

Information System for Managing Teacher and Student Achievements at SMK Negeri 1 Suak Tapeh

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ABSTRACT

This study aims to develop a web-based information system for recording teacher activities and student achievements at SMK Negeri 1 Suak Tapeh. The background of this research lies in the school's previous manual data management method using Microsoft Word and Excel, which often caused inefficiency and data loss. The objective is to create a structured and accessible system that improves the accuracy, transparency, and accountability of institutional data management. The system was developed using the Agile Scrum methodology to ensure iterative development and continuous user involvement. PHP was used as the main programming language, MySQL as the database, and Tailwind CSS for responsive interface design. The system integrates five user roles Operator, Teacher, Head of Administration, Principal, and Vice Principal each with specific access privileges according to their institutional responsibilities. Black-box testing was applied to evaluate system functionality, focusing on the accuracy of input and output processes. The results show that all system modules, including activity submission, approval workflow, achievement management, and report generation, functioned as expected and met user requirements. The system successfully replaced the manual process with a digital platform that enhances efficiency and transparency. Furthermore, it provides real-time access through responsive web design across desktop and mobile devices. Future improvements may include integrating data analytics, notification systems, and enhanced security layers to support the school's digital transformation.

INTRODUCTION

The rapid advancement of information technology in the modern era has had a significant impact on various aspects of human life, including the field of education. Its utilization is now evident across all levels of education, from primary to higher education (Prasetyo, 2023). One of the important areas where technology plays a crucial role is in educational institutions, particularly in vocational schools (*Sekolah Menengah Kejuruan* or SMK). The application of technology in this field enables accurate and efficient data management, especially for recording student information and academic activities (Fitriani et al., 2024). An information system for managing teacher activities and student achievements can serve as an effective solution to streamline and accelerate data recording processes that are essential for institutional administration and educational quality assurance.

SMK Negeri 1 Suak Tapeh, located in Banyuasin Regency, South Sumatera, Indonesia, was established in 2009 and operates under the local government. The school implements the 2013 Vocational Curriculum (REV) with a specialization in automotive engineering and obtained an accreditation grade of "A" from the National Accreditation Board for Schools/Madrasahs (BAN S/M) in 2019. Although the school already maintains an official website, its content is limited to a brief profile and a few activity updates, with outdated or incomplete data such as student and alumni information. Consequently, data management related to teacher activities and student achievements remains suboptimal. Teachers cannot access assignment letters online, activity documentation is not systematically recorded, and student achievement data are often incomplete or lost. Furthermore, dissemination of student achievements is limited to social media platforms, which are less effective for structured data presentation or broad public access. Reports of activities and achievements are still created manually using word processors or spreadsheets, which are prone to human error and inefficiency.

To address these challenges, SMK Negeri 1 Suak Tapeh requires a comprehensive information system that facilitates structured and automated management of teacher activities and student achievements. Such a system should also enhance transparency, support report generation, and provide accessible and accurate data for school administration. The development of this system will transform the existing website (<https://www.smkn1suaktapeh.sch.id/>) from a simple school profile page into a functional platform capable of recording teacher activities and showcasing student achievements dynamically. The system will serve as a digital repository for institutional documentation and as a medium for publicizing achievements, thereby improving the school's visibility and credibility.



This study adopts the Agile development approach, specifically the Scrum framework, to ensure an iterative, collaborative, and user oriented system design process. Agile methodology emphasizes flexibility, responsiveness to change, and continuous improvement through user feedback (Fitriani et al., 2024). The system is developed using PHP for the backend programming language and MySQL as the database management system (Roeslan Djatalov, 2022). The system's key functionalities include data entry for teacher activities, automated report generation, digital archiving of assignment letters, and a web interface for displaying student achievements through visual infographics. The implementation of this system is expected to minimize data loss, improve efficiency in report management, and strengthen school administration processes.

Based on these considerations, this study focuses on developing a web based information system for recording teacher activities and student achievements at SMK Negeri 1 Suak Tapeh. The proposed system aims to provide a structured, efficient, and reliable digital platform that facilitates data documentation, supports decision making, and promotes transparency and public engagement. Therefore, this study contributes to improving the effectiveness of data management in vocational education institutions through the application of web based information systems and Agile software development methodology.

LITERATURE REVIEW

Information System and Web Based Applications

An information system is an integrated structure of components that collect, process, store, and distribute data into meaningful information to support decision making and organizational control (Nisa & Priambodo, 2024). In educational institutions, information systems play a critical role in improving data accuracy, accessibility, and transparency, especially for managing student and teacher activities.

One of the most effective forms of information systems today is a web based application, which allows real time access and interaction through browsers. A website functions as a digital platform that displays various forms of information, including text, multimedia, and dynamic data (Zubaedah et al., 2022). The integration of technologies such as HTML, PHP, MySQL, and Tailwind CSS facilitates the development of dynamic, responsive, and efficient web systems. These technologies support automation and simplify the management of educational data within schools.

