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FROM DEVELOPMENT TO IMPLEMENTATION : USABILITY AND PERFORMANCE EVALUATION OF AN INTERNSHIP SYSTEM

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Abstract

This study aims to develop a web-based internship management system to enhance efficiency, transparency, and usability for students and university administrators. Traditional internship management methods often suffer from inefficiencies and limited accessibility, necessitating a more structured digital approach. By integrating User-Centered Design (UCD) and Feature-Driven Development (FDD), an Agile methodology, this research focuses on improving system usability and user experience. The method involved data collection through interviews with students and university administrators to identify key requirements. The platform was developed iteratively, incorporating continuous feedback to ensure alignment with user needs. Feature prioritization and incremental implementation allowed for a structured approach to system refinement, resulting in a more effective and adaptable solution. The results indicate that the developed platform successfully addresses key challenges in internship tracking, document management, and communication. Usability evaluations using User Experience Quality (UEQ) metrics show high satisfaction in accuracy, efficiency, and clarity, while

engagement remains an area for further improvement. This research contributes to digital transformation in internship management, with future potential for AI-driven automation in feedback analysis and internship matching.

Keywords: Agile Methodology, Feature-Driven Development, Internship Management System, Usability Testing, User-Centered Design

INTRODUCTION

The need for efficient internship management systems underscores the importance of innovative solutions that address the dynamic requirements of academic institutions and students. However, managing internships effectively remains a challenge for many institutions, as traditional manual systems often lack efficiency, transparency, and scalability (Mydyti & Ware, 2025). This creates bottlenecks in communication, monitoring, and evaluation processes, ultimately impacting the quality of the internship experience.

A robust internship management system is essential to streamline processes such as internship applications, tracking student progress, and facilitating communication between administrators and students (Nurfaizi & Hindarto, 2023). By addressing these gaps, an effective platform can enhance productivity, improve user satisfaction, and ensure that internships meet academic requirements (Top & Ali, 2021). The integration of modern technology in internship management is thus not merely an option but a necessity in today's digital era.

This research focuses on developing a web-based internship platform utilizing User-Centered Design (UCD) principles. UCD emphasizes the importance of understanding and prioritizing user needs throughout the development process (Visescu et al., 2024). This approach ensures the resulting platform is intuitive, accessible, and capable of addressing the specific challenges faced by students and university administrators. By incorporating feedback and iterative design practices, UCD helps create a system that aligns with user expectations (Daggubati, 2024) .

In addition to UCD, the development process adopts the Agile methodology (Alamri et al., 2024), a flexible and iterative approach that promotes collaboration, adaptability, and responsiveness (Celestin et al., 2024). Agile enables the development team to continuously

refine the platform based on user input and evolving requirements (Ekechi et al., 2024; Kasauli et al., 2021). This methodology is particularly suitable for projects requiring frequent adjustments and a focus on delivering functional components incrementally.

The combination of UCD and Agile methodologies provides a balanced approach to creating a platform that is both technically robust and user-friendly. While UCD focuses on the end-users' experience (Akello & Nabukenya, 2024), Agile ensures that the development process remains dynamic and efficient (Popoola et al., 2024). Together, these methodologies address the multifaceted requirements of an internship management system, from user interface design to backend functionality.

The objectives of this research include enhancing the efficiency of internship management, improving stakeholder satisfaction, and facilitating seamless communication between students and administrators. This paper outlines the design and implementation phases of the platform, providing insights into how UCD and Agile contribute to addressing the challenges of traditional systems. The outcomes are expected to offer significant contributions to digital transformation efforts in academic institutions, particularly in managing internships effectively and sustainably.

METHODS

This study employed a structured methodology integrating User-Centered Design (UCD) (Salinas et al., 2020) and Feature-Driven Development (FDD) , one of the Agile methods (Al-Saqqa et al., 2020), to develop an effective and user-friendly web-based internship management platform. The research process commenced with (1) requirement analysis, during which data were collected through interviews with university administrators and students to identify their specific needs and challenges. This phase provided the essential foundational understanding necessary to ensure that the platform's design would comprehensively address the users' requirements. The interview questions employed in this phase are presented in Table 1.

