Academic Information System at SMA PGRI 2 Palembang Using the Web Engineering Method

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Abstract

SMA PGRI 2 Palembang is a private senior high school accredited "A," located on Jendral Ahmad Yani Street, Gotong Royong Alley, 9/10 Ulu Subdistrict, Seberang Ulu 1, Palembang City. At this school, academic activities particularly the management of student report cards are still conducted manually (offline). Although such offline management practices are still common among educational institutions below the tertiary level, the rapid advancement of information technology has encouraged schools to adopt systems similar to those implemented in higher education institutions. To enhance efficiency and accuracy in academic data processing, this study proposes the development of an Academic Information System (AIS) specifically designed for managing student report cards online. The system is developed using the Web Engineering method, which ensures a structured, scalable, and user-centered design process. Implementing an online academic information system offers several advantages, including streamlined data management, better data integration, and the creation of a centralized academic information hub. The resulting web-based system enables teachers to input grades and students to access their report cards anytime and anywhere, significantly improving the effectiveness and transparency of academic administration at SMA PGRI 2 Palembang.

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Introduction

Education represents the cornerstone of national development and plays a pivotal role in shaping the quality of human resources. A nation's progress depends heavily on its ability to cultivate competent, creative, and technologically literate citizens who can respond to the demands of an increasingly interconnected world. As technology advances rapidly in the era of globalization, the nature of information has become more complex, dynamic, and easily disseminated across various sectors. This transformation compels the education system to continually adapt and integrate technology into its teaching and administrative frameworks. Educational institutions must therefore leverage innovations in computer-based and information systems to enhance efficiency, accessibility, and transparency in their operations.

The internet has emerged as an indispensable medium for communication, information exchange, and service delivery across different levels of society. Among the various internet-based technologies, the website remains one of the most effective tools for disseminating information quickly, accurately, and interactively. Within educational contexts, web-based platforms not only facilitate the distribution of academic information but also support administrative management and stakeholder engagement. Developing such platforms requires structured, disciplined methodologies to ensure that system design aligns with user needs and institutional objectives. One of the most widely adopted frameworks for this purpose is Web Engineering (WE), an extension of software engineering principles that emphasizes systematic processes, quality assurance, user-centric design, and continuous improvement throughout the development lifecycle.

The integration of information systems in education has profoundly transformed how institutions manage data, deliver content, and interact with students, parents, and teachers. An Academic Information System (AIS) serves as a centralized platform for managing academic records, faculty information, scheduling, and extracurricular activities. By digitizing these functions, AIS enables users to access information swiftly and reliably, supporting not only administrative operations but also teaching and learning processes. However, despite the proliferation of such systems in Indonesian schools, their potential is often underutilized due to limited functionality, lack of technical expertise, or inadequate adaptation to user requirements. This underutilization hinders the broader goals of digital transformation in education.

At SMA PGRI 2 Palembang, the adoption of an academic information system has been initiated but remains partial in scope. While certain administrative features have been implemented, core academic components—such as report card (grade) management—are still handled conventionally. Students can only view their grades once printed report cards are distributed by the school. This manual approach creates several inefficiencies, including delays in information dissemination, limited accessibility for students and parents, and increased administrative workload for teachers. Moreover, in today's digital era, such practices are no longer aligned with the expectations of immediacy, transparency, and online accessibility that define modern education management.

Recognizing these limitations, there is a pressing need for a web-based academic information system that can automate and digitize report card management processes. Such a system would enable teachers to input student grades directly through a secure online interface, while students and parents could access academic results anytime and anywhere. Beyond improving operational efficiency, the system would also strengthen communication between

the school and its stakeholders by providing real-time academic updates. Furthermore, the digitization of report card data contributes to data integrity and serves as a foundation for future analytical developments, such as performance tracking and data-driven decision-making in education.

Based on these considerations, this study aims to develop an Academic Information System (AIS) for SMA PGRI 2 Palembang using the Web Engineering method. The use of Web Engineering ensures that the system is developed through structured phases of requirement analysis, design, implementation, and testing, resulting in a robust, scalable, and user-friendly application. The research focuses on enhancing accessibility, data accuracy, and workflow efficiency while ensuring that the system's functionalities align with the real needs of teachers, students, and school administrators. Ultimately, this project seeks to support the digital transformation of SMA PGRI 2 Palembang by creating a comprehensive web-based platform that modernizes academic information management and aligns with Indonesia's vision for technology-integrated education.