Agile and Scrum Methodology

The Agile Software Development methodology is a framework that focuses on iterative and incremental processes, allowing system development to be carried out in gradual cycles. This method enables development teams to respond quickly and flexibly to changing requirements and user feedback (Badiwibowo Atim & Korespondensi, 2024). Agile emphasizes continuous delivery of functional software, intensive teamwork, and planning that adapts to ongoing project needs. It promotes a learning process throughout the project lifecycle, ensuring that development aligns closely with user expectations and institutional goals (Trisnawati & Setiawan, 2022).

The Agile process begins with the identification of user and stakeholder requirements, followed by the creation of a product backlog containing prioritized lists of features to be implemented. Each iteration involves user interaction and evaluation to refine functionality and enhance system performance (Badiwibowo Atim & Korespondensi, 2024).

Scrum is one of the frameworks within the Agile methodology used for developing complex systems. It adopts a staged and continuous approach to improve predictability and control over risks during the development process (Wijaya et al., 2024). In web-based academic information systems, the use of Scrum allows the development team to quickly respond to user feedback, improving the overall quality of the system through regular evaluation. Scrum includes main elements such as sprints, product backlogs, and daily stand-up meetings to ensure consistent communication and synchronization among team members (Ardiansyah & Phang, 2025).

The Scrum framework consists of several phases, including user stories, product backlog, sprint planning, sprint backlog, sprint review, and sprint retrospective, which enable the structured management of changes during development (Chris & Wibowo, 2022). From these explanations, it can be concluded that Agile and Scrum are adaptive methods of software development that focus on collaboration, incremental delivery, and continuous improvement. This approach allows the team to adjust to changes efficiently, ensuring that the resulting system meets evolving user and institutional needs.

System Modeling and Design Tools

System modeling helps visualize workflows and define system requirements. The Flowchart is used to represent sequential processes, providing a clear overview of the system's operation flow (Zubaedah et al., 2022). Meanwhile, the Unified Modeling Language (UML) offers a standardized approach to modeling software structures, including Use Case, Activity, and Class Diagrams, which facilitate understanding of user interactions, process flows, and data structures within the system (Nabila & Wati, 2022).

Black-Box Testing

Black-Box Testing is a software testing method that focuses on evaluating the functionality of a system without



considering its internal structure or source code. The main objective of this method is to verify that the software meets all functional requirements and operates without failures or logical errors (Madhani et al., 2022).

According to (Nabila & Wati, 2022), this approach involves designing test cases to validate whether the software functions align with predefined specifications. The tests are performed by providing various input conditions and observing the corresponding outputs to ensure that the system behaves as expected.

In summary, Black-Box Testing serves as an effective technique to assess the reliability and performance of software from the user's perspective. It ensures that each module of the system functions according to its intended purpose, maintaining consistency with the established design and functional requirements.

Previous Studies

Several previous studies have explored the use of information systems for managing academic and organizational activities. (Nisyak, 2023) developed a monitoring application for student academic achievements that allowed teachers and parents to track learning progress collaboratively. (Rudi et al., 2022) designed a web based student achievement information system for SMP Negeri 5 Metro to record and publish students' academic and non academic achievements. (Adimurdaka & Jati, 2022) developed an Android based organizational management information system (Agendakeun) to assist student organizations in recording and managing their agendas efficiently. (Ula et al., 2022) focused on a computerized school document management system to improve administrative efficiency at SMK Negeri 1 Suak Tapeh. (Abidin & Desty Ayu, 2023) implemented a web based performance information system for lecturers and students using the prototype method, aimed at improving the monitoring and evaluation of academic achievements across faculties.

These studies demonstrate the effectiveness of digital information systems in educational and organizational contexts. However, few have focused specifically on integrating teacher activity data and student achievements within a single school based system. This research addresses that gap by developing a web based information system for recording teacher activities and student achievements at SMK Negeri 1 Suak Tapeh, using the Agile Scrum approach to ensure iterative development and responsiveness to user needs.

METHOD

This research was conducted using a systematic approach based on the Agile Scrum methodology to ensure that the developed system meets user requirements effectively. The study was carried out at SMK Negeri 1 Suak Tapeh, Banyuasin, in 2024. Before applying the Agile Scrum stages, a requirement analysis was conducted to identify functional and non functional needs through observation, interviews, documentation, and literature review. The main development process was carried out following the Agile Scrum cycle, which consists of planning, implementation, testing, documentation, deployment, and maintenance. This iterative process allows continuous improvement through user feedback and ensures that the resulting system aligns with actual needs.



Figure 1. Agile Scrum Development Flow

Requirement Analysis

The requirement analysis phase focused on understanding the existing workflow and identifying the needs of users in managing teacher activities and student achievements. The results of this stage were divided into functional and non functional requirements.