Table 1. Interview Question Student and Employee

Students	1.	What challenges do you face in finding comprehensive and up-to-date internship information?
	2.	To what extent do you find it difficult to track the progress of your internship applications?

	3.	Do you feel that you lack feedback from industry partners or campus coordinators regarding your internship applications?
	4.	How important is it for you to have a centralized platform to access internship opportunities? What are your expectations regarding the platform's navigation?
	5.	Do you need the ability to upload and manage your profile and resume on the internship platform?
	6.	How important is it for you to have a feature to track the real-time status of your internship applications?
	7.	What are your expectations regarding the platform's interface? Do you prefer an intuitive interface?
	8.	How important is it for the platform to be mobile-friendly?
	9.	Would you like to receive notifications related to deadlines or updates for your internship applications?
Employees	1.	What challenges do you face in managing communication with students regarding internships?
	2.	To what extent do you find it difficult to provide timely updates on student internship applications?
	3.	Do you find it challenging to maintain organized records of internship applications and feedback?
	4.	Do you need tools to monitor, review, and approve student internship applications efficiently?
	5.	How important is it to have a feedback system that allows you to provide constructive input on students' performance during their internships?
	6.	Would you like a reliable dashboard to manage various student applications and generate analytical reports?

The development phase utilized (2) User-Centered Design (UCD) principles, focusing on iterative prototyping and refining user journey maps to meet expectations. Feedback was continuously gathered and incorporated into subsequent refinements. The platform was developed using (3) Feature-Driven Development (FDD), an Agile methodology emphasizing incremental delivery of functional features. The FDD process consists of five sequential steps performed iteratively (Hagal et al., 2024; Merzouk et al., 2022) : developing the overall model by defining the project scope and selecting the optimal model; building a feature list based on requirements and confirming it with users and experts; planning by feature, where high-level plans prioritize features and schedule milestones; designing by feature, involving iterative creation and approval of design packages and

sequence diagrams; and building by feature, where designs are implemented, tested, and integrated into the main build before starting new features. The iterative nature of the FDD process is depicted in Figure 1 for further clarity.

Figure 1. Feature-Driven Development Process (Granrath et al., 2021)

The platform underwent (4) testing and validation to assess usability and resolve any identified issues. This was followed by (5) deployment during a pilot phase, with user training sessions to facilitate system adoption. Finally (6), an evaluation and analysis phase was conducted to measure the platform's impact on internship management efficiency and user satisfaction, utilizing User Experience Quality (UEQ) metrics . This evaluation provided a comprehensive assessment of how well the platform met user needs and expectations, focusing on key aspects such as usability, effectiveness, and overall satisfaction.

RESULTS

The requirement analysis phase focused on gathering insights from two key participant groups: university employees and students. Data collection was carried out through interviews to understand the specific needs and challenges each group faced with internship management. University employees provided detailed information about the administrative processes, necessary functionalities for managing internships, and their pain points in handling applications, approval workflows, and reporting. Students, on the other hand, shared their expectations regarding ease of use, internship application tracking, and document management. These insights formed the foundation for developing a platform that effectively addressed the distinct needs of both groups.

The interviews provided valuable insights into the problems, needs, and expectations of users regarding the internship platform, involving 10 students and 5 university employees as participants. Among the students interviewed, 8 out of 10 (80%) reported challenges in finding comprehensive and up-to-date internship information, 7 out of 10 (70%) indicated difficulties in tracking the progress of their applications, and 6 out of 10 (60%) noted a lack

of feedback from industry partners or campus coordinators. Meanwhile, 3 out of 5 campus employees (60%) mentioned difficulties in managing communication with students, 3 out of 5 (60%) expressed concerns about providing timely updates, and 3 out of 5 (60%) reported challenges in maintaining organized internship application records and feedback.

