A Digital Logbook Model for Student Activities Management During Industrial Training

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Abstract— **Industrial training is an essential component of higher education programmes, enabling students to apply theoretical knowledge in actual work environments while developing practical and professional skills. A core requirement during training is the daily logbook, which serves as a record of student activities and a key channel for supervisors to monitor progress. However, paper-based logbooks often result in inconsistent reporting, missing entries, delayed feedback, and challenges in validating student activities. These limitations reduce the effectiveness of supervision and hinder accurate assessment of learning outcomes. To overcome these challenges, this study proposes A Digital Logbook Model for Student Activities Management During Industrial Training. The objective is to develop a structured digital reporting model that improves the accuracy, consistency, and timeliness of daily reporting. This study adopts the Waterfall methodology, that consists of requirements analysis, system design, development of the model, implementation planning, and final evaluation. Requirements were gathered from students, academic supervisors, and industry partners to ensure that the model addresses actual user needs. The resulting model consists of four main components: a student daily reporting module, supervisor verification interfaces, a centralized reporting engine, and an interactive monitoring dashboard. Findings show that the digital logbook model significantly enhances daily reporting discipline, improves data reliability, and enables more effective supervision by providing timely insights into student activities. This study contributes a practical and scalable solution for improving industrial training management. Future enhancements may include mobile application support, predictive analytics for performance monitoring, and integration with institutional learning-management platforms to create a more comprehensive and fully digital ecosystem.**

Keywords: Digital Logbook, Industrial Training Management, Daily Reporting System, Student Monitoring, Web-Based Activity Tracking

I. INTRODUCTION

Industrial training is widely recognized as a core experiential learning component in higher education, providing students with structured opportunities to apply theoretical knowledge in authentic workplace environments. This exposure helps strengthen professional skills, technical competence, and workplace readiness, thereby supporting a more seamless transition into the industry [1]. To facilitate continuous monitoring during this practicum, institutions traditionally require students to maintain a daily logbook documenting their tasks, reflections, and progress. Despite its long-standing use, the traditional paper based logbook format often proves inadequate for modern supervision needs.

Extensive literature has highlighted significant challenges associated with paper-based logbooks. These include missing or incomplete entries, inconsistent reporting formats, difficulties in tracking student progress, and the risk of misplacing physical documents [2]. Supervisors frequently face delays in reviewing student submissions and providing feedback, resulting in reduced oversight and weaker alignment between student activities and intended learning outcomes [3]. Verification of the authenticity of reported tasks also becomes problematic, particularly when students are dispersed across diverse training locations with varying levels of supervision.

In response to digital transformation trends across educational institutions, researchers have begun proposing digital and web-based platforms to streamline activity reporting and documentation processes. Studies have demonstrated that digital practicum systems can enhance transparency, strengthen record accuracy, and reduce administrative burdens for both students and supervisors [3,4]. These systems also provide structured interfaces that support real-time reporting, improved data validation, and centralized access to records, addressing multiple weaknesses in traditional reporting practices.

Recent developments in digital educational tools further emphasize the value of structured, model-driven platforms. For instance, user-requirement studies for web-based systems highlight the importance of designing platforms that support ease of use, reliable data handling, and effective information retrieval [6]. At the same time, digital academic tools such as e-portfolios demonstrate how well-designed platforms can support student professional development by organizing, curating, and validating learning activities [7]. These findings indicate that digital systems, when grounded in clear models, can significantly improve the integrity and usability of student activity records.

In the specific context of industrial training, existing digital systems have shown encouraging outcomes. A recent study at the School of Computing demonstrated that web-based industrial training platforms can improve communication mechanisms, streamline reporting workflows, and support more efficient supervisor oversight [8]. Another related system developed for recording student industrial training activities

further supports the value of digital tools in strengthening reporting consistency, supervisor engagement, and data management quality [9]. These local findings reinforce the need for a structured digital model that directly addresses the gaps in daily activity reporting.

Motivated by these issues and the increasing institutional demand for digital reporting solutions, this study proposes A Digital Logbook Model for Student Activities Management During Industrial Training. The objective is to design a systematic model that enhances the accuracy, consistency, and timeliness of daily reporting while enabling supervisors to monitor student progress effectively. The proposed model integrates key components such as daily reporting modules, verification mechanisms, and centralized monitoring to ensure data reliability and strengthen supervision practices. Ultimately, this model aims to support more effective assessment, improve the quality of industrial training experiences, and contribute to the broader digital transformation agenda within higher education institutions.