From a functional perspective, the system was designed to be accessible to teachers, operators, and the school principal through an online platform that facilitates efficient management of teacher activities and student achievements. The website also serves as a new platform for data recording and as a promotional medium to highlight the school's achievements.

From a non functional aspect, the system was developed using a laptop with Intel Core i3 processor, 8 GB of



memory, Intel HD Graphics, and a 512 GB SSD. The software environment included the Windows operating system, PHP programming language, MySQL database, Google Chrome browser, and Visual Studio Code as the code editor.

To obtain accurate information, data were collected through several techniques. Observation was conducted to study the existing process of managing teacher activities and student achievements. Interviews with teachers, operators, and school administrators were carried out to identify user needs and constraints. Documentation was used to collect both physical and digital records related to the existing data management process. In addition, literature studies were performed to gather theoretical support from previous studies and references relevant to the research topic.

Agile Software Development Method

The development of the system was carried out using the Agile Scrum framework, which emphasizes adaptability, collaboration, and continuous improvement through iterative development cycles. In the planning phase, the user requirements gathered from the analysis stage were translated into a product backlog containing prioritized features. Each feature was defined as a user story and distributed across sprints to ensure incremental progress and better alignment with user needs.

The system design was visualized using the Unified Modeling Language (UML) to represent the interaction between users and system components. The Use Case Diagram illustrated the relationships among users teachers, operators, and the principal with the main system functions. The Activity Diagram described the logical flow of each process, while the Class Diagram depicted the structural relationships among data entities within the system. The complete representation of the system design is presented in Figure 2.

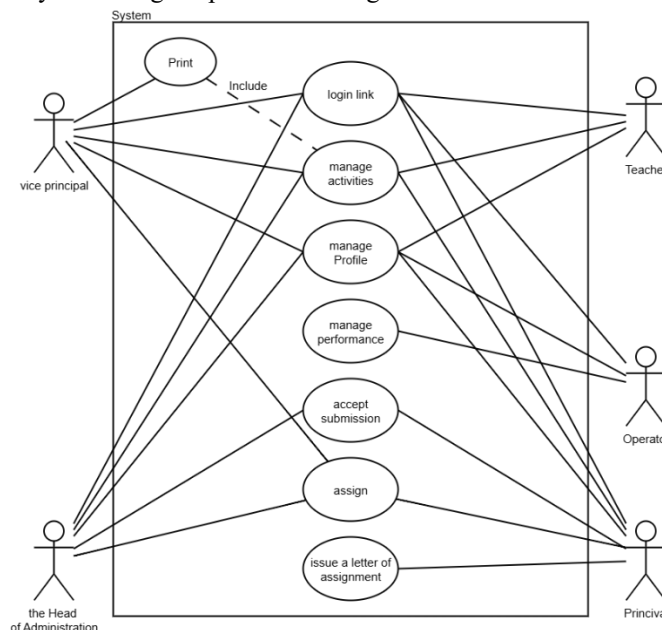


Figure 2. Use Case Diagram

During the implementation stage, the system was developed using PHP as the main programming language, MySQL as the database management system, and Tailwind CSS to design a responsive and modern user interface. The development was supported by the Laragon local environment, which facilitated efficient integration of all tools. The resulting system included several key modules, such as teacher activity management, achievement recording, and automated reporting.

The system testing process adopted the Black box testing method to verify functional accuracy by focusing on input and output responses without examining the internal code structure. Documentation was conducted throughout every phase to ensure traceability and maintain transparency in design, coding, and testing. After successful testing, the system was deployed at SMK Negeri 1 Suak Tapeh for real operational use. A continuous maintenance process was established to monitor system performance, correct potential errors, and integrate user feedback for ongoing improvements.

RESULT

System Development

The development of the Information System for Recording Teacher Activities and Student Achievements at SMK Negeri 1 Suak Tapeh was carried out using the Agile Scrum framework, which emphasizes flexibility, collaboration, and continuous improvement. The system was designed to facilitate structured data management involving five main

user roles: Operator, Teacher, Head of Administration (TU), Principal, and Vice Principal. Each user role was assigned specific access rights according to their duties and responsibilities, ensuring that the data management process is organized, secure, and efficient.

The website was implemented using PHP as the main programming language, MySQL as the database, and Tailwind CSS for interface styling. The local development environment Laragon was used to integrate all components efficiently. The system was designed with a clear menu structure that supports easy navigation for each user role. The Operator menu manages teacher and student achievements, the Teacher menu provides access for submitting and tracking activity proposals, while the Head of Administration and Principal menus handle verification and approval processes. The Vice Principal menu provides access to monitoring reports and export functions.

System Menu Structure

The system interface is designed to provide clear and structured navigation according to the responsibilities of each user role. This structure helps ensure that users can efficiently access various system features based on their respective authority levels. The system menu consists of five main roles: Operator, Teacher, Head of Administration (TU), Principal, and Vice Principal.

