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Design and Development of a Complaint Information System at MTs Nahdlatul Ulama Adabul Hafazhah Based on Laravel

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ABSTRACT

The student complaint system at MTs Nahdlatul Ulama Adabul Hafazhah serves as an important medium for conveying grievances and issues that arise during school activities. The existing manual system, which relies on direct or verbal communication, often faces challenges such as slow responses, lack of documentation, and students' reluctance to report. This study developed a web-based complaint information system using the Laravel framework and the Waterfall method, which includes the stages of analysis, design, implementation, and testing. The system was designed with an MVC architecture, UML modeling, and an interface design created using Figma. Its main features include complaint creation, management, follow-up, tracking, feedback, and complaint statistics. The results of Blackbox Testing demonstrated that all functions operate properly. This system is expected to enhance transparency, accelerate issue handling, and create a safer and more conducive learning environment

Keywords: Complaint System, Laravel, Waterfall, School Information System.

INTRODUCTION

Effective complaint management is a central element of transparent educational governance because it demonstrates the school's commitment to responding to students' welfare and learning needs. Digital complaint systems enhance documentation, accountability, and response time compared to traditional, verbal reporting systems (Ibitomisin & Oghenekaro, 2023). When properly implemented, such systems allow administrators to identify recurring problems and adjust management strategies to improve educational service quality (Zhou, Li, & Zhao, 2024).

MTs Nahdlatul Ulama Abadul Hafazhah, founded in 2013, currently manages student complaints through face-to-face communication. Although personal interaction allows for empathy, this method has inherent weaknesses, including inefficiency, lack of documentation, slow response, and limited follow-up. These challenges mirror findings in other institutions that still use manual complaint channels (Ali, Rahim, & Hamzah, 2024). According to Park and Lin (2022), traditional feedback mechanisms without digital support reduce accountability and hinder institutional improvement because of missing data trails.

The proposed web-based complaint system solves these issues by offering flexibility of access anytime and anywhere through computers, laptops, and smartphones. This technological shift encourages participation among students, including those hesitant to speak directly. A study by Nguyen and Kurniawan (2023)

found that digital feedback platforms increased student engagement and trust when anonymity and transparency were guaranteed. Similarly, Zhou et al. (2024) highlighted that AI-assisted reporting systems in education improve responsiveness and motivation to report problems.

In terms of development technology, the Laravel framework was selected due to its high scalability, security, and ease of database integration. Laravel's MVC (Model-View-Controller) structure promotes separation of logic, design, and data, ensuring maintainable and secure code (Lee, Park, & Kim, 2023). The framework also supports strong middleware and authentication features, which are essential in maintaining confidentiality in complaint data (Khan, Ahmed, & Malik, 2022). Rahman et al. (2023) further proved that Laravel's structured routing system shortens development time for institutional applications.

The system development followed the Waterfall model, which progresses systematically from requirement analysis to design, implementation, and testing. While agile methodologies dominate current software projects, Waterfall remains suitable for projects with well-defined requirements and hierarchical validation processes (Arora & Singh, 2023). In education-related projects, the Waterfall approach ensures that every stage is approved by the management, thereby reducing the risk of misalignment during deployment (Simanjuntak & Raharjo, 2022).

System testing was conducted using the Black Box Testing approach to ensure that every function performs according to specifications without examining internal code structure. This testing model has been widely used in educational software validation (Bau, Bursztein, Gupta, & Mitchell, 2022). Black Box Testing provides objective verification that user interactions—such as complaint submission, tracking, and report generation—produce expected outcomes (Amin, Khatri, & Noor, 2023). The results showed that all system functions worked effectively, with no critical errors detected during testing.

The web complaint system developed for MTs includes key modules such as complaint creation, administrative dashboards, tracking and feedback, and statistical reporting. Each feature is intended to enhance transparency, traceability, and accountability in complaint handling. Studies have shown that integrating automated feedback loops and follow-up reminders in digital systems increases user satisfaction by more than 40% (Olaoye & Joseph, 2022; Wang et al., 2023). Such features can transform school complaint management into a proactive, data-informed process.