Students emphasized the need for a centralized platform with clear navigation for accessing internship opportunities (9 out of 10, 90%), uploading and managing personal profiles and resumes (8 out of 10, 80%), and tracking application statuses in real-time (9 out of 10, 90%). On the other hand, campus employees required tools to efficiently monitor, review, and approve student applications (4 out of 5, 80%) as well as a feedback system to provide constructive input on students' performance during internships (3 out of 5, 60%). These insights are visually represented in Figure 3, which illustrates the survey results from the students, and Figure 4, which shows the survey results from the campus employees.

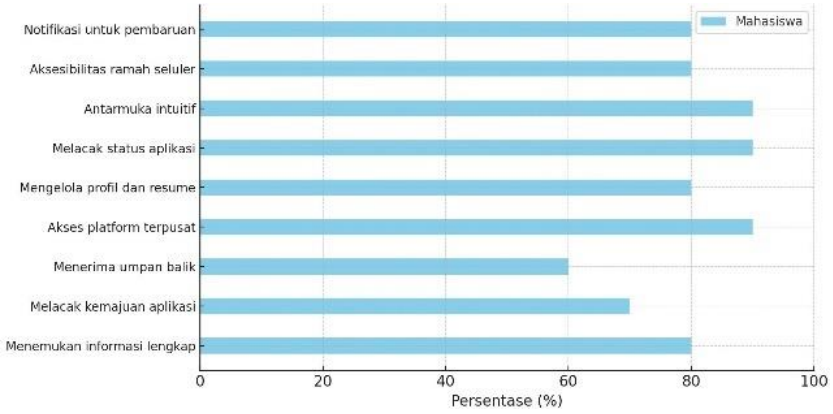

Figure 2. Student Needs and Challenges in Internship Programs

Both groups highlighted the importance of usability, with 9 out of 10 students (90%) expecting an intuitive interface, 8 out of 10 (80%) wanting mobile-friendly access, and 8 out of 10 (80%) requesting notifications related to deadlines and updates. In comparison, 4 out of 5 campus employees (80%) prioritized a reliable dashboard to manage various applications and generate analytical reports.

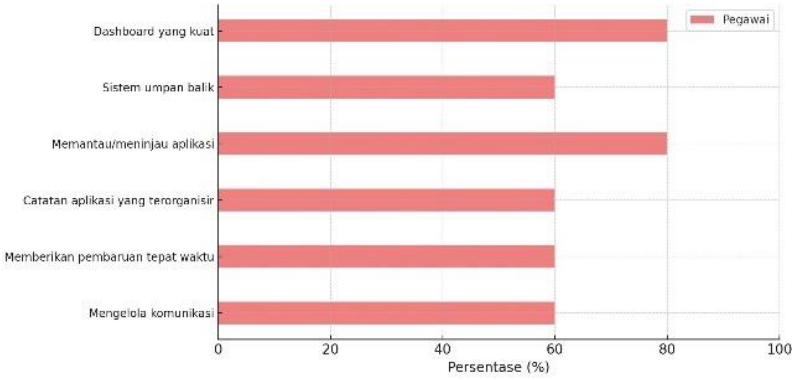

Figure 3. Employee Needs and Challenges in Internship Programs

After the interviews were completed, the next phase of the research involved initiating the program development using a prototype approach. This method allowed for the creation of an initial version of the platform, which could be tested and evaluated by users. The prototype served as a tangible representation of the platform's core features, enabling further refinement based on user feedback and ensuring that the final design would align with the identified needs and expectations of both students and university employees. The prototype snippet is shown in Figure 4.

