

---

## Academic Information System at SD Negeri 1 Sidomakmur Using the Web Engineering Method

---

Imam Hasyah Frans<sup>1\*</sup>

### Abstract

The management of students, teachers, and learning activities at SD Negeri 1 Sidomakmur has been partially computerized. However, the school continues to rely on basic applications such as Microsoft Word and Excel for administrative tasks. Considering the rapid advancement of digital technology, it is essential for SD Negeri 1 Sidomakmur to implement a specialized web-based information system to support administrative and academic operations more efficiently. The proposed system enables seamless data processing and integration across all school activities, thereby facilitating faster and more accurate management of teaching and learning processes. This study aims to develop a web-based academic information system utilizing the Web Engineering method, the PHP programming language, and the MySQL database. The implementation of this system is expected to enhance the effectiveness, accuracy, and reliability of the school's administrative and academic management.

### Keywords

Academic Information  
System, Software  
Engineering, Web  
Engineering

### Article History

Received 01 August 2023

Accepted 30 October 2023

### How to Cite

Frans, I, H. (2023). Academic Information System at SD Negeri 1 Sidomakmur Using the Web Engineering Method. Jurnal Ilmu Komputer dan Sistem Informasi (JIKSI), 4(3), [86-92].

---

<sup>1\*</sup> Universitas Bina Darma, Indonesia, Corresponding email: imamhasyah97@gmail.com

## **Introduction**

The rapid advancement of information and communication technology (ICT) has fundamentally transformed how educational institutions manage academic and administrative data. Technology has become an indispensable component of modern education management, enabling schools to streamline workflows, maintain data accuracy, and enhance service quality. Digitalization not only supports administrative efficiency but also strengthens transparency, accountability, and decision-making within educational environments. As technology continues to evolve, even small-scale institutions are encouraged to adopt computerized systems that align with national education digitalization initiatives and the broader vision of a data-driven education system.

SD Negeri 1 Sidomakmur, as a public elementary school, has begun implementing basic forms of computerization in its administrative and teaching activities. The institution currently employs nine teachers and serves 257 students as of 2020. While these figures indicate a relatively modest institutional scale, the administrative workload associated with student registration, grading, attendance, and reporting remains considerable. At present, the school still relies heavily on Microsoft Word and Excel for data management. Although these general-purpose tools offer flexibility, they lack the structure and automation required for complex data relationships, version control, and multi-user access. As a result, the risk of data redundancy, inconsistencies, and loss remains high—particularly when administrative tasks are handled manually or distributed across multiple files.

Given these operational challenges, the development of a dedicated Academic Information System (AIS) is crucial for SD Negeri 1 Sidomakmur. A properly designed AIS can centralize administrative data, automate repetitive processes, and facilitate faster information retrieval. Through digital integration, teachers can manage grades, attendance, and reports within a unified database, while administrators gain real-time access to institutional data for decision-making. Such a system also supports data integrity, reduces human error, and minimizes dependency on physical documentation. More importantly, it provides a sustainable foundation for the school's ongoing digital transformation, aligning with current trends in smart education and e-governance within Indonesia's public education sector.

The development of an AIS requires a methodological framework that ensures system quality, usability, and maintainability. In this study, the Web Engineering (WE) approach is employed as the primary development methodology. Web Engineering emphasizes a structured and systematic process that integrates principles of software engineering with the unique requirements of web-based applications. It includes stages such as requirements analysis, design, implementation, testing, and maintenance, ensuring that the resulting system is robust, scalable, and user-centered. This approach is particularly suitable for small and medium-sized educational institutions, as it allows for iterative development and adaptation to user feedback throughout the system lifecycle.

In the context of data management, the transition from manual to computerized systems represents a strategic move toward improving administrative productivity. Traditional, paper-based data management is increasingly recognized as inefficient due to its high demand for time, labor, and physical storage. Moreover, manual data handling often results in difficulties during record retrieval, potential document loss, and inconsistent reporting structures. Even institutions that have adopted partial digitalization—such as spreadsheet-based management—face limitations in terms of data sharing, concurrent access, and security. Thus,

integrating a comprehensive web-based system is necessary to meet both operational and technological standards in the digital era.

Among various technological options available, web-based information systems have emerged as the most practical solution due to their scalability, accessibility, and flexibility. These systems enable users—including administrators, teachers, and students—to access academic data anytime and anywhere through an internet-connected device. As noted by Putri, Dahlia, and Fikri (2021), web-based information systems facilitate efficient data dissemination and provide equitable access to institutional information for all stakeholders. Implementing such a system at SD Negeri 1 Sidomakmur would not only enhance administrative efficiency but also strengthen the school's capacity to engage with parents and the wider community. Ultimately, this initiative supports the broader goal of fostering a digitally responsive and transparent educational environment capable of adapting to the evolving demands of the 21st-century learning ecosystem.