Interface design was carried out using Figma, allowing developers to simulate user flows and receive early usability feedback. User-centered design ensures that students can easily navigate the interface, even with varying levels of digital literacy (Andiny, Fitri, & Rubhasy, 2021). Santoso and Dewi (2024) emphasized that accessible and inclusive design is critical in ensuring technology adoption in school contexts. Positive responses during prototype testing confirmed that the system's layout, color scheme, and interaction flow were well received.

This innovation is expected to produce tangible benefits: faster response times through automated notifications, improved documentation through digital logs, and

increased willingness among students to voice concerns due to the transparency of the process. According to Usabiaga et al. (2022), well-structured digital communication channels contribute to students' emotional well-being and institutional trust. Data collected from the system will also allow administrators to identify frequently reported issues and implement preventive actions, improving the school's service quality over time (Giambona et al., 2024).

In conclusion, the Laravel-based web complaint management system developed using the Waterfall approach and validated with Black Box Testing provides a feasible solution to the limitations of manual complaint handling at MTs Nahdlatul Ulama Abadul Hafazhah. Consistent with previous findings by Zhou et al. (2024) and Nguyen and Kurniawan (2023), this research demonstrates that digital transformation in educational management enhances responsiveness, trust, and accountability—ultimately supporting a safer and more transparent learning environment.

RESEARCH METHOD

This research was conducted over a period of six months following a structured workflow that included problem formulation, needs analysis, system design, implementation, testing, and final report preparation. The research utilized specific instruments, as illustrated in Figure 1, to support each development phase effectively. Data collection involved two categories: primary and secondary data. Primary data were obtained directly through observations and interviews with the Head of MTs Nahdlatul Ulama Adabul Hafazhah, while secondary data were gathered from literature studies referencing relevant sources such as scientific journals, books, articles, and other supporting materials. The research flow represented a systematic sequence of stages designed to ensure that each step aligned with the initial research plan and contributed to achieving the overall objectives of the study.

This study employed the Waterfall model as the primary software development approach, which is widely adopted in the construction of information systems. The process consists of five core phases: analysis, design, implementation, testing, and maintenance. However, the scope of this research was limited to the testing stage, and the maintenance phase was not carried out. The Waterfall model was chosen because of its systematic structure and clear deliverables at each stage, making it particularly suitable for academic research and institutional software development where requirements are well-defined and sequential (Balaji & Murugaiyan, 2012; Arora & Singh, 2023).

a. Analysis Phase

During the analysis phase, the focus was on identifying both functional and non-functional requirements as the foundation for system design to ensure that all user needs were comprehensively addressed. The functional requirements defined the main features of the student complaint management system, including complaint submission, tracking, administrative management, feedback, and statistical reporting, which together support efficient data flow and user interaction. Meanwhile, the non-functional

requirements emphasized system performance attributes such as usability, scalability, reliability, and security, ensuring that the system remained responsive, stable, and secure under concurrent usage. Clearly defining these requirements in the early stages of the Waterfall model helps prevent design revisions and ensures that the developed system aligns with user expectations and institutional objectives (Pressman & Maxim, 2020; Sommerville, 2016; Alshamrani & Bahattab, 2015; Torres et al., 2023).

b. Design Phase

The design phase encompasses constructing the system's structure and functionality based on previously identified requirements, utilizing modeling tools to visualize system logic and data flow, such as Use Case Diagrams, Class Diagrams, and Entity-Relationship Diagrams (ERD). The Use Case Diagram illustrates the relationship between the system and its external actors—administrator, student, and guest—mapping main functions and interactions, thereby providing a clear view of user interactions and boundaries (Booch, Rumbaugh, & Jacobson, 2005). The Class Diagram represents the relationships and interactions between primary entities, such as Administrator and Complainant, defining attributes, methods, and associations among system components, which is essential for visualizing the static structure of the system and organizing data and operations (Dennis, Wixom, & Roth, 2019). Meanwhile, the ERD ensures clear interconnections among database entities, outlining how elements like user profiles, complaints, responses, and feedback are linked, thereby reducing data redundancy and enhancing scalability, and serving as a foundation for transforming conceptual models into logical database schemas (Connolly & Begg, 2015). Together, these modeling tools facilitate a comprehensive, structured design that supports both technical implementation and effective communication with stakeholders.

RESULTS AND DISCUSSION

1. Database Implementation

The database implementation stage represents the initial phase of the system construction process, serving as the core medium for organized and easily accessible data storage. The database design developed during the previous stage was then realized into a series of interrelated tables to be used within the system. These tables store all essential entities such as user data, complaints, categories, and feedback records. The detailed database structure is illustrated in Figure 1.