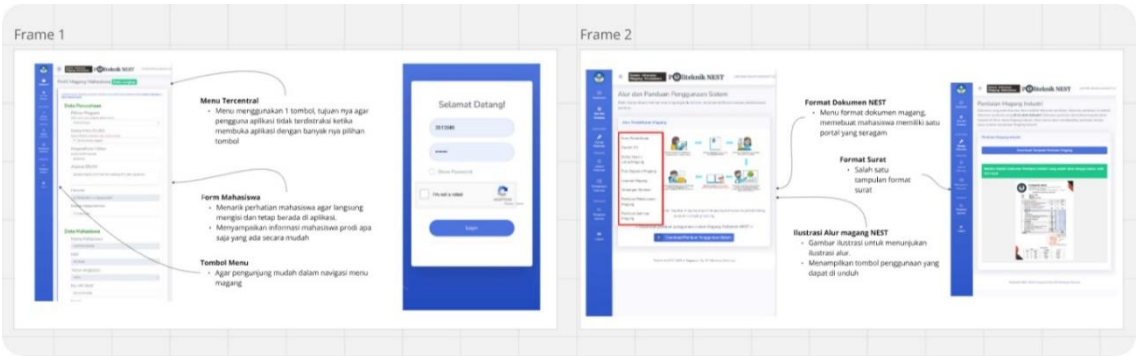

Figure 4. The prototype snippet is shown program development

In addition to the prototype development, a feature list was also created based on the insights gathered from the interviews. This list outlined the key features and functionalities that were deemed essential by both students and university employees. The features included in the list were derived directly from the users' needs and expectations, such as a centralized platform for accessing internship opportunities, real-time application tracking, and a user-friendly interface. The feature list served as a guide for further development and prioritization, ensuring that the platform's design would address the most critical requirements identified during the interview process.

Table 2. Feature in prototype development program internship

Feature	Description
Internship Registration	A feature for students to register for available internship opportunities, including personal details and preferences.
Internship Letter Format	A section where predefined internship letter formats can be accessed, ensuring students and administrators can easily generate required documents.
Upload Internship Documents	A feature allowing students to upload necessary internship-related documents, such as agreements, reports, and certificates.
Internship Administrative Completeness	A system to verify and manage the completeness of all required administrative documents for the internship process.
Internship Document Monitoring	A tool for administrators and students to track the status of submitted internship documents, ensuring timely reviews and approvals.
Input Evaluation	A feature for supervisors and administrators to input performance evaluations, assessing the student's progress and overall internship experience.
Internship Documentation Management	A repository for storing and organizing all internship-related documents, making them accessible for review, updates, and reference.

After the prototype and feature list were completed, the next step involved presenting the developed platform to the university stakeholders. This presentation served as an opportunity to showcase the key features, user interface, and functionality of the platform. During the presentation, feedback was gathered from administrators and other relevant parties to ensure that the platform met the needs and expectations of both students and staff. This step allowed for any necessary adjustments or improvements to be identified before moving forward with further development, ensuring the platform's effectiveness and usability in the real-world setting. The process of the presentation can be seen in Figure 5.

Figure 5. Presentation to Stakeholder

Following the creation of the feature list, the next step involved Planning by Feature, where a high-level plan was developed to prioritize the features and schedule key milestones for the platform's development. This phase focused on organizing the features according to their importance and relevance to the users, ensuring that the most critical functionalities would be developed first. The planning process involved setting clear deadlines and defining the timeline for each feature's implementation, with an emphasis on dependencies and customer priorities. This strategic approach allowed the development team to efficiently allocate resources, streamline the workflow, and ensure that key milestones were met on time. Through this process, the project's scope and goals were clearly outlined, guiding the team towards successful and timely completion of the platform. The Feature Prioritization Matrix can be seen in Table 3.

Table 3. Feature Prioritization Matrix

Feature	Importance to Users (1-5)	Effort to Implement (1-5)	Impact (1-5)	Total Score (15 max)
Internship Registration	5	2	5	12
Internship Letter Format	4	2	4	10
Upload Internship Documents	5	3	5	13
Internship Administrative Completeness	4	4	4	12
Internship Document Monitoring	4	3	5	12
Input Evaluation	4	3	4	11
Internship Documentation Management	5	4	4	13

In the Designing by Feature phase, the process begins with the iterative creation of design packages and sequence diagrams for each prioritized feature, based on the Feature Prioritization Matrix. This matrix helps determine which features should be prioritized based on their importance to users, the effort required to implement them, and their potential impact. High-priority features, such as Upload Internship Documents and Internship

Documentation Management, are given special attention during the design phase. The design process starts with developing a high-level design that outlines the core components, user flows, and system architecture for each feature. Sequence diagrams are then crafted to map out the interactions between system components and users, ensuring clarity in the feature's expected behavior. After creating the initial designs, feedback is gathered from stakeholders and the development team to identify areas for improvement. The design is refined iteratively, with each version being reviewed and approved by stakeholders to ensure alignment with both business requirements and technical feasibility. Once the design packages and sequence diagrams are finalized and approved, they are prepared for the next phase of development.

