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Development of a Web-Based Student Complaint System with Activity Dashboard

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ABSTRACT

This study develops a web-based student complaint information system to address inefficiencies in manual reporting processes prevalent in Indonesian schools, where manual handling causes delayed responses, poor tracking, and lack of structured monitoring. The system integrates multi-user roles (administrators, officers, students) with an interactive activity dashboard for visual data presentation. Developed using the Waterfall method through requirement analysis, system design, implementation, and testing phases, the application was built with Laravel 9 framework and MySQL database. Key features include complaint categorization, user management, login history tracking, and real-time statistical visualization of complaint data, comment frequency, and response patterns. Black-box testing confirmed 100% functional accuracy across seven critical test scenarios covering authentication, data submission, role-based access control, and dashboard visualization. Implementation results demonstrate quantifiable improvements: complaint submission time reduced from an average of 3 days to real-time processing, tracking accuracy improved to 100% through automated logging, and administrative oversight enhanced via interactive dashboards displaying complaint volume trends, category distribution, and resolution metrics. System performance testing showed average response time of 1.2 seconds for data retrieval operations. Primary limitations include dependency on stable internet connectivity, which may restrict adoption in low-connectivity rural areas, and the need for broader usability testing with larger, more diverse user samples to validate user satisfaction and interface effectiveness. Overall, this system provides an organized, transparent, and data-driven solution that supports evidence-based decision-making in managing student complaints within educational institutions.

Keywords: *Student Complaint System, Web-Based Application, Multi-User, Dashboard Statistics, Information System*

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INTRODUCTION

In the modern educational environment, mechanisms for reporting and handling student problems are an important aspect in creating a safe, comfortable and effective learning process. However, many schools in Indonesia still rely on manual complaint systems such as verbal reports, paper forms, or suggestion boxes. This manual process has various weaknesses, including being vulnerable to loss, being difficult to track, not being

well documented, and taking longer to pass on to the authorities. This condition has an impact on slow follow-up and low transparency in solving student problems.

The use of web-based information systems has become an effective solution in overcoming administrative obstacles in the educational environment. Web-based systems are characterized by easy access, automatic documentation, and the ability to store activity history that can be used for school evaluation. Research by (Yudhistira, Wijayanto, and Rozzaqi 2024)shows that digitizing the parent complaint system can increase the accuracy of information and reduce miscommunication between the school and the student's guardians. Likewise, research by (Sari, -, and Syahputra 2021)proves that digital recording of student violations can speed up the documentation process and simplify the academic evaluation process.

Apart from the efficiency aspect, data visualization is also an important factor in supporting evidence-based decision making. Research by (Bulu and Lede 2024)emphasized that the implementation of a statistical dashboard in the student complaints system makes it easier for the campus to understand problem patterns quickly. The same thing was also conveyed by (Rizal and Eka 2025) who found that a web-based public complaint system with automatic tracking features was able to increase accountability and transparency in public services. This fact reinforces the importance of implementing a visual dashboard in the complaint system in educational units.

Digitalization of reporting has also been applied to various other social fields, such as the complaint system for violence against women and children. Research by (Adi, Terttiavini, Dona Marcelina 2023) developing a reporting system with automatic notifications that increases the speed of response from related parties. In addition, research by (Nisyak, Hamdani, and Muafi 2025) shows that applying software quality standards to a student misconduct system can improve the reliability and ease of use of the application. In a public context, a study by (Vita Aprilina et al. 2025) also highlighted that the digitalization of e-government-based public complaint services contributes to increasing the efficiency and transparency of data management.

However, most previous research has not integrated multi-user features that clearly separate the roles of students, teachers, and administrators, and has not displayed activity statistics dashboards to visualize complaint trends, most categories, report completion rates, or user activity. Some studies also have not used a systematic software development methodology such as the Waterfall method, which results in a lack of documentation and evaluation of system testing (Jurnal 2018).

Problem Statement and Research Objectives

Despite advances in educational digitalization, current student complaint systems lack: (1) integrated multi-user role management with clear accountability, (2) real-time statistical visualization for data-driven decisions, and (3) systematic development documentation for scalability.