The operator serves as the content administrator responsible for managing the school's landing page within the Information System for Teacher Activities and Student Achievements at SMK Negeri 1 Suak Tapeh. This role focuses on ensuring that achievement data covering institutional, teacher, and student accomplishments are accurately uploaded, curated, and displayed on the website's main page. Operators can access features to add, edit, and update achievement records that appear on the public dashboard. Through this process, they ensure that all published information reflects verified data and contributes to the school's transparency and reputation. The navigation flow of the operator's tasks, from logging in to managing achievements on the main page, is shown in Figure 3.

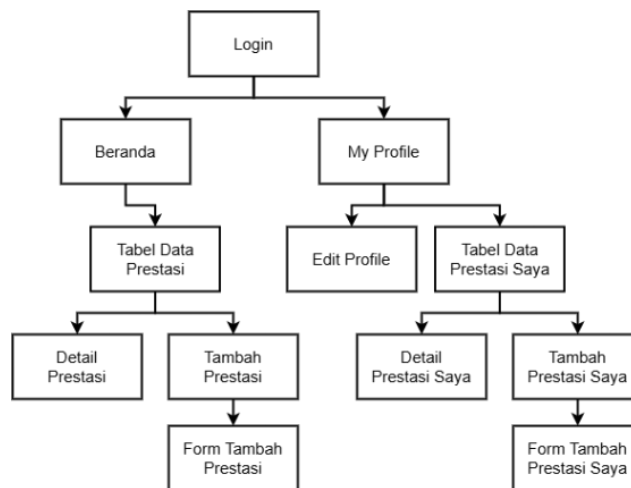


Figure 3. Operator Menu Structure

The teacher serves as an active user within the system, responsible for submitting activity proposals and managing personal achievement data. Through the Home menu, teachers can view the complete list of school activities, submit new activities using the Activity Submission Form, and monitor activities that have received official assignment letters via the Latest Assignment Letters menu. Additionally, teachers can access detailed information on each activity to ensure data accuracy and track the approval status.

Within the My Profile menu, teachers can update their account information and manage their personal achievements. This feature allows teachers to add, view, and edit their recorded achievements, ensuring that individual accomplishments are well documented and easily accessible within the system. The overall menu structure for the teacher role is illustrated in Figure 4.

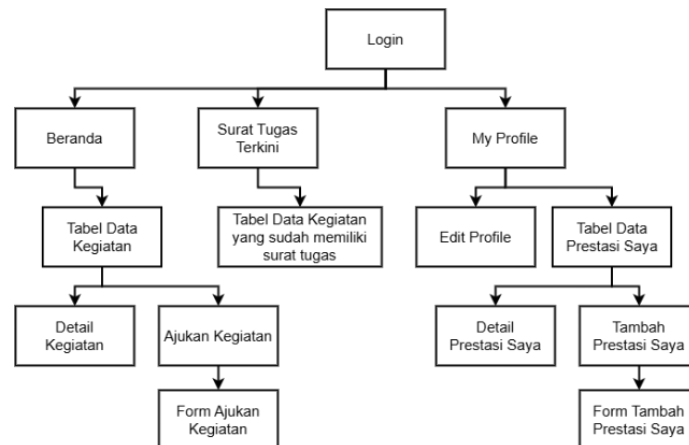


Figure 4. Teacher Menu Structure

The Head of Administration holds an intermediate supervisory role within the system, primarily responsible for reviewing and validating teacher submitted activity proposals before they are forwarded to the principal. Through the Home menu, this user can access the Activity Data Table to view all recorded school activities, examine detailed information for each proposal, and perform approval actions such as Approve, Request Revision, or Reject. This approval feature reflects the user's authority in verifying the eligibility of activities prior to official endorsement. Additionally, the Latest Assignment Letters menu provides access to a list of approved activities that have already been issued official assignment letters, ensuring efficient monitoring of school events.

Within the My Profile section, the Head of Administration can update personal data and manage personal achievements. This includes editing profile information, viewing recorded achievements, and adding new ones when necessary. The role supports both administrative control and self management functions, ensuring that validation and documentation processes are well coordinated. The overall menu structure for this role is illustrated in Figure 5.