The platform is designed with core components to ensure smooth and efficient interaction between students and mentors. Table 8 summarizes the key features within each core component, with descriptions combined for student and mentor roles.

Table 4. Key feature each component

Core Component	Feature	Description
User Management	Student Profile	Students can create, update, and manage their profiles, upload internship reports, and track progress.
	Mentor Panel	Mentors can manage student submissions, evaluate performance, provide feedback, grade internship reports, and review internship logs.
Document Management	Document Uploading	Students can upload internship reports, work logs, and supporting documents using an intuitive interface.
	File Organization	Documents are categorized and stored securely by student, date, internship company, etc.
	Version Control	Tracks document revisions, allowing students to submit updates or corrections.
	Document Review and Feedback	Mentors can leave comments, ratings, and feedback on student documents.
Internship Progress Tracking	Dashboard	Personalized dashboards for each user displaying key information like submission status, feedback, and deadlines.
	Milestones & Deadlines	Tracks important deadlines for report submissions, feedback, and other internship-related documents.
	Notifications	Automated reminders for students and mentors regarding upcoming deadlines and new feedback.

To facilitate the efficient operation and seamless interaction among users, the platform is designed with a range of management features tailored to the specific needs of each user role. The User Management feature enables the admin to oversee user accounts, including those of students and mentors, by assigning roles and reviewing access permissions within the system. Students are empowered to update and manage their profiles, upload internship reports, and track their progress. Mentors are equipped with tools to monitor student submissions, provide feedback, and evaluate internship reports through their dedicated panel, enabling them to assess student performance, submit comments, and review internship logs.

In the context of Document Management, students are provided with an intuitive interface for uploading internship reports, work logs, and supporting documents, which are securely stored and categorized by student, submission date, internship company, and other pertinent details. The platform incorporates version control functionality, allowing students to resubmit updated documents when revisions are required. Mentors can offer feedback through comments or ratings on the documents, enhancing the evaluation process. Regarding Internship Progress Tracking, each user whether a student or mentor has access to a personalized dashboard displaying critical information such as submission status, feedback, and deadlines. The platform also features automated notifications that remind both students and mentors of approaching deadlines or newly provided feedback, ensuring that all parties remain aligned and well-informed throughout the internship period. The user flow for each role is visually represented in Figure 6.