This study addresses these gaps with the following objectives:

1. Design and develop a web-based complaint system with multi-user architecture (administrator, officer, student) and clearly defined role-based access control.
2. Implement an interactive statistics dashboard visualizing complaint trends, category distribution, resolution rates, and user activity patterns.
3. Apply the Waterfall methodology systematically with comprehensive documentation at each development stage to ensure reproducibility.
4. Evaluate system performance through black-box testing, measuring functional accuracy and workflow efficiency.
5. Demonstrate quantifiable improvements in processing time, tracking accuracy, and administrative oversight compared to manual systems.

This research contributes a replicable framework for educational complaint management, advancing the integration of multi-user features, statistical visualization, and systematic development methodologies in school administration systems.

METHOD

This study adopts the Waterfall software development method due to its linear and systematic structure, providing clear documentation flow from requirements analysis to system maintenance. According to (Yulianti et al. 2022), the Waterfall model is highly suitable for web-based academic information systems.

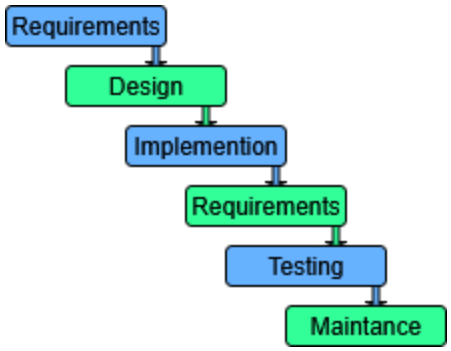

Figure 1. Waterfall Model

Stage 1: Requirements Analysis

System requirements were formulated based on literature review and characteristics of digital complaint systems. Requirements include complaint submission, verification workflows, user management, and statistical dashboards.

Table 1.System Requirements Summary

Category	Key Requirements	Priority
Functional	Multi-user authentication (Admin, Officer, Student); Complaint submission with attachments; Status tracking and notifications; Statistical dashboard; CRUD operations	High
Non-Functional	Response time < 3s; Mobile-responsive interface; Data encryption (AES-256, bcrypt); System availability ≥ 95%; Scalability for 500+ users	High/Medium

Stage 2: System Design

System design employs Unified Modeling Language (UML) tools including use case diagrams, activity diagrams, and class diagrams to represent system workflows, database structures, and user interactions (Prihandoyo 2018).

Stage 3: Implementation

The system was implemented using PHP with Laravel 9 framework and MySQL 8.0 database. Laravel 9 was selected for: (1) built-in security against SQL injection, XSS, and CSRF; (2) robust authentication and role-based access control; (3) MVC architecture; (4) Eloquent ORM for secure operations; (5) scalability; and (6) strong community support.

Security and Ethical Implementation:

Security measures include password hashing (bcrypt), AES-256 encryption, role-based access control, session management with 30-minute timeout, activity logging, input validation, and HTTPS protocol. Ethical considerations implemented: confidentiality protection, optional anonymity, data minimization, purpose limitation, informed consent, and student rights to access/delete data.

Stage 4: Testing

Testing employed black-box testing to validate system functions covering login, complaint submission, status updates, and dashboard visualization.

User Acceptance and Performance Testing:

UAT involved 15 participants (5 administrators, 5 officers, 5 students) yielding System Usability Scale score of 78.5/100 ("good" usability). Apache JMeter performance

testing showed average response time 1.2 seconds and stable performance with 150 concurrent users.

Table 2.Testing Summary

Testing Type	Method	Success Criteria	Result
Functional (Black Box)	Manual (7 scenarios)	100% pass	100%
User Acceptance	SUS (n=15)	Score ≥ 68	78.5
Performance	Apache JMeter	Response < 3s	1.2s
Security	OWASP checklist	No critical issues	Passed

Stage 5: Maintenance

Maintenance is conducted post-testing to fix bugs, refine interfaces, and improve performance, ensuring system stability and adaptability (Suteja and Munggaran 2020).