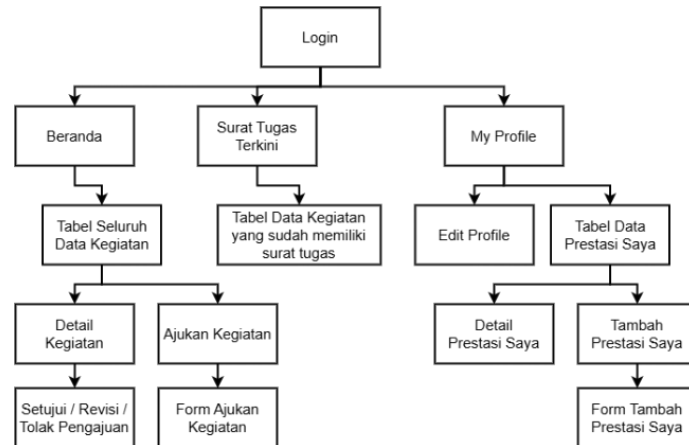


Figure 5. Head of Administration Menu Structure

The Vice Principal's role focuses on administrative supervision, documentation, and archiving of school activities. This user can propose new school activities through the Submit Activity form available in the Home menu. Additionally, the Vice Principal can review the complete list of activities and utilize the Print Report feature to generate documentation in spreadsheet format for official records. Through the Latest Assignment Letters section, the Vice Principal monitors the progress and validation status of approved activities. In the My Profile menu, the user can update personal information, view or add personal achievements, and maintain a record of professional accomplishments. The navigational structure for this role is depicted in Figure 6.

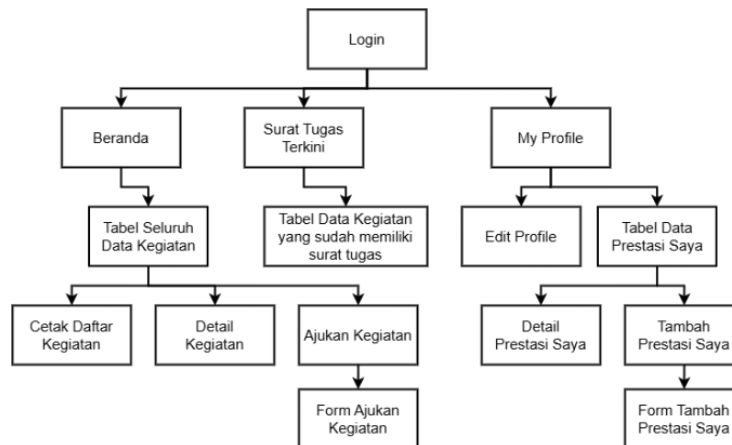


Figure 6. The Vice Principal's Menu Structure

The Principal acts as the highest authority within the system, primarily responsible for authorization, approval, and ensuring the legality of activities. Upon reviewing detailed activity proposals, the Principal can make final decisions by approving, requesting revisions, or rejecting submissions through the Approval Menu. When a proposal is approved, the Principal issues an official Assignment Letter, marking the final validation step in the process. Furthermore, the Principal can access the Activity Data Table and Latest Assignment Letters menus to oversee all ongoing and approved activities. Similar to other roles, the My Profile section enables the Principal to manage personal data and document personal achievements. The overall menu structure for this role is illustrated in Figure 7.

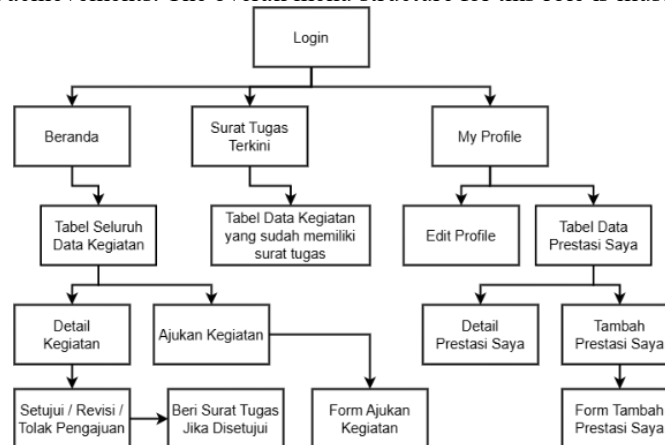


Figure 7. The Principal Menu Structure

Implementation Results

The developed system, named *Sistem Informasi Prestasi SMK Negeri 1 Suak Tapeh*, was implemented to manage and document teacher activities and student achievements through a role based access control (RBAC) approach. This implementation involved five user roles Operator, Teacher, Head of Administration, Principal, and Vice Principal each having specific access privileges aligned with their institutional responsibilities. The interface design emphasized simplicity and accessibility to ensure that users from different roles could interact with the system efficiently.