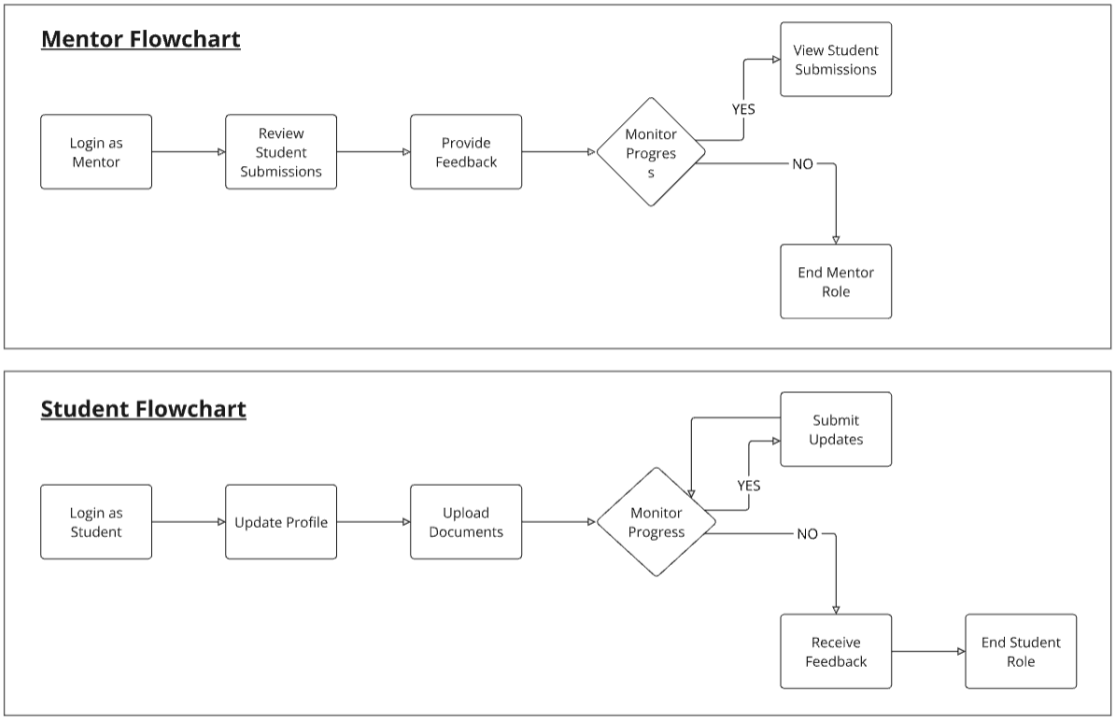

Figure 6. User Flow for Each Role

The system architecture was meticulously developed using Laravel for both backend and frontend components, ensuring seamless integration and robust performance. The Frontend (User Interface) was implemented with Laravel's Blade templating engine, offering a responsive, user-friendly, and accessible design. The interface was optimized for mobile devices, providing intuitive navigation for both students and mentors. Authentication and authorization mechanisms were securely configured using Laravel Sanctum, ensuring reliable access control and user management.

The Backend (Server-side) was constructed using Laravel's MVC (Model-View-Controller) framework, which streamlined server-side logic and facilitated scalability and maintainability. Data management was centralized within a MySQL database, where user data, document metadata, and logs were securely stored. Uploaded documents were integrated directly into the hosting database, stored as file path references. Laravel's file storage system ensured efficient upload, retrieval, and management of these documents. RESTful APIs were developed to facilitate seamless communication between the frontend and backend components. Notifications, implemented using Laravel's built-in mail and notification services, provided timely updates to users regarding deadlines and feedback via email or in-platform alerts.

The Database Schema was designed to efficiently support the system's core functionalities. The Users table encompassed essential user information, including roles such as students and mentors. The Documents table stored uploaded file data and associated metadata, such as submission dates and user identifiers. Mentor feedback was recorded in the Feedback table, while the Progress table tracked submission milestones and completion statuses. Notifications were logged in the Notification table to ensure consistent communication. The database schema can be seen in Figure 7.

Security Considerations were integral to the system's development. HTTPS and SSL certificates were employed to secure communication between the client and server, while role-based access control (RBAC) was implemented to restrict user access to relevant functionalities. Regular backups of the database and uploaded files were configured to ensure data integrity and recovery capabilities. Audit logs were maintained to track system actions, providing a foundation for enhanced security and effective troubleshooting. This comprehensive and systematically designed architecture effectively addresses the requirements of internship management while ensuring operational efficiency and data security.