## **Methodology**

This research employed a quantitative approach. According to Donmoyer (as cited in Given, 2008), quantitative research is an empirical method designed to collect, analyze, and present data numerically rather than narratively.

### ***Data Collection Methods***

The data collection methods applied in this study include interviews, literature review, and observation (Putri et al., 2021).

1. Interview Data were collected through direct interviews with the administrative staff of SD Negeri 1 Sidomakmur to obtain insights into existing management systems and administrative workflows.
2. Literature Review Relevant literature, books, and journal articles were reviewed to gather theoretical foundations and methodological guidance for designing and developing the proposed system. The reviewed sources are cited in the References section.
3. Observation Field observations were conducted to examine actual conditions and identify specific problems in the school's academic data management processes. Data related to planning mechanisms and existing workflows were collected for analysis and system design.
4. System Development Method The Web Engineering method was employed for system development. According to Pressman (2005), Web Engineering is a systematic approach used to develop web-based applications. While sharing conceptual similarities with Software Engineering (Rekayasa Perangkat Lunak), Web Engineering focuses more on web-specific management and technical aspects.

The Web Engineering process includes several key stages:

1. Customer Communication Effective communication with users is crucial to accurately identify and translate their needs into system requirements (Sains et al., 2018).

2. Planning This stage integrates information and feedback from both users and engineers. It identifies necessary hardware and software components and defines the project's scope and objectives (Sains et al., 2018).
3. Modeling consists of two major components: analysis modeling and design modeling.
  - Analysis Modeling: Identifies system interactions, user access rights, and functional requirements. It also determines the software and hardware environments suitable for implementation.
  - Design Modeling: Includes conceptual, logical, and physical database design; content and navigation structure; and interface aesthetics. The design ensures the application's usability and alignment with the institution's objectives.
4. Construction The implementation phase involves coding using HTML for web structure and PHP for dynamic functionality. Testing is performed to detect and resolve potential errors in scripts, forms, navigation, and interfaces.
5. Delivery and Feedback Upon completion, the system is evaluated through user feedback gathered via questionnaires focusing on usability, functionality, and reliability. The feedback informs necessary revisions and enhancements.

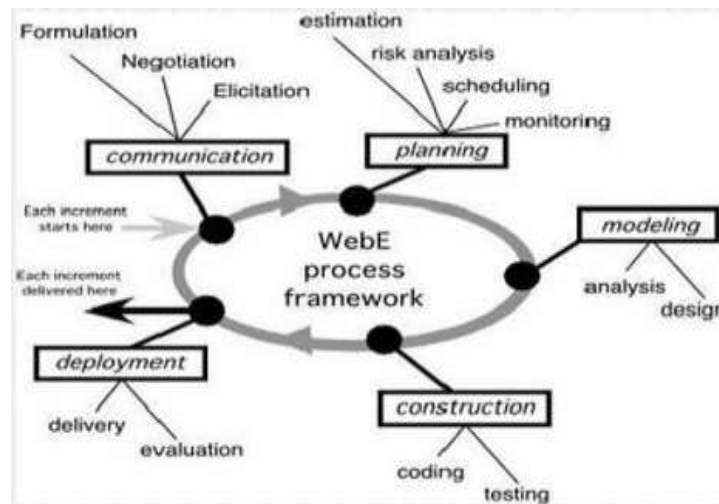


Figure 1. Web Engineering Process Framework

## Results

The study resulted in the development of a web-based academic information system for SD Negeri 1 Sidomakmur. This online platform serves as an integrated medium for teachers and students to manage academic information effectively. Teachers can view lesson plans (Rencana Pelaksanaan Pembelajaran or RPP) and input student grades directly through the system.

The system simplifies course scheduling and eliminates the need for manual administrative tasks. It also provides an intuitive interface that adjusts according to user roles, such as administrator, teacher, or student.



Figure 2. Login Menu



Figure 3. Student Menu Interface

The developed academic information system enhances efficiency and accuracy in managing educational activities and contributes to improving the quality of teaching and learning processes at SD Negeri 1 Sidomakmur.

## Discussion

The implementation of the web-based Academic Information System (AIS) at SD Negeri 1 Sidomakmur provides clear evidence of the effectiveness of the Web Engineering (WE) approach in developing integrated and sustainable educational management software. The WE methodology enabled the development team to apply a structured framework—comprising systematic stages such as requirements analysis, design modeling, implementation, testing, and maintenance—that ensured consistency between user expectations and system outcomes. The process also emphasized modularity, documentation, and iterative validation, allowing the system to evolve in response to real user feedback. This structured yet flexible design approach resulted in a system that is not only functionally robust but also scalable and adaptable to future institutional needs.