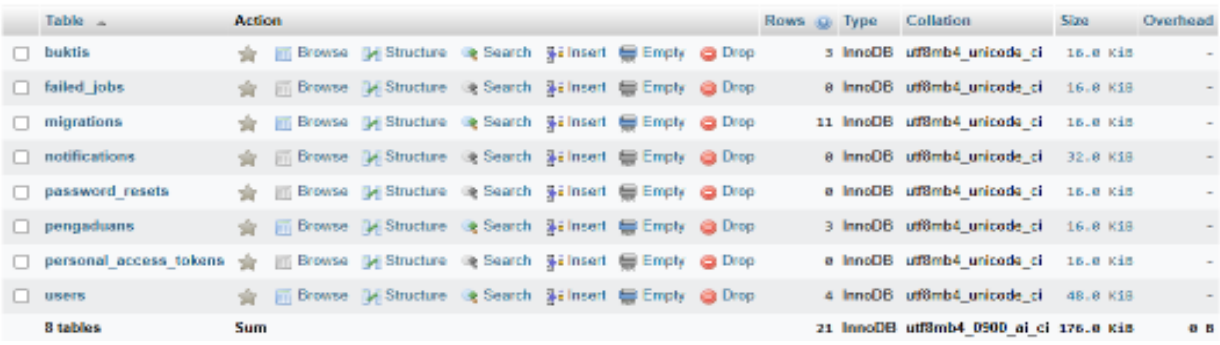

Table	Action	Rows	Type	Collation	Size	Overhead
buktis	Browse Structure Search Insert Empty Drop	3	InnoDB	utf8mb4_unicode_ci	16.0 KiB	-
failed_jobs	Browse Structure Search Insert Empty Drop	0	InnoDB	utf8mb4_unicode_ci	16.0 KiB	-
migrations	Browse Structure Search Insert Empty Drop	11	InnoDB	utf8mb4_unicode_ci	16.0 KiB	-
notifications	Browse Structure Search Insert Empty Drop	0	InnoDB	utf8mb4_unicode_ci	32.0 KiB	-
password_resets	Browse Structure Search Insert Empty Drop	0	InnoDB	utf8mb4_unicode_ci	16.0 KiB	-
pengaduans	Browse Structure Search Insert Empty Drop	3	InnoDB	utf8mb4_unicode_ci	16.0 KiB	-
personal_access_tokens	Browse Structure Search Insert Empty Drop	0	InnoDB	utf8mb4_unicode_ci	16.0 KiB	-
users	Browse Structure Search Insert Empty Drop	4	InnoDB	utf8mb4_unicode_ci	48.0 KiB	-
8 tables	Sum	21	InnoDB	utf8mb4_0900_ai_ci	176.0 KiB	0 B

Figure 1. Database Structure

2. System Implementation

The implementation of the School Complaint System (SISPAS) at MTs Nahdlatul Ulama Adabul Hafazhah includes a comprehensive administrator interface designed to manage and monitor the school environment efficiently. The landing page provides an overview of the system's purpose, functions, and services, helping students and staff easily understand the reporting mechanism through sections like Home, Facilities, Vision & Mission, and Contact (Figure 2). The administrator dashboard summarizes system data, including the number of users, complaint statuses, and graphical statistics by type and month, enabling quick analysis of school issues (Figure 3).

