

Design and Development of a Web-Based Student Discipline Evaluation Information System Using a Research and Development Approach

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Abstract—Student discipline management is an essential component of educational administration that supports the creation of a conducive learning environment. However, disciplinary management at SMA Negeri 2 Cikarang Selatan was previously conducted manually using notebooks and spreadsheet applications, resulting in data redundancy, inaccurate calculation of violation points, delays in report generation, and difficulties in monitoring students' disciplinary records. This study aims to design and develop a Web-Based Student Discipline Evaluation Information System to improve the efficiency, accuracy, and transparency of disciplinary management. The study employed the Research and Development (R&D) approach, which consisted of needs analysis, system design, system development, implementation, and system evaluation. The proposed application was developed using PHP and MySQL and integrated several functional modules, including user authentication, student data management, violation recording, automatic point calculation, report generation, and user management. Functional evaluation was conducted using the Black-Box Testing method to verify that each module operated according to the specified requirements. The evaluation results indicated that all functional modules performed successfully without significant errors, demonstrating that the developed system satisfied the identified functional requirements. Compared with the previous manual procedure, the proposed system improved administrative efficiency, enhanced data accuracy through automated point calculation, facilitated faster report generation, and increased accessibility to disciplinary information through a centralized web-based platform. The developed system also strengthened communication among administrators, teachers, guidance counselors, and student guardians by providing accurate and timely disciplinary information. Therefore, the proposed Web-Based Student Discipline Evaluation Information System can serve as an effective digital solution for modernizing student discipline management and supporting evidence-based decision-making in educational institutions.

Keywords: Student Discipline Evaluation; Web-Based Information System; Research And Development; Discipline Management; Educational Information System.

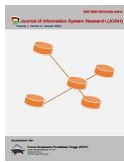
1. INTRODUCTION

Student discipline is an essential component of educational management because it supports the creation of a conducive learning environment, strengthens students' sense of responsibility, and contributes to the achievement of educational objectives. Schools are expected to establish disciplinary policies that are implemented consistently to encourage positive student behavior and improve academic performance. One of the most widely adopted approaches is the implementation of a violation point system, where each disciplinary violation is assigned a specific score according to its level of severity. The accumulated points are then used as the basis for evaluating student discipline and determining appropriate guidance or sanctions. Previous studies have demonstrated that web-based student discipline information systems improve the efficiency of recording disciplinary violations, facilitate monitoring activities, and support better administrative processes within schools [1], [2]. Furthermore, the successful implementation of disciplinary point systems depends not only on technological support but also on the effectiveness of guidance and counseling services as well as students' compliance with school regulations [3], [4].

Student discipline is influenced by numerous internal and external factors. Active parental involvement has been identified as an important factor in encouraging responsible student behavior and reducing disciplinary problems. Schools that establish effective communication with parents generally achieve better disciplinary outcomes because behavioral issues can be addressed collaboratively [5]. Likewise, consistent enforcement of school regulations contributes significantly to reducing both traditional and cyber-related disciplinary violations among students [6]. Effective leadership from school administrators also plays a vital role in establishing a positive disciplinary culture by promoting responsibility, accountability, and character development throughout the school environment [7]. These findings indicate that effective discipline management requires collaboration among teachers, school administrators, students, and parents rather than relying solely on disciplinary sanctions.

Modern web-based applications enable educational institutions to manage information in real time, reduce manual administrative work, and improve decision-making processes through centralized data management. The integration of Application Programming Interfaces (APIs) also facilitates communication between different information systems, while modern web development approaches provide scalable and user-friendly applications that support educational administration more effectively [8], [9].

Despite these technological advancements, many schools continue to manage disciplinary records manually using paper documents or spreadsheet applications. Such conventional practices frequently result in duplicate



records, calculation errors, delays in report preparation, and difficulties in monitoring students' disciplinary histories. To overcome these limitations, several studies have proposed the development of web-based disciplinary information systems. Martadina and Aslamiyah developed a web-based student offense recording system using the Waterfall method to improve administrative efficiency [10]. Mustika et al. integrated a decision support mechanism based on the SMART method to evaluate student violations and achievements objectively [11]. Putra and Jemakmun applied the Agile development methodology to build an electronic violation point application that enhanced system flexibility and development efficiency [12]. Novianti et al. also developed a web-based student violation recording system using the CodeIgniter framework, demonstrating improvements in data management accuracy and reporting effectiveness [13].