Methodology

Literature Review
Information System

According to Alter (as cited in Joni et al., 2012), an information system is "a work system whose activities are intended to process (capture, transmit, store, retrieve, manipulate, and display) information."

Academic Information System

Nauri (as cited in Irawan, 2018) defines an academic information system as "an application designed to manage academic-related data, including student data, lecturer data, academic records, curriculum, and class schedules."

Values

Mulyana (as cited in Sukitman, 2016) describes values as "references and beliefs used in making choices."

Report Card

According to Aprianto et al. (2017), a report card is "a document used to report a student's academic performance to parents or guardians, including attendance, behavior, and learning achievements."

Web Engineering

Pressman (as cited in Hadinata & Udariansyah, 2015) defines Web Engineering as "a process used to create high-quality web applications through structured and disciplined development methods."

Analysis and System Design

Customer Communication
Formulation
1. Business Need Identification: The primary business objective is to develop an online student report card management system.

2. Feature Specification: The system includes functionalities for managing grades, attendance, and student data online.

Negotiation
1. The system should allow students to access report cards online.
2. It should manage academic grades (knowledge, skills, social, spiritual, and extracurricular values).
3. The system must also handle minimum competency criteria (KKM), attendance records, and user profiles.

Planning
1. Project Duration: August 2020 – January 2022.
2. Cost Estimation: Since the system was developed as part of an academic research project, detailed cost data are not disclosed.
3. Resource Estimation: Hardware: Laptop (Intel Core i3, 1.7 GHz, 2 GB RAM, 64-bit), Android phone, printer, 16 GB flash drive, and mouse.Software: XAMPP, Google Chrome, Sublime Text, Pencil, StarUML, Microsoft Word 2007, and Microsoft PowerPoint 2007.Human Resources: The researcher developed the system independently.

Modeling

Context Diagram A context diagram was created using StarUML to illustrate the interaction between system components and users (teachers, students, and administrators).
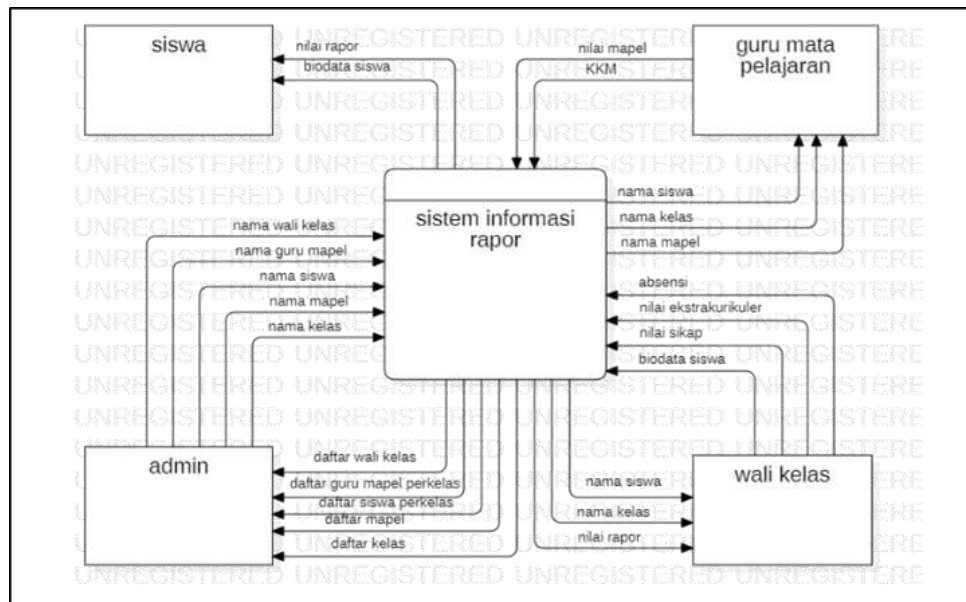

Figure 1. Context Diagram of the Academic Information System.