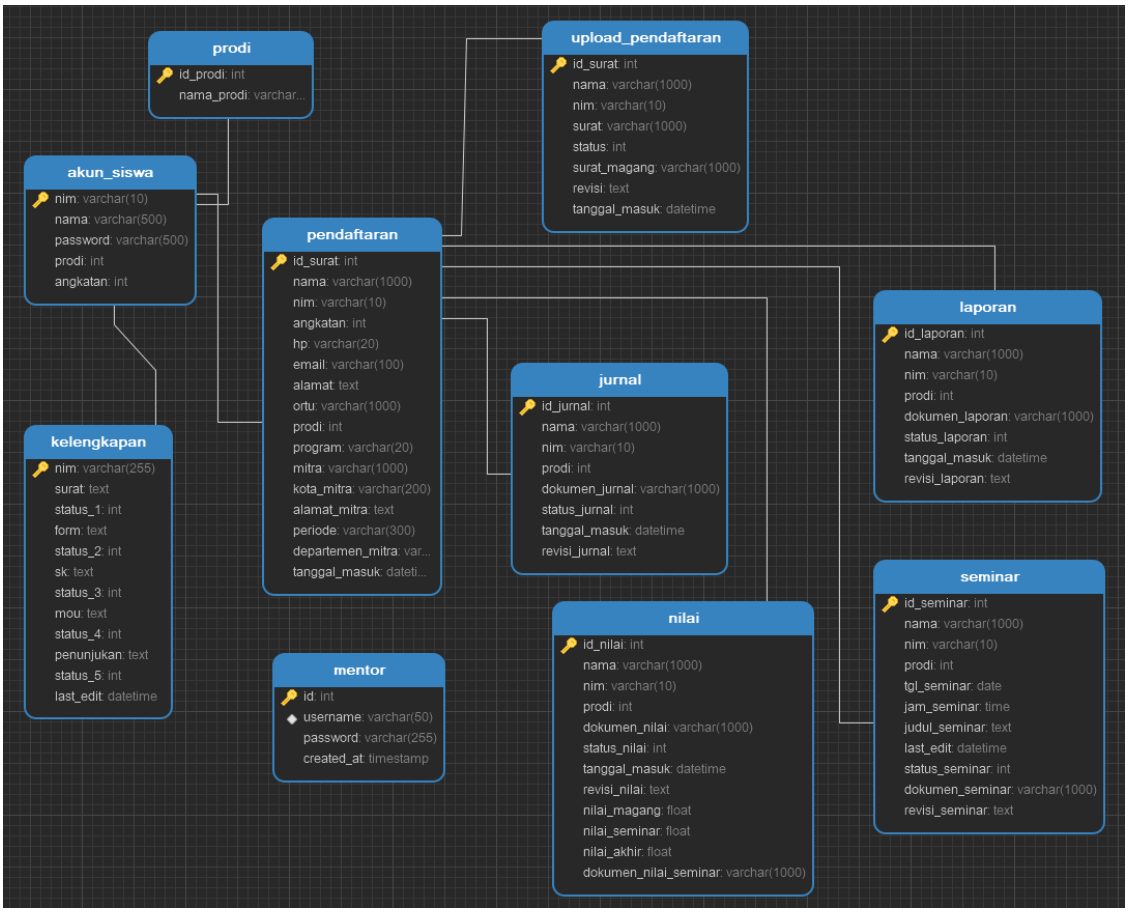

Figure 7. Database Schema

After completing the coding phase and building the web platform by feature, the next critical step is to conduct rigorous testing using User Experience Quality (UEQ) metrics. This testing phase is essential to evaluate the usability and overall user experience of the platform, ensuring that it aligns with the needs and expectations identified during the requirement analysis. The insights gained from the UEQ testing will inform the team about potential areas for improvement, guiding necessary adjustments for future iterations of the platform. The results of the UEQ can be seen in Table 9, providing a representation of user feedback and satisfaction levels, which will be instrumental in refining the platform to better serve both students and university employees in subsequent development cycles.

Table 5. UEQ Benchmark Result

Scale	Mean	Comparisson to benchmark	Interpretation
Daya tarik	1,78	Good	10% of results better, 75% of results worse
Kejelasan	1,98	Good	10% of results better, 75% of results worse

Scale	Mean	Comparisson to benchmark	Interpretation
Efisiensi	1,88	Good	10% of results better, 75% of results worse
Ketepatan	1,81	Excellent	In the range of the 10% best results
Stimulasi	1,38	Good	10% of results better, 75% of results worse
Kebaruan	1,62	Excellent	In the range of the 10% best results

The analysis indicates that most scales fall into the "Good" category, with average scores ranging from 1.38 to 1.98. Specifically, Appeal, Clarity, Efficiency, and Stimulation are classified as "Good," meaning 10% of benchmark results are better while 75% are worse. This highlights an overall favorable performance. Meanwhile, Accuracy and Novelty achieved an "Excellent" interpretation, placing them among the top 10% of results, which suggests outstanding performance in these aspects.