The success of educational information systems is strongly influenced by the software development methodology employed during system development. Waterfall remains one of the most widely used methods because it provides systematic development stages, comprehensive documentation, and easier project control [14], [15]. In addition, modern web technologies, including Progressive Web Applications (PWA), have expanded the capabilities of educational information systems by providing better accessibility, responsiveness, and cross-platform compatibility [16]. These technological developments enable schools to implement integrated information systems that are more efficient and easier to maintain.

Recent studies have shown significant progress in the development of student discipline information systems. Livamianti et al. introduced SIMPONIS, a web-based student violation point information system equipped with an early warning feature to improve monitoring efficiency and transparency [17]. Krisfianto and Indahyanti demonstrated that real-time notification technology enhances communication between schools and parents while improving disciplinary monitoring [18]. Similarly, Kiswara and Syidada developed a student violation point information system using the CodeIgniter framework that successfully improved data accessibility and management efficiency [19]. These studies confirm that web-based information systems can substantially improve discipline management compared with conventional administrative approaches.

Although previous studies have successfully developed digital disciplinary management systems, several limitations remain. Most existing systems primarily emphasize violation recording and point calculation, while relatively few provide comprehensive discipline evaluation, integrated reporting, centralized data management, and structured system development using a research-oriented approach. Moreover, some studies focus only on software implementation without emphasizing the complete process of identifying user needs, designing, developing, validating, and evaluating the resulting application. Therefore, there remains an opportunity to develop a more comprehensive student discipline evaluation information system that integrates administrative management, automated evaluation, reporting, and stakeholder access within a single web-based platform.

This study addresses these limitations by designing and developing a Web-Based Student Discipline Evaluation Information System using the Research and Development (R&D) approach. Unlike previous studies, the proposed system integrates student data management, violation recording, automatic point calculation, discipline evaluation, report generation, and role-based user management into one centralized application. The Research and Development approach ensures that the system is developed systematically through the stages of needs analysis, design, development, implementation, and evaluation. Furthermore, the proposed system is expected to improve efficiency, transparency, accuracy, and accessibility in managing student disciplinary information while supporting evidence-based decision-making within educational institutions.

The development of web-based educational systems has also been widely implemented in various educational domains beyond discipline management. Previous studies have reported successful applications of web-based information systems using the Waterfall model [20], online information systems utilizing PHP and MySQL [21], Android-based educational applications that improve student engagement [22], web-based school support systems for student well-being [23], and educational technology platforms that enhance learning participation [24]. These findings demonstrate the broad potential of digital technology to improve educational services and strengthen school management.

Based on the identified research gap, the objective of this study is to design, develop, and evaluate a Web-Based Student Discipline Evaluation Information System using the Research and Development approach. The proposed system is expected to improve the effectiveness of disciplinary management, simplify administrative processes, enhance communication among stakeholders, and contribute to the advancement of educational information systems through an integrated and user-oriented web-based solution.

2. RESEARCH METHODOLOGY

2.1 Research Method

This study employed the Research and Development (R&D) approach to design, develop, and evaluate a Web-Based Student Discipline Evaluation Information System. The Research and Development approach was selected because this study aims not only to identify problems in the existing student discipline management process but also to produce a functional software application that addresses those problems. The R&D approach enables

researchers to systematically develop, test, evaluate, and refine a product based on user needs and evaluation results, making it suitable for educational information system development [9], [12], [14].

2.2 Data Collection Techniques

The research was conducted through six sequential stages using the Research and Development approach. The overall research process is illustrated in Fig. 1