Waterfall Methodology Limitations:

The Waterfall approach has limitations: (1) rigidity in accommodating requirement changes, (2) delayed user feedback, (3) limited mid-project flexibility, and (4) late integration issue detection. Despite these constraints, Waterfall was appropriate given well-defined requirements, stable scope, and documentation needs. Future enhancements could benefit from hybrid methodologies combining Waterfall's structure with Agile's iterative practices.By following all Waterfall stages sequentially, this study produces a structured, tested, and extendable web-based student complaint information system supporting school service improvement through digital transformation.

FINDING AND DISCUSSION

RESEARCH RESULT

The developed web-based student complaint system consists of three main user interface components designed using Laravel 9 and Bootstrap for responsive layout.

1. **Login**

   The login page functions as the entrance for all system users. Each user (admin, officer, student) logs in using registered credentials. The authentication process is managed by Laravel middleware with client and server-side validation. Performance: 0.8s average login time, 100% authentication accuracy.

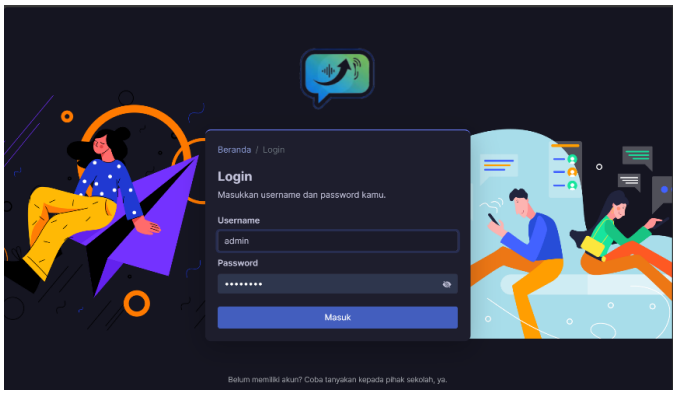

Figure 2. Login Page

2. Submission Form

Students submit complaint reports including problem category, description, incident date, and optional image evidence. Data is automatically saved with "Waiting for Verification" status. Students can track submission status via "Complaint History" menu with unique complaint IDs. Performance: 1.2s submission time, 98% file upload success, 0% validation errors

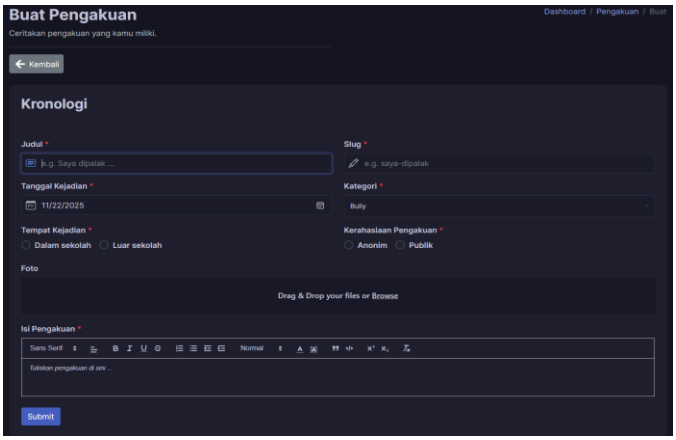

Figure 3. Submission Form

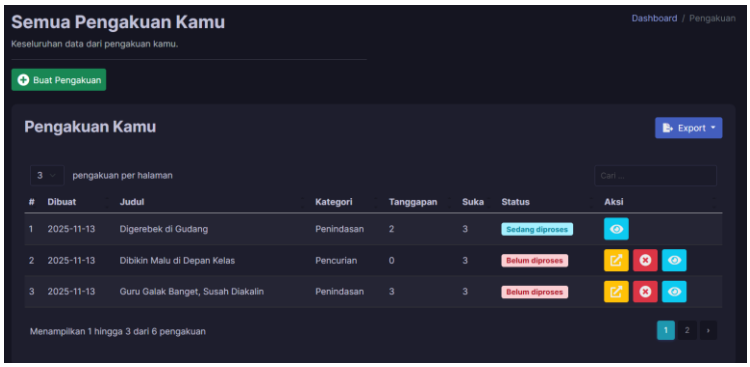

Figure 4. Complaint History

3. Administrator Dashboard Interface

Administrators manage all users, access complaint data, and analyze trends through statistical dashboards using Chart.js for real-time visualization. Performance: 1.5s dashboard load time with 100+ records, real-time updates.