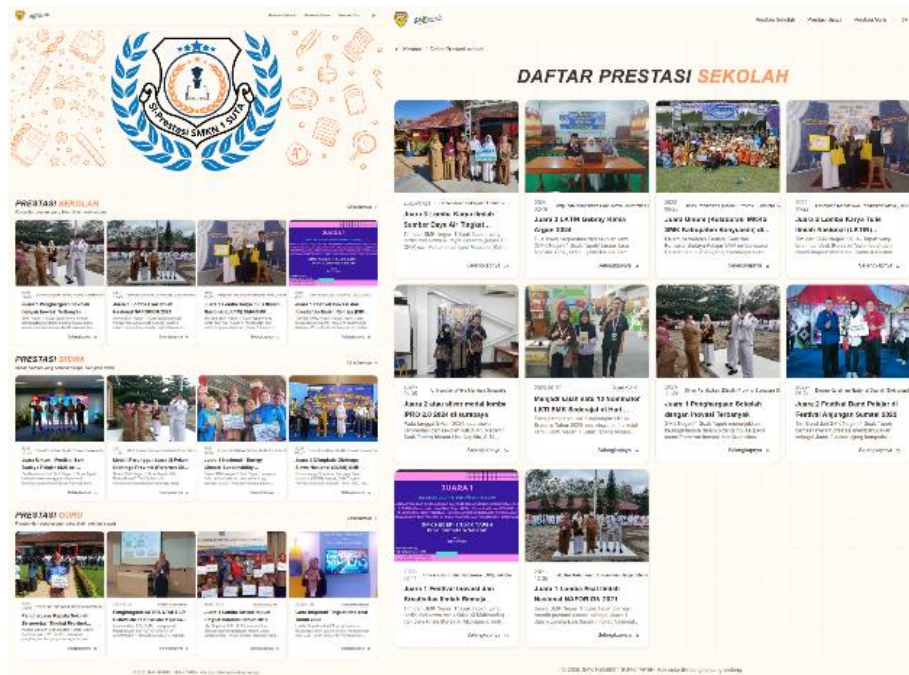


Figure 8. Public Interface of the Academic Achievement Information System

The main interface of the system is the Home Page, which publicly displays curated data on teacher and student achievements, as shown in Figure 8. The Achievements Page presents a comprehensive list of institutional accomplishments, specifically showcasing school achievements to enhance transparency and strengthen the school's reputation. The display format for teacher and student achievements is designed similarly to the school achievements page, maintaining consistency in layout and functionality. Each listed record links to a Detail Page, where complete information such as event descriptions, documentation, and participant details can be accessed, as illustrated in Figure 9.

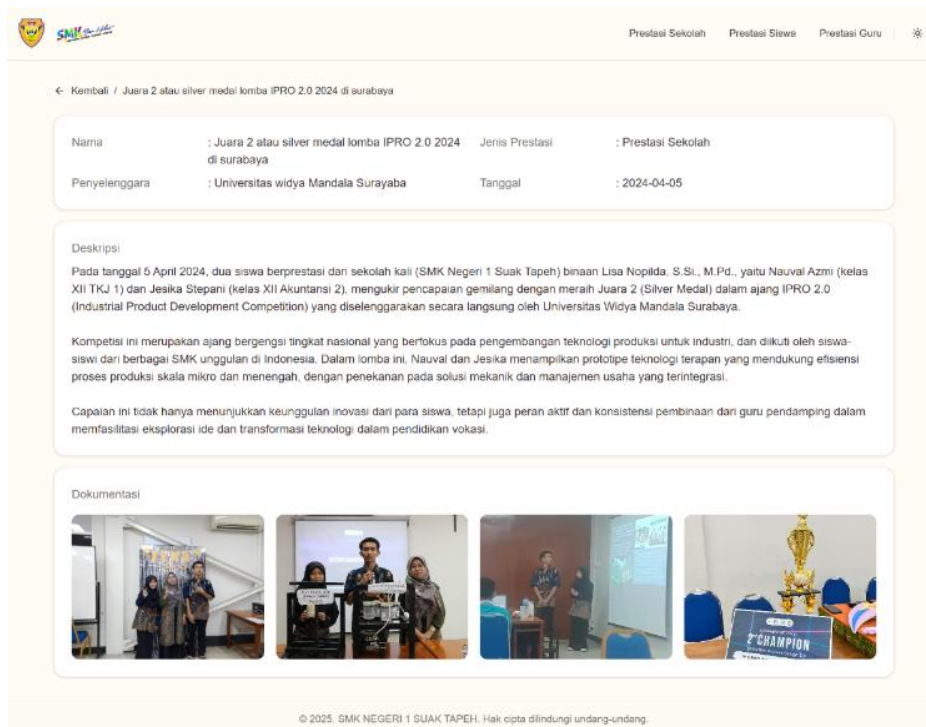


Figure 9. achievement details page

The User Profile Page serves as a personal management center for each user, enabling them to view and edit their personal information, record personal achievements, and manage account data. Teachers, for example, can also access

the Activity Submission Form, allowing them to propose new events or competitions to be reviewed and approved by administrative officers. The Task Letter Page summarizes approved activities and provides downloadable official documents for authorized users. The page can be seen in Figure 10.