II. METHODOLOGY

This study adopts the Waterfall methodology, consisting of five sequential phases: requirements analysis, system design, model development, implementation planning, and evaluation (Figure 1).

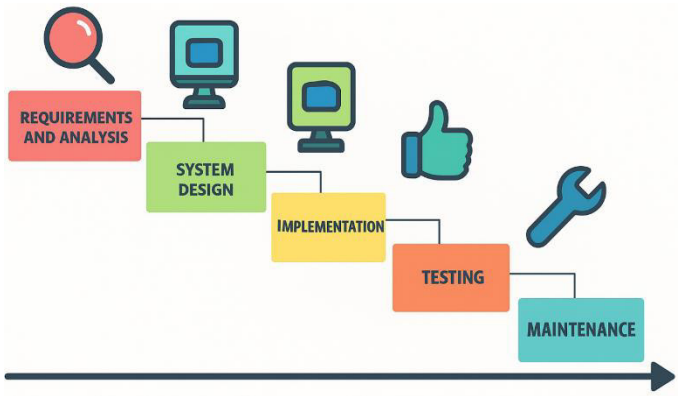

Fig. 1 Waterfall Model

1. Requirements Analysis

The study began with a detailed requirements-gathering process involving interviews and discussions with key stakeholders such as students, academic supervisors, and industrial training coordinators from the School of Computing, Universiti Utara Malaysia. These sessions aimed to understand the limitations of the existing manual process for monitoring industrial training. Challenges such as inconsistent documentation, delayed supervisor responses, limited transparency, and communication gaps between students and mentors were highlighted. Insights gathered during this phase informed the functional and non-functional requirements that later guided the system design.

2. System Design

In the design phase, the requirements were transformed into a structured system blueprint. Unified Modeling Language (UML) diagrams were used to illustrate system interactions and behaviour. The user interface concepts were developed in Figma to create wireframes and clickable prototypes, prioritising usability, seamless navigation, and responsiveness across devices. This phase ensured both back-end architecture and front-end user experience were cohesively planned before development commenced.

3. System Development

The development phase involved constructing the system based on the approved design documents. The back-end was implemented using PHP and MySQL, technologies well suited for web-based environments and compatible with the XAMPP development setup. The front-end was built using HTML, CSS, and JavaScript to provide a responsive and user-friendly interface. These technologies were integrated to support core features including daily activity logging, supervisor feedback workflows, and digital document submission.

4. System Testing

System testing focused on validating usability, system reliability, and functional performance. Usability evaluation was conducted using the WAMMI instrument, which assesses five key dimensions: Attractiveness, Controllability, Helpfulness, Efficiency, and Learnability. The WAMMI framework was selected because it offers structured and validated metrics specifically tailored to web application usability [10].

A purposive sample of 30 respondents from the School of Computing; comprising 80% students and 20% staff was selected to capture feedback from both primary user groups. Students were chosen as they form the main users who submit daily activities and reports, while staff members play supervisory and evaluative roles. This sample size aligns with usability research by Turner et al [11], which suggests that 20–30 participants are typically sufficient to identify the majority of usability issues. Participants completed key tasks (login, activity entry, report submission, feedback review) and later rated the system using the WAMMI questionnaire. Observational notes were recorded, and all identified issues were documented and resolved prior to deployment.

5. Maintenance

After deployment, the system moved into the maintenance phase where iterative refinements were carried out based on user feedback. This included minor corrections, interface enhancements, and usability improvements to ensure long-term system stability and relevance. Although the Waterfall Model normally limits changes after implementation, this phase was essential for supporting continuous improvements within an academic setting.

III. FINDINGS

1. Structural and Functional Findings of the Digital Logbook Model

The finalized model consists of four integrated components (Figure 2), each addressing specific weaknesses commonly found in manual logbook systems. These components work together to enhance reporting accuracy, supervisory monitoring, and overall training management.

- Student Daily Reporting Module - This module provides a structured digital interface where students record their daily activities in a uniform and timestamped format.