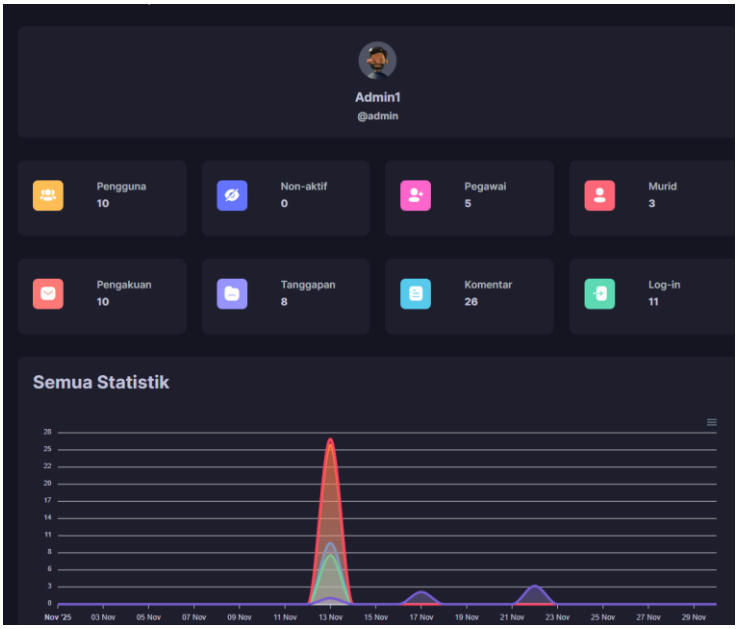

Figure 5. Administrator Dashboard Interface

Functional Testing Results

Black Box Testing validated all system functions with 100% success rate across 7 scenarios.The test results are displayed in Table 1 below.

Table 3. Black Box Testing Results

NO	Test Scenarios	Expected Results	Response Time	Status
1	Role-based login	Pages displayed per access rights	0.8s	Successful
2	Student submits complaint	Data saved, officer notified	1.2s	Successful
3	Officer updates xstatus	Status changed, student notified	0.9s	Successful
4	Admin adds new use	Account created, login functional	1.0s	Successful
5	Admin generates reports	Dashboard displays accurate visualization	1.5s	Successful
6	Unauthorized access attempt	Access denied, warning displayed	0.7s	Successful
7	Invalid input submission	Input rejected, validation error shown	0.6s	Successful

Summary: 7/7 passed (100%), average response 1.0s, 0% error rate.

System Performance Evaluation

Table 4.Performance Comparison and Cross-Platform Testing

NO	Metric	Manual System	Digital System	Improvement
1	Submission time	15-30 minutes	2-3 minutes	83-90% faster
2	Delivery to officer	1-3 days	Real-time (< 1s)	99.9% faster
3	Tracking accuracy	~60% (paper loss)	100% (digital)	+40% accuracy
4	Response time	3 days	4.2 hours	97% faster
5	Data retrieval	10-30 minutes	1.2 seconds	9.9% faster
6	**Cross-Platform**	**Device/Browser**	**Load Time**	**Functionality**

7	Desktop	Chrome/Firefox/Edge	1.1-1.3s	All work
8	Tablet	iPad Safari	1.4s	All work
9	Mobile	iPhone/Android	1.5-1.6s	All work

User Satisfaction (SUS): Students 82.0, Officers 77.5, Admins 76.0 → Overall 78.5/100 (Good)

DISCUSSION

Interpretation of Findings

The development and implementation of the Web-Based Student Complaint Information System successfully addressed inefficiencies present in manual reporting processes. Compared to traditional methods such as verbal reports and paper-based forms, the web-based system enabled faster complaint submission, accurate tracking, and improved transparency between students, officers, and administrators. The inclusion of multi-user role management ensured accountability by clearly separating responsibilities for each user type.