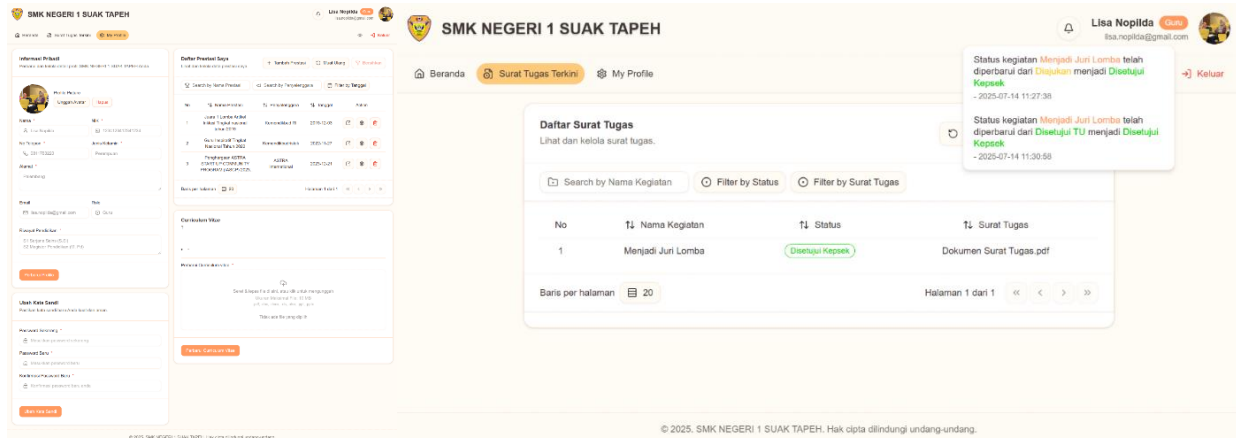


Figure 10. profile page and assignment letter

The Activity Submission feature allows teachers to propose new academic or extracurricular events directly through an integrated form, as shown in Figure 11. Each submission is automatically forwarded to the Head of Administration and Principal for verification and approval. This workflow ensures that all proposed activities follow institutional procedures and receive appropriate authorization.

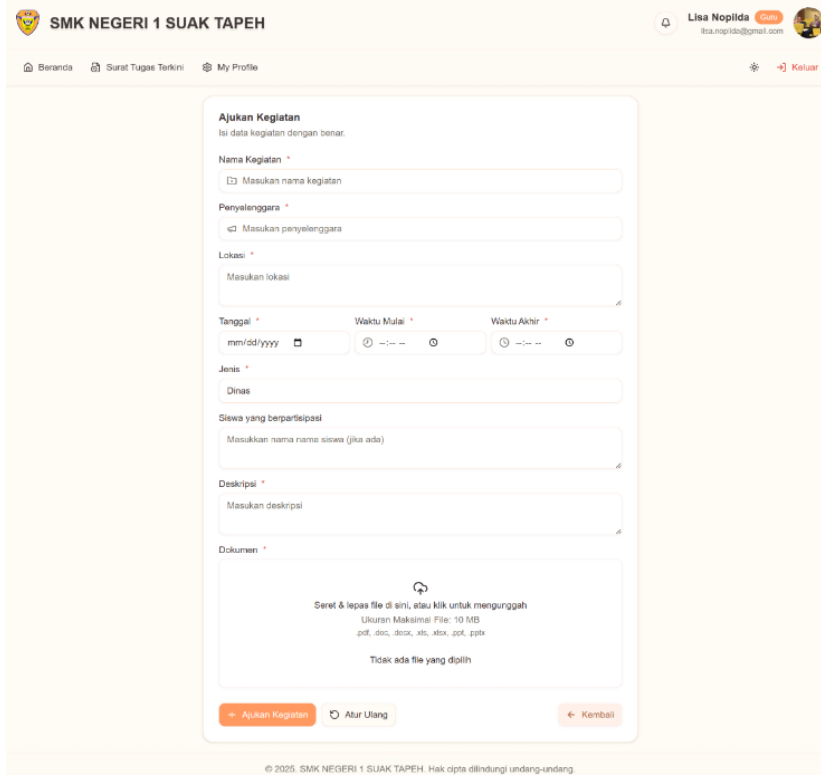


Figure 11. Activity Submission feature

The Administrative Dashboard provides tailored access for different management roles within the institution, as shown in Figure 12. The Head of Administration, Principal, and Vice Principal each have distinct levels of authority in managing school activities. The Head of Administration's Dashboard serves as the first verification point, allowing approval, revision, or rejection of submitted activity proposals before forwarding them to the Principal for final authorization. The Principal's Dashboard provides a comprehensive overview of all ongoing and approved activities, enabling review and issuance of formal task letters once requirements are met. In contrast, the Vice Principal's Dashboard functions solely as a monitoring interface, allowing oversight of all recorded activities without modification

or approval privileges, ensuring transparency and proper documentation of the school's operational processes.