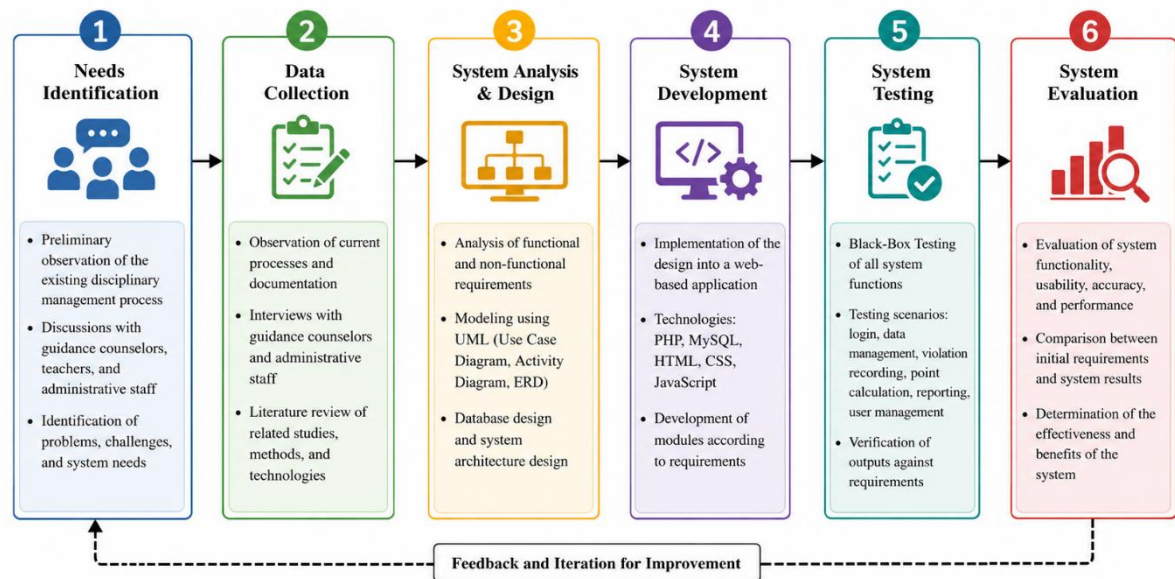


Figure. 1. Research Stages Using the Research and Development Approach

The first stage was needs identification, where preliminary observations and discussions with school personnel were conducted to identify the problems associated with manual disciplinary management. The results indicated that student violation records were still maintained using paper documents and spreadsheet applications, leading to data redundancy, calculation errors, reporting delays, and difficulties in monitoring student disciplinary histories [1], [2].

The second stage was data collection, which involved observation, interviews, and literature review. Observation was conducted to understand the existing disciplinary procedures, while interviews with guidance counselors and administrative staff were carried out to identify user requirements. In addition, scientific literature was reviewed to obtain theoretical foundations related to student discipline management, web-based information systems, software development, and educational technology [3][10][13].

The third stage was system analysis and design. Functional requirements such as login authentication, student management, violation recording, point calculation, reporting, and user management were identified. Subsequently, Unified Modeling Language (UML) diagrams and database structures were designed to describe the proposed system architecture before implementation [8], [16].

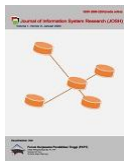
The fourth stage was system development, during which the proposed design was implemented into a web-based application using PHP and MySQL. The application integrates all student discipline management activities into a centralized information system that can be accessed by authorized users through a web browser [20][21].

The fifth stage was system testing, which employed the Black-Box Testing method to evaluate the functionality of the developed application. Testing scenarios included login authentication, student data processing, violation recording, automatic point calculation, report generation, and user management. Each function was tested to ensure that the expected outputs were produced according to the specified requirements [11][15].

The final stage was system evaluation, where the completed system was evaluated by comparing the implementation results with the identified user requirements. The evaluation focused on system functionality, usability, processing accuracy, reporting efficiency, and information accessibility. The results demonstrated that the developed application successfully improved the effectiveness and efficiency of student discipline management while reducing administrative workloads and supporting better decision-making [17], [18], [19].

2.3 System Development

Data collection was conducted to obtain comprehensive information regarding the existing disciplinary management process and to identify user requirements. Three data collection techniques were employed in this study: observation, interviews, and literature review.



Observation was conducted directly to examine how student disciplinary records were managed, including the procedures for recording violations, calculating violation points, and preparing disciplinary reports. Interviews were conducted with guidance counselors and administrative staff to identify operational challenges and determine the expected functionality of the proposed system. Furthermore, a literature review was carried out by examining previous studies related to student discipline management systems, web-based applications, software engineering, and educational information systems to strengthen the theoretical foundation of the research [1], [2], [17].

2.4 System Development

The proposed information system was developed using PHP as the server-side programming language and MySQL as the database management system. These technologies were selected because they are reliable, open-source, and widely used for web application development. The developed application integrates student data management, violation recording, automatic point calculation, report generation, and user management into a centralized web-based platform. Role-based access control was implemented to ensure that administrators, teachers, and authorized users could access system functions according to their respective responsibilities [9], [20], [21].