User Interface Design

a. **Student Report Card Page** Displays final semester grades, including social and spiritual attitudes, knowledge-based and skill-based subject scores, and extracurricular activities.
b. **Knowledge Category Grades Page** Allows teachers to enter students' cognitive scores for each subject and update them as needed.
c. **Social Attitude Page** Displays social assessment data per class, including numeric scores, letter grades, and descriptive feedback.
d. **Extracurricular Scores Page** Records extracurricular performance based on activities participated in by students.
e. **Attendance Page** Tracks student absences by class and semester.

Results

User Interface Implementation

a. Student Report Card InterfaceThis page displays students' final grades for all academic and non-academic activities at the end of the semester.
b. Knowledge Category InterfaceTeachers input cognitive scores for specific subjects through an editable form.
c. Social Assessment InterfaceDisplays students' social grades, including qualitative and quantitative evaluations.
d. Extracurricular InterfaceEnables the management of extracurricular grades for each activity joined by students.
e. Attendance InterfaceManages and records students' absences and tardiness efficiently**.**

The implementation of the user interface (UI) in the developed web-based Academic Information System (AIS) at SMA PGRI 2 Palembang was designed to ensure an intuitive, efficient, and user-centered experience. Each interface component was developed based on user requirements gathered during the analysis phase and structured according to the Web Engineering methodology. The UI aims to facilitate interaction between teachers, students, and administrators, enabling seamless access to academic data and enhancing the school's digital service quality. The following sections describe the main modules of the system's user interface.

a. Student Report Card Interface

This interface serves as the core feature of the AIS, providing students with access to their final grades for all academic and non-academic activities at the end of each semester. The page displays detailed grade information per subject, overall averages, and descriptive assessments in both numeric and qualitative formats. Students can log in using their unique credentials to view personalized reports securely. The system also allows students and parents to download or print report cards in PDF format, thereby reducing the need for physical distribution. This digital mechanism ensures transparency, minimizes administrative workload, and enables real-time grade accessibility.

b. Knowledge Category Interface

The Knowledge Category Interface is dedicated to teachers for entering and managing cognitive assessment data. Each subject teacher can input scores for individual students through an editable form that supports validation checks to prevent input errors. The form

includes fields for daily tests, mid-term exams, and final exams, all of which are automatically calculated to generate final cognitive grades. The interface also provides instant feedback to ensure that teachers can verify score accuracy before submission. By automating these processes, the system minimizes manual calculation errors and enhances data reliability for academic reporting.

c. Social Assessment Interface

The Social Assessment Interface allows teachers to record and evaluate students' social behavior and interpersonal skills throughout the semester. This module integrates both quantitative scores (numeric grading) and qualitative descriptions, enabling holistic assessment of character education outcomes in line with the national curriculum. Teachers can select predefined social indicators such as cooperation, discipline, empathy, and responsibility. Each evaluation is then compiled into the student's overall report card. This approach supports the school's goal of combining academic excellence with moral and social development while providing parents with a comprehensive understanding of their child's progress.

d. Extracurricular Interface

The Extracurricular Interface manages data related to students' participation in extracurricular programs such as sports, arts, and student organizations. Teachers or advisors responsible for each activity can input and update performance evaluations directly through the system. Grades are recorded based on participation level, achievement, and attitude during the activities. This feature ensures that extracurricular contributions are properly documented and integrated into the student's overall academic record. Moreover, the digital management of extracurricular data enhances transparency and facilitates recognition of student achievements beyond the classroom environment.

e. Attendance Interface

The Attendance Interface streamlines the recording and monitoring of student attendance throughout the academic term. Teachers can log daily attendance, including instances of absence, tardiness, or permitted leave, with data automatically summarized into monthly and semester reports. The interface supports real-time updates, allowing homeroom teachers and administrators to monitor attendance patterns efficiently. Additionally, the attendance data are directly linked to academic performance records, enabling correlation analysis between attendance and achievement. This integration promotes accountability and helps teachers identify students who may require academic or behavioral intervention early on.

Conclusion and Recommendations

Conclusion

The developed academic information system integrates all user data students, teachers, homeroom teachers, and administrators within a centralized report card database. The system can be accessed anytime and anywhere, as it is web-based. Users can log in via any internet-connected device using registered credentials. Only the administrator has the authority to register user accounts to prevent unauthorized access.

Recommendations

Future developers should enhance the system by adding features currently not included in this version. Visual and interface design improvements are recommended to increase user engagement and usability.

Disclosure Statement

The authors declare no conflicts of interest regarding the development or publication of this study.

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