The modular architecture of the system plays a pivotal role in supporting scalability and maintainability. Each module—such as student data management, grade processing, and teacher records—was developed as a semi-independent unit that can be enhanced or replaced without affecting the entire system. This modularity provides room for future integration of advanced features, including attendance monitoring, student performance analytics, or even communication dashboards for parent-teacher interaction. As digital education continues to expand, such modular extensibility ensures that the system remains relevant and capable of integrating new functionalities aligned with national education digitalization programs.

Furthermore, the user-centered development process adopted within the Web Engineering framework ensures that system functionality closely aligns with the school's actual operational workflows. During the analysis and design stages, the development team actively collaborated with school administrators and teachers to identify pain points in existing manual processes—such as difficulties in managing grades, attendance, and report generation. This participatory approach ensured that each feature addressed a concrete need rather than serving as a purely technical innovation. As a result, the developed AIS automates essential administrative functions, reduces manual workloads, minimizes human error, and improves data accessibility across the institution.

One of the most significant advantages of this system lies in its web-based architecture, which supports real-time data synchronization and broad accessibility for authorized users. Administrators, teachers, and potentially even parents can access information securely from any internet-connected device without being limited by time or location. This design not only facilitates faster decision-making but also enhances transparency and accountability in academic administration. Compared with traditional desktop-based systems, the web-based platform significantly reduces the risk of data loss caused by local hardware failures while improving information-sharing capabilities between users. This aligns with Putri, Dahlia, and Fikri (2021), who emphasize that web-based systems enable efficient information dissemination and promote equitable access among education stakeholders.

From an operational perspective, the system demonstrates substantial efficiency gains. Processes that once required manual data entry and paper-based archiving can now be completed digitally in a fraction of the time. Teachers can input and update grades directly into the system, and administrative staff can instantly generate reports or student records. The shift from manual to automated processing not only improves productivity but also enhances the overall accuracy and reliability of school data. Additionally, the integrated database structure ensures consistency across modules, reducing redundancy and maintaining data integrity. This improved efficiency directly supports the broader objective of enhancing educational governance through digital innovation.

Ultimately, the findings of this study underscore the feasibility and impact of adopting affordable, web-based academic systems in small educational institutions. The successful implementation at SD Negeri 1 Sidomakmur illustrates that even schools with limited resources can leverage technology to improve administrative management and service delivery. Such systems contribute to Indonesia's ongoing digital transformation in education, supporting national efforts to modernize school management through accessible and context-appropriate ICT solutions. As recommended by Putri et al. (2021), expanding digital platforms across the education sector can enhance transparency, efficiency, and equity in information access. In the long term, the system developed through this project can serve as a model for



similar schools seeking to implement low-cost, sustainable digital infrastructures that align with the goals of Education 4.0 and Smart School initiatives.

### **Conclusion and Recommendations**

Based on the findings and analysis, the following conclusions are drawn: The development of a web-based academic information system has significantly improved the efficiency of academic and administrative data management at SD Negeri 1 Sidomakmur. The system facilitates teachers' instructional activities by providing digital access to lesson plans and enabling direct entry of student performance data. The application of the Web Engineering method ensures a structured, systematic, and user-oriented approach to system design and implementation, resulting in enhanced functionality, usability, and reliability.

### **Disclosure Statement**

The authors declare no potential conflicts of interest concerning the research, authorship, or publication of this article.

### **Acknowledgments**

The authors express sincere gratitude to SD Negeri 1 Sidomakmur, Universitas Bina Darma, and the Faculty of Computer Science for their support, cooperation, and guidance throughout the research and development process.

### **References**

- Donmoyer, R. (2008). In Given, L. M. (Ed.), *The SAGE Encyclopedia of Qualitative Research Methods*. SAGE Publications
- Pressman, R. S. (2005). *Software Engineering: A Practitioner's Approach*. McGraw-Hill
- Putri, E. M., Dahlia, & Fikri, M. H. (2021). Web-based management information system for asset inventory complaints at the Financial Agency. *Jurnal Sains dan Informatika*, 7(1), 23–28. <https://doi.org/10.22216/jsi.v7i1.311>.
- Sains, A., Yang, T., Lingkungan, B., Daya, P., & Yogyakarta, S. B. (2018). *Proceedings of the National Seminar on Applied Science and Technology*.
- Sutresna, J. (2017). *Design of an Online Funeral Service Form System Using the Web-Based*

---

### **Biographical Notes**

**IMAM HASYAH FRANS** is a researcher at the Department of Informatics Engineering, Universitas Bina Darma, Palembang, Indonesia. His research focuses on web-based systems, information management, and software engineering methodologies.