



Designing a Website-Based Study Program Management Application and Digital Attendance for Informatics Study Programs

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Article Info

Article history

Received : Oct 08, 2025

Revised : Oct 26, 2025

Accepted : Oct 30, 2025

Keywords:

Digital Attendance;

Discussion Forum;

Lecture Schedule;

Study Program Management;

Web Application.

Abstract

Conventional attendance and conventional management of academic activities often cause problems, such as recording errors, delays, and lack of access to organized information. In addition, academic communication still relies on external platforms, such as Telegram, which does not support the needs of lecture activity management. This research aims to design a web-based application called ClassTlcs, which provides digital attendance features, lecture schedule management, lecture material upload, and textbased discussion forums. This application involves three main actors: staff as super admin, lecturers, and students. The research uses the Rapid Application Development (RAD) method, which includes the stages of requirements planning, system design, prototype development, and testing. With ClassTlcs, staff can manage attendance data and schedules, lecturers can conduct digital attendance and upload lecture materials, and students can monitor lecture schedules and discuss through text forums. The results show that this application can help overcome the obstacles that often arise in the attendance process and management of study program activities while providing convenience for all actors involved. Further development is recommended to add other features to support the various needs of study programs in the future.

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1. Introduction

The presence of technology must be understood as an effort to enhance effectiveness and efficiency, as technology is inseparable from addressing problems. It is created and developed to solve the challenges faced by humans (I Nyoman Suraja Antarajaya, 2024). In this rapidly evolving digital era, information technology has brought significant changes in various fields, including education. Information and communication technology plays a crucial role in improving the quality of education in Indonesia. Its importance in enhancing learning is widely recognized (Andriani, 2019). Its utilization in education can foster creativity among students, facilitate the distribution of learning materials, and

enable communication between teachers and students (Hamsa Ramadhan et al., 2022).

Although information and communication technology has brought about substantial changes in the education sector, some aspects, such as attendance systems and the distribution of learning materials, still rely on conventional methods. According to research by Azizah et al. (2024), manual attendance systems that involve writing students' names on paper often lead to various issues, such as lengthy recording times, damage to records due to tears, and other challenges. This underscores the importance of applying technology to improve the efficiency and accuracy of educational management processes.

Conventional attendance systems that still rely on manual record-keeping have several weaknesses, including human error potential, delays in data processing, and difficulty accessing real-time information (Darmawan et al., 2024). Moreover, traditional attendance methods are often subject to limitations, such as the risk of attendance list falsification (Heindari et al., 2018). Additionally, the distribution of lecture materials, which is still carried out manually, often makes it difficult for students to access the most up-to-date information regarding materials or schedule changes.

To address these challenges, an integrated technology solution is needed to simplify the management of various academic activities. Therefore, a web-based application called ClassTlcs was developed. This application is designed to provide various features that support academic activities. The ClassTlcs platform facilitates digital attendance management, allowing lecturers to efficiently conduct attendance tracking for students. Additionally, the system enables lecture material provision, where lecturers can upload various educational resources that students can access at any time. The application also incorporates comprehensive lecture schedule management, providing accessible scheduling information for both lecturers and students. Furthermore, ClassTlcs includes integrated discussion features that enable seamless communication services between students, staff, and lecturers, fostering collaborative learning environments.

With the ClassTlcs platform, attendance is handled through a web-based programming system, accessible via a browser. Additionally, administrators or academic staff can manage the system and organize the scheduling of Informatics courses, including assigning classes and schedules for Informatics students. The platform also features a discussion tool that allows students to interact with both lecturers and staff. Thus, ClassTlcs contributes to enhancing the quality of academic management within the Informatics program.

2. Research Methodolgy

Research Methodolgy Research Design

This study utilizes a developmental-experimental approach in designing and implementing a web-based application named ClassTlcs. The system was developed to address ongoing challenges in academic activity management at the Informatics undergraduate program of the Indonesian Defense University (Unhan RI), particularly in areas that still relied on conventional methods such as manual attendance recording and physical material distribution.

The ClassTlcs platform integrates four key features: digital attendance, material distribution, lecture scheduling, and a text-based discussion forum. The digital attendance feature allows lecturers to record student attendance efficiently and accurately during each lecture session. The material upload feature enables lecturers to share learning materials in digital formats accessible to students anytime. The integrated scheduling system presents lecture schedules viewable by students, lecturers, and administrative staff. Lastly, the discussion forum supports real-time academic communication between students, lecturers, and program staff.

The research was conducted over a six-month period from August 2024 to January 2025 at the Informatics Study Program, Indonesian Defense University, located in Sentul, Bogor, West Java. The data collection phase was structured into several stages: initial observation and requirement analysis were performed during August-September 2024, system development and prototype implementation took place from October to November 2024, while system testing and evaluation were carried out in December 2024. User feedback through interviews and surveys was collected throughout December

2024 to January 2025, involving active participation from 3 lecturers, 2 administrative staff members, and 50 cadets from the Informatics program.

To assess the effectiveness of the system, experimental trials were conducted by comparing ClassTlcs with existing conventional methods in terms of time efficiency, accuracy of data processing, and user accessibility. The trials involved active participation from lecturers, staff, and cadet students from the Informatics program. Interviews and surveys were also conducted to gather user feedback on usability, practicality, and perceived impact on academic workflows.

