeks)

Activities include functionality testing, bug fixing, and performance optimization.

6. Deployment

Timeline: 1st of May 2025 – 1st of June 2025 (4 Weeks)

Activities include hosting the platform, setting up the domain, and providing user training.

PROCESS	Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
	Start Date	end of Oct	1st week	Mid-Dec	end of Month	1st week	-	1st week	Mid-May	-
Planning		�								
Design Process			▪							
Front-end development				▪						
Back-end development						▪				
Testing & Error Handling								▪		
Deployment									▪	

Fig. 2. Work plan for the entire project

VII. EXPECTED OUTCOMES

The eLearning project is designed to deliver a range of impactful outcomes that will enhance the overall learning experience for users and simplify administrative processes for course managers. By implementing key features and capabilities, the platform will provide flexibility, automation, and user-friendly navigation, ultimately driving improved engagement and productivity

for all stakeholders. Below are the specific outcomes expected from the successful implementation of the project:

● Flexibility**:** the users will be able to study anytime, anywhere, at their own pace.

● Manage courses and set up tests**:** Admins can manage courses and set up tests seamlessly.

● Automation**:** Analytics and grading reports will be auto generated, minimizing the manual work and saving tons of time.

● User friendly interface and scalability**:** User friendly interface will be provided alongside a scalable system so that users can navigate easily throughout the system without any space limitations.

● Recommendations for courses that suit their learning needs and career goals.

VIII. ETHICAL CONSIDERATION

● Data Protection and Security: Comply with the PDPA while protecting the personal information of respondents and maintaining appropriate data security, in particular for sensitive information contained in grading reports.

● Content Quality: The learning
● content needs to be accurate, reliable, and free from stereotypes and misinformation. The content shall be updated periodically to keep up with the latest knowledge.

● Users Instructions and Support : Provide clear instructions, tutorials, and training that would enable all users-students, parents, and teachers-to use the platform effectively, considering the factor of inclusion.

● Digital Well-being: Promote healthy screen time along with balanced learning habits that contribute toward the overall well-being of the users.

IX. EQUIPMENT NEEDED FOR THE PROJECT

Hardware

● Computers
● Servers
● Backup Storage Devices

Software

● Development Tools
● Version Control (Git)
● Testing Tools
● Cloud Platforms
● Design Software
● Collaboration & Communication Tools

X. REFERENCES

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