The high ratings for Accuracy and Novelty reflect the system's strengths in precision and innovation, aligning with user expectations for accurate and cutting-edge features. Conversely, the slightly lower score for Stimulation indicates a potential area for improvement in maintaining user engagement and enthusiasm. These findings provide valuable insights into identifying both strengths and areas for improvement in the evaluated system.

DISCUSSION

This study underscores the importance of a user-centered internship management system in enhancing efficiency, transparency, and usability for students and university administrators. The integration of User-Centered Design (UCD) and Agile methodologies effectively addressed key challenges (Al-Razgan et al., 2022), as identified during requirement analysis. Interviews revealed that students struggled with accessing up-to-date internship information, tracking applications, and receiving timely feedback, while university administrators faced difficulties in managing applications, maintaining records, and ensuring efficient communication. The developed platform tackled these issues through features such as centralized internship registration, real-time document tracking, automated notifications, and an intuitive user interface.

Interpreting these findings, the incorporation of Feature-Driven Development (FDD) allowed for an incremental and structured approach to feature implementation

(Granrath et al., 2021; Tetteh, 2024). Prioritizing critical functionalities ensured the platform met user needs while remaining adaptable for future improvements (Baswardono et al., 2021; Naufal et al., 2024). The iterative prototyping process refined usability based on continuous user feedback, and evaluations using User Experience Quality (UEQ) metrics confirmed positive reception, particularly in accuracy, clarity, and efficiency. However, engagement and stimulation remain areas for improvement, suggesting the need for more interactive elements and personalized user experiences to boost user involvement.

Beyond addressing usability, the developed system provides insights into how digital internship platforms can streamline administrative processes (Hendrawan et al., 2024). The automation of application tracking, real-time status updates, and structured feedback mechanisms significantly reduce manual workload and enhance efficiency for both students and university staff (Elshami et al., 2021). By integrating structured workflows, the platform minimizes errors in document management and ensures seamless communication between stakeholders.

Another significant contribution of this study is the scalability of the proposed system (Nugraha et al., 2023). While initial testing involved a limited number of participants, the platform architecture allows for expansion across multiple institutions. Future implementations could explore cloud-based deployment to facilitate wider adoption and enhance system accessibility. Additionally, integrating multi-language support would improve usability for international students and institutions with diverse user demographics.

From a technological perspective, this research highlights the potential of incorporating AI-driven automation for internship matching and performance assessment. Machine learning algorithms could be utilized to provide intelligent recommendations based on students' skills and employer requirements. Additionally, AI-based feedback analysis could improve response times and ensure more personalized guidance for students during their internship journey (Hannan & Liu, 2023). These enhancements could further strengthen the role of digital transformation in academic internship management.

This study also contributes to theoretical advancements by reinforcing existing UCD and Agile methodologies in educational software development and proposing the integration of FDD as a framework (Losana et al., 2021), particularly for internship management systems. Future research should explore AI-driven automation to enhance feedback analysis and internship matching. While the system has demonstrated effectiveness, broader user

testing is necessary to ensure scalability and applicability across different institutions. Overall, the findings support the ongoing digital transformation of academic internship management, emphasizing the importance of iterative development and user-driven enhancements.

CONCLUSION

This study highlights the significance of a user-centered internship management system in addressing the inefficiencies of traditional internship tracking methods. Through an analysis of User-Centered Design (UCD) and Agile methodologies, the findings demonstrate that a structured, iterative development approach enhances system usability and user satisfaction. The research contributes to internship management and digital transformation in academic institutions by offering a web-based platform that streamlines internship applications, document management, and communication between students and mentors, which can be applied to higher education institutions seeking efficient internship coordination.

Despite certain limitations, such as the need for broader user testing and potential scalability concerns, the study provides a foundation for future research in enhancing engagement features and integrating AI-driven automation for feedback and evaluation. Further exploration into adaptive learning mechanisms and real-time analytics could enhance the understanding and implementation of internship systems tailored to user needs, ensuring continuous improvement and a more effective internship experience.

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