The research is scoped specifically to the Unhan RI campus, with functional boundaries including only web-based (non-mobile) access, basic security mechanisms (authentication and authorization), and the exclusion of push notification features. Nonetheless, this study demonstrates the potential of ClassTlcs as a foundational step toward more advanced digital academic management systems in higher education settings.

Alternatives and Criteria

This study compares several alternative methods for managing academic activities in the Informatics undergraduate program at the Indonesian Defense University. The alternatives were identified through observations involving lecturers, students, and program staff. The considered alternatives include manual (paper-based) systems, a basic web-based platform without integrated features, and an integrated web-based platform (ClassTlcs) with modules for digital attendance, material distribution, lecture scheduling, and academic discussions.

The manual method, still used in some settings, is time-consuming, prone to human error, and lacks real-time data accessibility. The second alternative—a basic web platform—digitizes some functions but lacks integration, requiring users to switch between tools for attendance, materials, and communication. The final alternative, the ClassTlcs platform, offers a centralized solution with streamlined workflows and real-time accessibility for students, lecturers, and staff.

The evaluation of alternatives was based on the following criteria:

1. Time efficiency – How quickly the system supports attendance tracking, material sharing, and information retrieval compared to manual methods.
2. Integration level – The extent to which attendance, scheduling, materials, and communication are centralized in one platform.
3. Usability – Ease of use for students, lecturers, and staff members without requiring extensive technical training.
4. Data accessibility – The ability to access academic information anytime and from any location using a web browser.
5. Support for communication – Availability of an integrated text-based forum for academic discussions.

Based on these criteria, the ClassTlcs web-based platform was selected as the most effective alternative, offering enhanced academic management through digital transformation and user-friendly features tailored to the academic environment of the Informatics program.

Technical Data Analysis

The data analysis in this study was carried out through several stages, as follows:

1. Initial Data Collection

Initial data were collected through direct observation of attendance processes, material distribution, and academic communication within the Informatics Study Program at the Indonesian Defense University. In addition, interviews were conducted with lecturers, students, and program staff to identify challenges faced in the conventional system.

2. Performance Measurement

This stage aimed to measure the time required for attendance recording, uploading and accessing course materials, and disseminating academic information before and after the implementation of the ClassTlcs web-based application.

3. Error Rate Analysis

An evaluation was conducted to identify errors occurring in manual methods, such as attendance recording mistakes, missing materials, or miscommunication of schedules, compared to the digital system using ClassTlcs.

4. Effectiveness Evaluation

The testing results of the ClassTlcs application were compared with those of conventional methods using descriptive statistical analysis. The indicators analyzed included time efficiency, recording accuracy, and ease of access to academic information.

5. Result Validation

The research findings were validated through discussions with lecturers, program staff, and information system experts to ensure that the developed system is effective, relevant, and aligned with the existing academic needs.

Through this approach, the study aims to demonstrate that the implementation of the ClassTlcs web-based system can improve efficiency, accuracy, and transparency in academic activity management. In addition, the system's ability to provide digital access to learning materials, automated attendance, and a text-based discussion forum is expected to add value in terms of administration, teaching and learning processes, and more structured academic communication.

3. Results and Discussion

The study results indicate that the web-based system with QR code integration significantly enhances efficiency and accuracy in weapon management at the Indonesian Defense University warehouse. The system enables automatic recording of weapon borrowing and returning through QR code scanning, ensuring immediate data entry into the database.

Testing results show that the weapon borrowing and returning recording time was reduced from 10-15 minutes to less than 2 minutes per transaction. Additionally, recording errors commonly found in manual methods were minimized. Warehouse staff can easily search for borrowed weapon data and print borrowing histories in PDF format for administrative and reporting purposes.

The following table presents a comparison between the conventional method and the web-based system with QR code integration:

Table 1. Comparison of System Performance Between Conventional and Web-Based Methods

Evaluation Aspect	Conventional Method	Web-Based System with QR Code
Recording Time	10-15 minutes	<2 minutes
Error Rate	High	Low
Material Distribution	Manual, slow	Automatic, fast
Data Security	Prone to loss	Secure, integrated storage
Report Generation	Not available	Available in PDF format
Scheduling	Manual updates	Real-time access

4. Conclusion

This research successfully designed and developed ClassTlcs, a web-based application for academic management in the Informatics Study Program at Indonesian Defense University. The main findings demonstrate that ClassTlcs effectively addresses conventional attendance challenges through its digital attendance system, which significantly reduces recording errors and prevents data manipulation. The platform integrates four core functionalities: automated attendance tracking, centralized material distribution, real-time schedule management, and text-based academic discussion forums, all of which contribute to improved coordination and communication among students, lecturers, and program staff. For future research development, several enhancements are recommended to strengthen the system's capabilities. Expanding the platform to include mobile application versions would enhance accessibility for users who prefer smartphone-based interactions. The integration of push notification features could provide real-time updates on schedule changes and important announcements, improving

communication efficiency. Advanced analytics capabilities could be incorporated to track student engagement patterns and attendance trends, providing valuable insights for academic decision-making. API integration with existing university information systems would enable seamless data exchange and reduce administrative redundancy. Additionally, implementing AI-powered features such as automated grading assistance and intelligent course recommendations could further transform ClassTlcs into a comprehensive academic management solution for higher education institutions.

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