2.5 System Testing

System testing was performed using the Black-Box Testing method to verify that every function of the developed application operated according to the specified functional requirements. The testing process evaluated login authentication, student management, violation recording, automatic point calculation, report generation, and user management without examining the internal source code. The testing results confirmed that all major system functions operated successfully and produced outputs consistent with user requirements. Therefore, the developed system is considered capable of supporting student discipline evaluation and improving administrative efficiency within educational institutions [11], [15], [17].

3. RESULT AND DISCUSSION

3.1 System Development Results

The Web-Based Student Discipline Evaluation Information System was developed to overcome the limitations of the conventional discipline management process at SMA Negeri 2 Cikarang Selatan. Previously, disciplinary activities relied on notebooks and spreadsheet applications, resulting in duplicated records, inaccurate calculation of violation points, delays in report preparation, and difficulties in monitoring repeat offenders. Similar challenges have been reported in previous studies, where manual disciplinary management reduced administrative efficiency and data accuracy [1], [2].

To address these issues, a web-based information system was developed using the Research and Development (R&D) approach. The system integrates disciplinary management into a centralized platform that enables administrators, guidance counselors, teachers, and student guardians to access information according to their respective roles. This centralized approach is expected to improve data consistency, reduce administrative workloads, and support more effective disciplinary management [17], [18].

System development began with requirement analysis through observations and interviews with school personnel. The identified requirements included user authentication, student data management, violation management, automatic point calculation, report generation, and user administration, providing the basis for system design and implementation [9][10].

The application was implemented using PHP and MySQL as open-source technologies to provide a reliable and centralized web-based platform accessible through standard web browsers. Similar technologies have been widely adopted in educational information systems because of their flexibility, scalability, and ease of maintenance [20], [21].

The developed application integrates several functional modules, including authentication, student data management, violation recording, automatic point calculation, report generation, and role-based user management. Among these, automatic point calculation represents a major improvement by eliminating manual calculations, reducing computational errors, and ensuring consistent disciplinary evaluation. This finding is consistent with previous studies highlighting the benefits of automation in educational information systems [11], [12].

Another important contribution is the implementation of a centralized relational database, which improves data integrity, eliminates duplicate records, and enables efficient retrieval of disciplinary information. Similar results have been reported by Livamianti et al. [17], who emphasized the role of centralized information systems in improving administrative transparency and operational efficiency.

The system also enhances communication among stakeholders. Teachers can record violations immediately, guidance counselors can monitor disciplinary histories more efficiently, administrators can generate reports automatically, and parents can access updated disciplinary information. These improvements strengthen collaboration between schools and parents, supporting previous findings on the importance of stakeholder involvement in student discipline management [3][5].

Overall, the implementation demonstrates that the proposed Web-Based Student Discipline Evaluation Information System fulfills the identified functional requirements. By integrating web technology, centralized database management, automated disciplinary evaluation, and reporting functions, the system improves administrative efficiency, transparency, accessibility, and data accuracy, providing an effective digital solution for evidence-based student discipline management in educational institutions [18], [19], [23].

3.2 System Implementation and Testing

Following the successful completion of the system development process, the proposed Web-Based Student Discipline Evaluation Information System was implemented and deployed to support daily disciplinary management activities at SMA Negeri 2 Cikarang Selatan. The implementation stage transformed the system design into a functional web application that integrates student discipline evaluation, violation recording, reporting, and user management within a centralized database environment. The application was developed using PHP and MySQL and can be accessed through standard web browsers, allowing authorized users to perform their respective responsibilities efficiently. The implementation results demonstrate that all major functionalities operate as intended and provide practical support for improving administrative performance.

3.2.1 Login Interface

The authentication interface of the developed application is presented in **Figure 2**. This interface was designed to ensure that only authorized users can access the information system according to their respective access privileges.

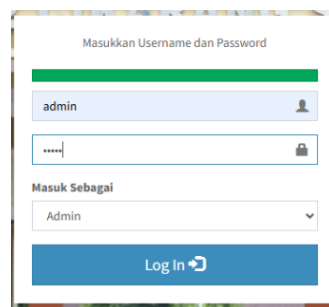


Figure 2. Login Interface

As shown in Figure 2, users are required to enter a valid username and password before entering the system. After the authentication process is completed successfully, the application verifies the user's credentials against the database and automatically redirects the user to the appropriate dashboard according to the assigned role. If invalid credentials are entered, the system rejects the login request and displays an authentication warning message.