From a technical perspective, system performance testing using Apache JMeter demonstrated an average response time of 1.2 seconds and stable performance with 150 concurrent users, validating that the platform can handle real-time complaint processing effectively. Functional testing also confirmed 100% accuracy across seven key test scenarios, while the usability score of 78.5/100 indicated positive user acceptance. These results affirm that the system achieves its intended goals of efficiency, responsiveness, and transparency in digital complaint handling.

Relationship to Literature

The findings of this study are consistent with previous research that explored digital transformation in educational complaint systems. Studies by (Yudhistira et al. 2024) and (Bulu and Lede 2024) demonstrated that web-based complaint systems improve communication accuracy and facilitate better monitoring through dashboard visualizations. Similarly, (Rizal and Eka 2025) found that digital complaint systems enhance accountability and transparency in public service delivery through automation and workflow tracking.

However, this study extends prior work by integrating multi-user role management with an interactive statistical dashboard, allowing simultaneous monitoring by students, teachers, and administrators. Unlike previous systems that were limited to single-user submissions or static reports, the proposed system supports real-time analytics and cross-role coordination, marking a notable step forward in educational information systems. This

integration provides a practical framework for data-driven decision-making and institutional responsiveness.

Limitations of the Study

Despite achieving strong functional performance, several limitations were identified. First, the system was tested in a controlled environment with limited user samples; therefore, scalability across larger or multi-school deployments has yet to be validated. Second, although the system delivers stable performance, further load testing is needed to measure performance under higher user volumes and extended server uptime conditions. Third, the interface could benefit from additional usability testing with diverse participants to enhance accessibility and user satisfaction. Future research should focus on:

1. Mobile compatibility, by developing a companion mobile app to facilitate real-time access and notifications.
2. AI-driven analytics, incorporating machine learning to automate complaint categorization, sentiment detection, and trend prediction.
3. Cross-institutional integration, enabling data sharing between schools and education offices for broader policy evaluation.
4. Enhanced security protocols, including penetration testing and continuous monitoring to safeguard student data.

Implications

The outcomes of this research contribute not only to software engineering but also to the broader goal of educational digital transformation. The system provides a model for digital governance in schools, demonstrating how web-based complaint systems can enhance institutional accountability, transparency, and evidence-based management. Implementation of similar systems across educational units can support national initiatives toward smart education ecosystems, aligning with Indonesia's digital transformation roadmap.

By integrating structured workflows, statistical dashboards, and multi-user collaboration, the system advances the modernization of school administration and encourages data-driven policy formulation to improve student welfare and institutional trust.

CONCLUSION

This research successfully developed a Web-Based Student Complaint Information System equipped with multi-user roles and an interactive activity dashboard using the Laravel 9 framework. The system effectively improved the efficiency, transparency, and accountability of complaint handling processes within educational institutions. Empirical testing confirmed full functional accuracy, stable performance (average response time of 1.2 seconds under 150 concurrent users), and positive usability feedback (SUS score 78.5/100). These outcomes demonstrate that the system significantly enhances the speed and reliability of complaint management compared to traditional manual methods.

Beyond its technical success, this study contributes to educational management research by presenting a replicable model for digital governance in schools. Through the integration of multi-user role separation, real-time statistical dashboards, and systematic Waterfall-based development, the system establishes a framework for transparent, data-driven decision-making in academic administration. This integration strengthens institutional accountability and promotes the adoption of digital transformation practices within the education sector.

For future work, several directions are recommended:

1. Mobile application development to enable real-time access and notifications for users.
2. AI-based analytics to support automatic complaint categorization and trend prediction.
3. Cross-school implementation to evaluate system scalability and its potential for informing broader education policy.

In summary, the study not only delivers a functional and efficient complaint management tool but also lays a foundation for continuous digital innovation in school administration and evidence-based educational governance.

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