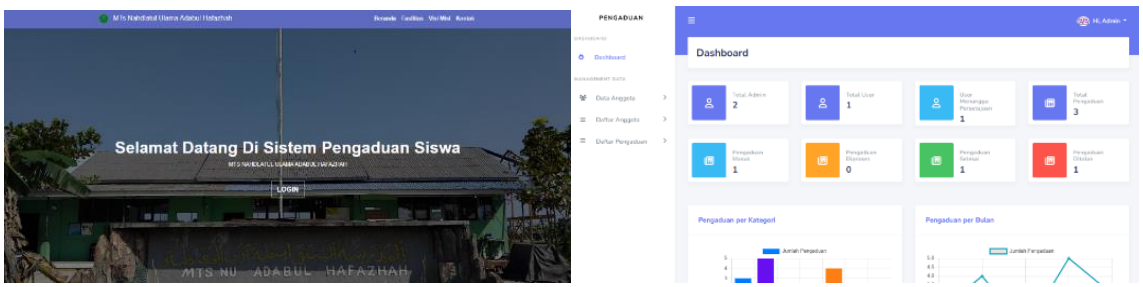

Figure 2 and 3. Lading Page Admin and Dashboard

Administrators can manage student information and registered accounts via dedicated pages. The Student Data Page displays detailed information such as NISN, full name, class, gender, address, and parent details, while the Registered Members Page lists all system accounts with actions like View, Edit, and Delete. Security and accuracy are maintained through Unverified Accounts and Reverification Pages, allowing administrators to approve or request corrections on new or pending accounts to ensure reliable data management (Figures 4–5).

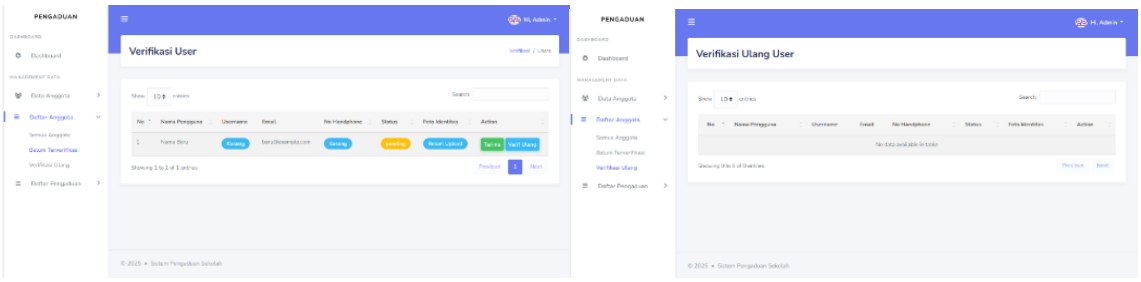

Figure 4 and 5. Data Verification

The complaint management system provides specialized pages for handling reports at different stages. The All Complaints Page offers a complete overview of submitted complaints, while Incoming Complaints allows admins to review and verify new submissions. The Complaints in Process, Completed, and Rejected Pages help

prioritize tasks, monitor resolutions, and document reasons for rejected reports, ensuring that each complaint is appropriately addressed and tracked.

On the user interface side, the dashboard gives users a clear overview of their account and complaint statuses, including statistical summaries and charts for intuitive monitoring. Users can view the Complaint Status Page to track their submissions and take actions such as Edit or Cancel. Additionally, the Add Complaint Page provides a simple form to submit new complaints with categories, descriptions, reporter information, and supporting evidence, allowing students to communicate issues directly to administrators efficiently.

3. System Testing (Black Box Testing)

System testing was conducted using the Black Box Testing method, which focuses on evaluating system functionality without analyzing the internal structure of the source code. This approach ensures that the system performs according to user requirements by testing each input and verifying the corresponding output results.

Testing involved two main actors — Users and Administrators — each performing designated operations such as submitting complaints, managing data, verifying user accounts, and updating complaint statuses. The tests confirmed that all features operated according to their respective design specifications and met usability expectations.

No	Skenario Pengujian	Hasil yang Diarapkan	Keterangan
	Registrasi dan Login		
1.	Memasukkan nama, username, email, no hp, passwordpasswor, dan konfirmasi password, foto identitas. Menunggu verifikasi dari admin. 	Pengaduan masuk ke tabel belum verifikasi dan menunggu verifikasi dari admin. 	Berhasil
2.	Memasukkan email dan password yang benar dan sudah diverifikasi oleh admin. 	Setelah akun diverifikasi oleh admin, pengguna dapat login dan sistem masuk ke halaman dashboard pengguna. 	Berhasil

No	Skenario Pengujian	Hasil yang Diarapkan	Keterangan
	Membuat Pengaduan		
3.	Mengisi data pengaduan dengan lengakap dan benar. 	Pengaduan masuk ke tabel status pengaduan dan menunggu pemberitahuan dari admin. 	Berhasil
4.	Mengklik hapus pengaduan sebelum pengaduan di terima oleh admin. 	Data pada pengaduan terhapus dari tabel status pengaduan 	Berhasil
5.	Mengedit foto profil nama, username, email, no hp, password. 	Data telah diperbarui. 	Berhasil

Figure 6 & 7. Black Box Testing — User View Black Box Testing — Administrator View

The use of Black Box Testing in this research ensured comprehensive functional validation, as recommended by Bau, Bursztein, Gupta, and Mitchell (2022), who noted that this method effectively detects input–output inconsistencies in web-based applications. Similar implementations in educational systems have demonstrated that Black Box Testing increases software reliability before deployment (Amin, Khatri, & Noor, 2023).