The implementation of user authentication improves the confidentiality and integrity of disciplinary information by preventing unauthorized access. In addition, role-based authentication ensures that administrators, guidance counselors, teachers, and student guardians only access functions corresponding to their responsibilities. Similar authentication mechanisms have been widely implemented in educational information systems because they improve information security and maintain the integrity of institutional databases [8][16].

3.2.2 Dashboard Interface

The main dashboard of the developed application is illustrated in **Figure 3**. The dashboard functions as the primary interface after successful user authentication and provides a comprehensive summary of student disciplinary information.

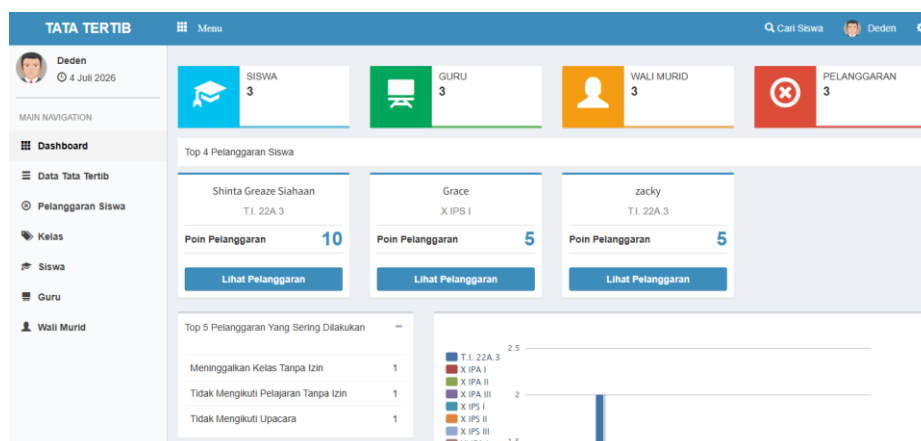
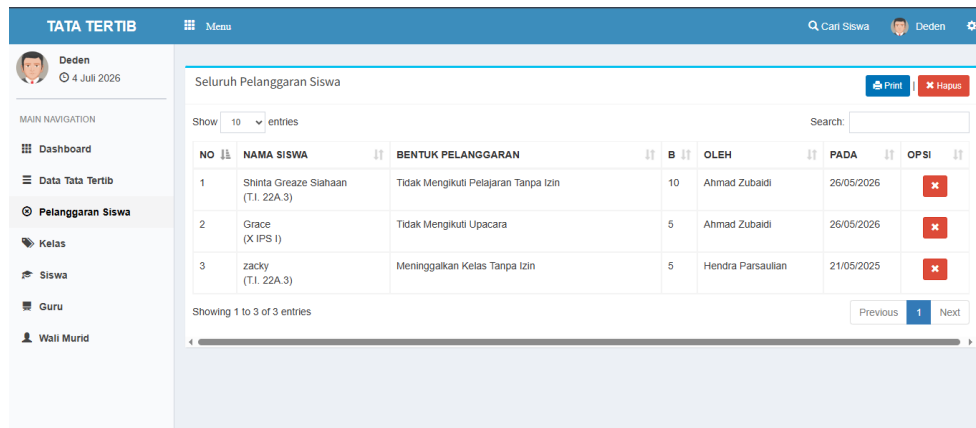


Figure 3. Dashboard Interface

As presented in Figure 3, the dashboard displays statistical summaries including the total number of registered students, total disciplinary violations, accumulated disciplinary points, and recent disciplinary activities. The dashboard also provides navigation menus that enable users to access student data, violation records, reports, and system administration efficiently.

3.2.3 Violation Data Management

The implementation of the Student Violation Management module is illustrated in Figure 5. This module represents one of the most important components of the developed application because it directly supports disciplinary monitoring activities.



NO	NAMA SISWA	BENTUK PELANGGARAN	B	OLEH	PADA	OPSI
1	Shinta Greaze Siahaan (T.I. 22A.3)	Tidak Mengikuti Pelajaran Tanpa Izin	10	Ahmad Zubaidi	26/05/2026	[X]
2	Grace (X IPS I)	Tidak Mengikuti Upacara	5	Ahmad Zubaidi	26/05/2026	[X]
3	zacky (T.I. 22A.3)	Meninggalkan Kelas Tanpa Izin	5	Hendra Parsaulan	21/05/2025	[X]

Figure 4. Violation Data Management Interface

As shown in Figure 4, teachers or guidance counselors can record student disciplinary violations by selecting predefined violation categories according to the school's disciplinary regulations. Each category has an associated disciplinary point value stored within the database. After a violation is submitted, the application automatically records the incident and updates the student's accumulated disciplinary points.