The module can reduces inconsistent reporting and prevents incomplete or unclear entries.

- Supervisor Verification Interfaces – This interface is designed for both academic and industry supervisors. Supervisors can validate reported tasks, verify activity authenticity, and provide timely feedback or corrective input. This feature directly addresses the issue of delayed or limited communication found in paper-based logbooks, promoting more responsive and continuous supervision.
- Centralized Reporting Engine - All student activity data is consolidated in a secure, centralized repository. This engine supports efficient data management by organizing records for quick retrieval, long-term storage, and supervisory monitoring. It also ensures data integrity and minimizes risks of misplaced or fragmented reports.
- Interactive Monitoring Dashboard - The dashboard visualizes real-time data, enabling supervisors and coordinators to track student progress throughout the training period.

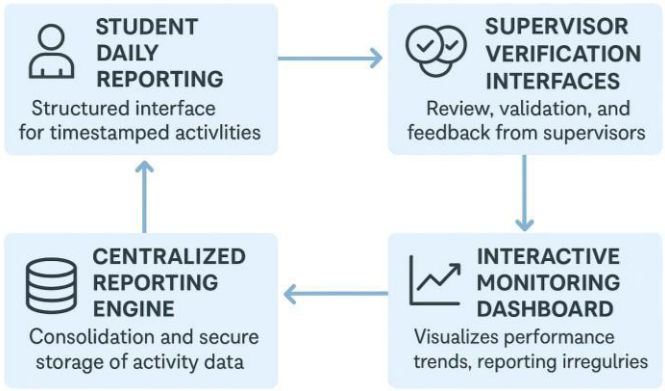

Fig. 2 The Digital Logbook Components

2. User Acceptance and System Effectiveness (WAMMI Evaluation)

The second set of findings is based on user perceptions of the system's usability and effectiveness through the WAMMI framework. Participants evaluated the digital logbook after performing essential tasks, including logging in, recording daily entries, submitting reports, and reviewing feedback.

The system achieved notably strong scores:

- Attractiveness: 91.67% – users found the interface visually appealing and engaging.
- Controllability: 97.5% – participants reported that the system responded predictably and allowed smooth navigation.
- Helpfulness: 94.17% – users felt the system effectively guided them through the reporting process.
- Efficiency: 92.5% – tasks could be completed quickly and without unnecessary steps.
- Learnability: 96.67% – users were able to understand and use the system with minimal learning effort.

These results indicate strong acceptance of the Digital Logbook Model. Users viewed the system as intuitive, reliable, and supportive of their daily reporting responsibilities. The overwhelmingly positive feedback validates the design and development approach of the proposed Digital Logbook, demonstrating its effectiveness in streamlining reporting processes, improving supervisory communication, and enhancing the overall management of industrial training activities.

IV. Conclusions

The proposed model offers a comprehensive solution for strengthening reporting discipline and enhancing supervisory oversight. It directly addresses the long-standing limitations of traditional paper-based logbooks, which frequently suffer from inconsistent entries, delayed feedback, and limited verifiability of student activities. By providing structured, digitalised reporting mechanisms, the model improves the quality and reliability of industrial training documentation.

This study contributes to the ongoing modernization of industrial training processes and supports higher education institutions in their transition toward fully digital monitoring systems. The Digital Logbook Model not only ensures more accurate and consistent documentation but also promotes greater transparency and communication between students, supervisors, and coordinators.

Findings from the WAMMI usability evaluation further reinforce the model's effectiveness. High scores in attractiveness, controllability, helpfulness, efficiency, and learnability demonstrate strong user acceptance and confirm that the system successfully supports students in their daily reporting tasks while facilitating supervisors' monitoring responsibilities. These positive evaluations also highlight the practicality and scalability of the system for wider institutional adoption.

Future improvements may include the development of a mobile application to increase accessibility and ease of use for students in diverse training environments. Advanced data analytics features—such as predictive performance monitoring or automated anomaly detection—could also be incorporated to support more informed and proactive supervisory decision-making. Additionally, seamless integration with existing institutional learning management systems would help establish a more unified and comprehensive digital ecosystem for industrial training administration. Collectively, these enhancements will continue to strengthen the model and reinforce its relevance as digital transformation progresses in higher education.

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