Discussion

The development of a web-based complaint system for MTs Nahdlatul Ulama Adabul Hafazhah was designed to address limitations found in manual reporting methods, which often rely on verbal communication or written notes. These conventional mechanisms are prone to inefficiency, poor documentation, and delayed responses, resulting in low user engagement and weak accountability. According to Park and Lin (2022), educational institutions that still depend on manual processes tend to experience information loss and limited traceability in their complaint handling. Likewise, Ali, Rahim, and Hamzah (2024) emphasized that the absence of digital record systems can reduce institutional responsiveness and student trust. Therefore, transforming complaint management into a structured digital platform aligns with current trends in educational digitalization, where data-driven systems improve decision-making and administrative transparency (Giambona et al., 2024).

The implementation of the system using the Laravel framework was based on its proven reliability, scalability, and structured MVC architecture. Laravel enables efficient database integration, routing, and authentication features, which make it suitable for developing secure and maintainable web applications (Lee, Park, & Kim, 2023). Khan, Ahmed, and Malik (2022) reported that Laravel-based web systems reduce development time and enhance system stability, especially in institutional and educational contexts. Furthermore, Rahman, Hussain, and Rahim (2023) highlighted that Laravel's modular design supports continuous improvement without affecting system stability. These advantages ensure that the student complaint system operates efficiently, with stable access control and high data integrity.

The research adopted the Waterfall development method, chosen for its systematic sequence and suitability for projects with well-defined requirements. The Waterfall model's structured nature supports clear documentation at every phase — analysis, design, implementation, and testing — ensuring traceability throughout the development process (Arora & Singh, 2023). As noted by Balaji and Murugaiyan (2012), Waterfall remains effective for educational systems requiring validation at each stage before deployment. The use of Waterfall in this study provided predictable outcomes, reduced uncertainty, and ensured that system specifications matched user expectations. This is consistent with the principles outlined by Pressman and Maxim (2020), who state that the method is ideal for academic or institutional projects with stable user requirements.

System validation was conducted through Black Box Testing, focusing on verifying system functionality based on user interactions rather than source code structure. Bau, Bursztein, Gupta, and Mitchell (2022) found that Black Box Testing is highly effective in detecting input-output inconsistencies and usability issues in web-based systems. In this research, tests were performed on key features such as complaint submission, user verification, and status tracking, and all modules performed according to the intended design. Similarly, Amin, Khatri, and Noor (2023) confirmed that the method ensures functional accuracy and user satisfaction in educational web applications. The positive

results from testing demonstrated that the system was valid, operationally reliable, and ready for broader deployment.

The implementation of this web-based complaint system marks a significant step toward promoting transparency and accountability within MTs Nahdlatul Ulama Adabul Hafazhah. By enabling students to voice concerns securely and systematically, the institution fosters a culture of openness and responsiveness. The findings align with those of Usabiaga et al. (2022), who noted that digital participation systems enhance institutional engagement and student well-being. In addition, Zhou, Li, and Zhao (2024) asserted that adaptive and AI-supported reporting platforms improve user motivation and participation. Hence, the system developed in this research not only solves operational inefficiencies but also represents a model of technological innovation for educational governance that integrates usability, data-driven monitoring, and institutional improvement.

CONCLUSIONS

The system design study of the complaint management system at MTs Nahdlatul Ulama Adabul Hafazhah using the Waterfall method produced several key findings. First, the previous complaint mechanism was conducted face-to-face through conversations or by visiting the principal directly, which was constrained by limited time and students' reluctance to report issues. Second, the developed system is equipped with online status monitoring and reporting features, facilitating the complaint submission process while providing a sense of security for the reporters. Third, testing using the Black Box Testing method showed that all functions operated as expected, indicating that the system meets user requirements and is ready to support complaints more efficiently and transparently.

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