The automation implemented within this module eliminates manual calculations previously performed by school personnel, thereby reducing computational errors and ensuring consistent implementation of disciplinary policies. Users are also able to edit, review, search, and validate disciplinary records whenever necessary, improving both administrative flexibility and data accuracy. Similar approaches have been recommended in previous studies because automated violation management improves efficiency and transparency within educational institutions [2], [10], [17].

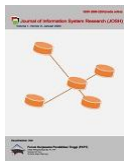
3.3 System Testing Results

Following the implementation stage, the developed Web-Based Student Discipline Evaluation Information System was evaluated using black-box testing to verify that all functional modules operated according to the predefined system requirements. Black-box testing was selected because it assesses system functionality from the user's perspective without examining the internal source code.

The evaluation covered the main system modules, including user authentication, student data management, violation management, report generation, and user management. Each module was tested using valid and invalid input scenarios to evaluate functionality, reliability, and response accuracy. Before presenting the testing results, Table 1 summarizes the functional evaluation performed on each module of the developed application.

Table 1. Black-Box Testing Results

No	Module	Test Scenario	Expected Result	Status
1	Login	Enter valid username and password	User successfully accesses the system	Pass
2	Login	Enter invalid username or password	Login is rejected and an error message is displayed	Pass
3	Student Data	Add new student data	Student data are stored successfully	Pass
4	Student Data	Edit student information	Updated information is saved correctly	Pass
5	Student Data	Delete student record	Selected record is removed successfully	Pass
6	Violation Data	Record student violation	Violation data are stored successfully	Pass
7	Violation Data	Automatic point calculation	Violation points are calculated correctly	Pass
8	Report	Generate disciplinary report	Report is displayed according to selected criteria	Pass
9	User Management	Create and update user account	User information is stored correctly	Pass



As shown in Table 4, all test scenarios produced the expected results. The authentication module successfully validated user credentials and prevented unauthorized access. The student data management module accurately handled adding, editing, searching, and deleting student records, while the centralized database maintained data consistency across the system.

The violation management module correctly stored disciplinary records and automatically updated accumulated violation points, reducing manual calculation errors. Meanwhile, the reporting module generated accurate disciplinary reports based on selected criteria, enabling administrators to obtain information more quickly than through manual reporting.

Overall, no critical functional errors were identified during testing, indicating that the application satisfies the predefined functional requirements and is reliable for operational use. These findings support previous studies showing that comprehensive functional testing enhances software reliability and user confidence before deployment.

The results demonstrate that the proposed Web-Based Student Discipline Evaluation Information System effectively supports daily disciplinary management through automated processing, centralized data management, and role-based access control, thereby improving administrative efficiency, data accuracy, and information accessibility within educational institutions.

3.4 Discussion

The findings of this study indicate that the developed Web-Based Student Discipline Evaluation Information System successfully improves the efficiency, accuracy, and transparency of disciplinary management at SMA Negeri 2 Cikarang Selatan. The integration of student management, violation recording, automatic point calculation, reporting, and role-based access control into a centralized web-based platform enables disciplinary data to be processed more systematically than the previous manual procedure.

These findings are consistent with previous studies that reported the advantages of digital discipline management systems in educational institutions. For example, Msacky et al. [5] reported that web-based student management systems improve communication among teachers, school administrators, and parents by providing timely access to student information. Similarly, the system developed in this study allows teachers to record violations directly, enables guidance counselors to monitor disciplinary status in real time, and provides parents with transparent access to student disciplinary records. This indicates that the proposed system supports collaborative disciplinary supervision in a manner consistent with previous research.

The present findings also support the study conducted by Nurreni et al. [4], which emphasized that standardized disciplinary regulations contribute to more consistent implementation of school policies. In the proposed system, every violation category is associated with predefined disciplinary points, thereby minimizing subjective judgment during evaluation and ensuring uniform implementation of school regulations. Consequently, the developed application not only digitizes disciplinary administration but also promotes fairness and consistency in disciplinary assessment.

In terms of administrative efficiency, the results are consistent with earlier studies demonstrating that web-based information systems reduce manual workload and improve data processing accuracy [1], [2], [17]. However, compared with those studies, the proposed system offers several additional capabilities. Besides recording student violations, it automatically calculates accumulated disciplinary points, stores all disciplinary data in a centralized database, generates reports, and applies role-based user authorization. These integrated features reduce administrative redundancy and improve the reliability of disciplinary information.

The findings also extend previous research on educational information systems that highlighted the benefits of centralized databases and web technologies for improving data accessibility and security [8], [17], [19]. Unlike conventional systems that often manage disciplinary records separately, the proposed application centralizes all disciplinary information into a single database that can be accessed securely by authorized users through standard web browsers. This architecture facilitates faster information retrieval while maintaining data integrity through controlled user access.

Furthermore, the successful functional testing confirms that all core modules—including authentication, student management, violation recording, reporting, and user management—performed according to the specified functional requirements without significant errors. These findings are consistent with previous software quality studies indicating that comprehensive functional testing is essential for ensuring the reliability of educational information systems [11], [15].

Despite these similarities, the proposed system provides several contributions beyond previous studies. Most earlier research focused on specific functions, such as digital violation recording or reporting. In contrast, this study integrates multiple disciplinary management functions into a unified web-based platform that supports automated point calculation, centralized information management, comprehensive reporting, and role-based authorization. Therefore, the proposed system offers a more comprehensive solution for managing student discipline while improving administrative efficiency, transparency, and data accuracy.

Compared with previous studies, the present research provides a more comprehensive evaluation of the implementation of a web-based student discipline management system. Studies by Triansyah et al. [1], Wulandari and Farell [2], Livamianti et al. [17], Krisfianto and Indahyanti [18], and Kiswara and Syidada [19] primarily



demonstrated that web-based systems improve violation recording, monitoring, reporting, and communication among stakeholders. The findings of this study are consistent with those results, as the developed system also improves administrative efficiency, transparency, and accessibility through centralized information management. However, unlike previous studies, this research integrates student management, automatic disciplinary point calculation, centralized reporting, and role-based user management within a single platform while evaluating its implementation in the operational environment of SMA Negeri 2 Cikarang Selatan. The implementation results confirm that the proposed system successfully addresses practical problems identified during the preliminary study, including duplicate records, delayed reporting, inaccurate point calculation, and difficulties in monitoring accumulated disciplinary points in real time. Therefore, this study not only confirms previous findings but also extends the existing literature by providing empirical evidence that a comprehensive web-based discipline evaluation system can improve administrative efficiency, data accuracy, transparency, and evidence-based decision-making in educational institutions.

Overall, the comparison with previous studies demonstrates that the findings of this research are consistent with existing literature while extending previous work through the integration of multiple disciplinary management functions into a single web-based information system. This integration provides practical benefits for educational institutions seeking to modernize disciplinary administration and strengthen evidence-based decision-making.

4. CONCLUSION

This study successfully designed and developed a Web-Based Student Discipline Evaluation Information System using the Research and Development (R&D) approach to improve the discipline management process at SMA Negeri 2 Cikarang Selatan. The developed system integrates several essential functions, including user authentication, student data management, violation recording, automatic point calculation, report generation, and user management within a centralized web-based platform. The implementation of these integrated features addresses the limitations of the previous manual disciplinary management process, which was characterized by data redundancy, delayed reporting, and inaccuracies in calculating disciplinary points. The system evaluation results demonstrated that all functional modules operated according to the specified requirements. The implementation of automated point calculation reduced the possibility of human error, while centralized database management improved data consistency, accessibility, and administrative efficiency. Furthermore, the reporting module enabled school administrators and guidance counselors to generate disciplinary reports more quickly and accurately, supporting evidence-based decision-making. The adoption of role-based access control also enhanced data security by ensuring that users could only access information relevant to their responsibilities. Overall, the developed information system contributes to improving the effectiveness, transparency, accuracy, and efficiency of student discipline management. The system also facilitates collaboration among administrators, teachers, guidance counselors, and student guardians by providing timely and reliable disciplinary information through a web-based platform. Although the proposed system has demonstrated satisfactory performance, this study was conducted within a single educational institution. Future research is recommended to evaluate the implementation of the system in different schools with larger user populations. Additional features, such as mobile application support, real-time notification services, dashboard-based analytics, and integration with other academic information systems through Application Programming Interfaces (APIs), may further enhance the effectiveness and scalability of the proposed system.

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