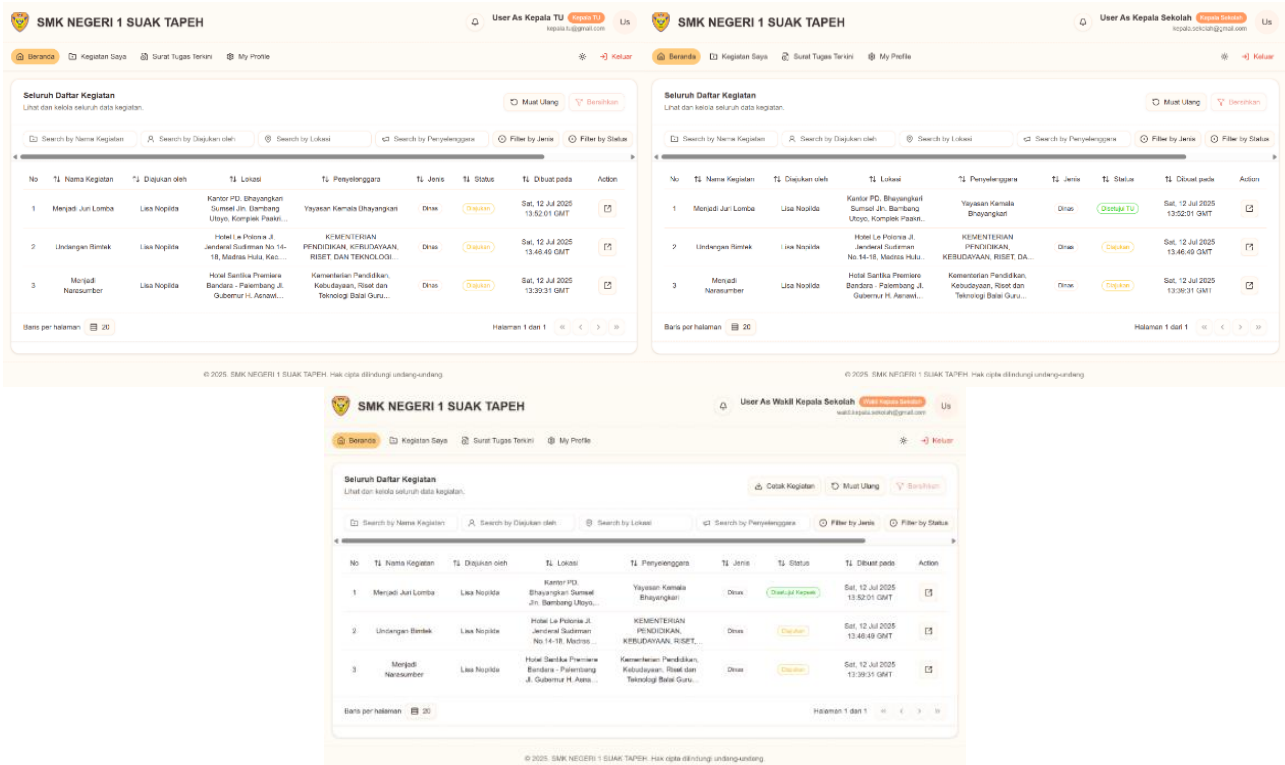


Figure 12. Administrative Dashboard for Head of Administration, Principal, and Vice Principal

The Approval Interface, managed by the Leader, allows for reviewing, revising, or rejecting activity submissions before issuing official assignment letters. Once an activity is approved, the system automatically generates official assignment documents that can be accessed by authorized users, as shown in Figure 9 above.

The Report Generation Page automatically produces downloadable Excel (.xls) files based on the selected activity data, as shown in Figure 13. This feature is primarily accessed by the Vice Principal to facilitate report printing and distribution in an official document format. It ensures that all recorded activities can be efficiently archived, reviewed, and presented for administrative and evaluation purposes.

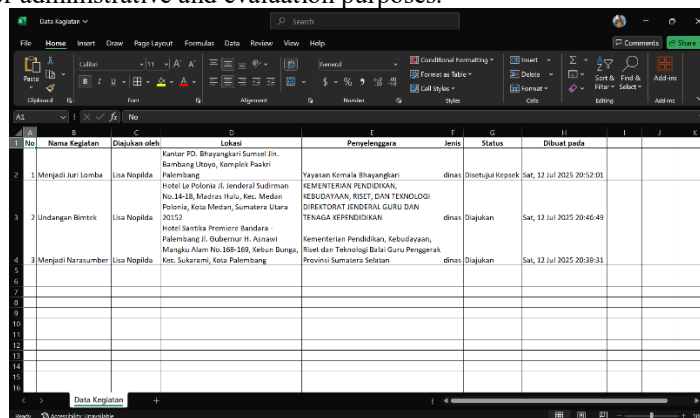


Figure 13. Report Generation and Export Interface

System Testing and Evaluation

The testing process aimed to verify that the developed system functioned according to the predefined functional requirements. The Black box testing method was used, focusing on evaluating system functionality based on user interactions rather than internal code structure. Each test case was designed to ensure that all main features including login authentication, activity submission, achievement management, and user profile access performed as expected. The testing was carried out using both valid and invalid inputs to observe system responses and confirm that outputs aligned with the expected results.

System testing was conducted collaboratively with users representing each role: Operator, Teacher, Head of



Administration, Principal, and Vice Principal. The test results demonstrated that all modules operated properly, and the system successfully met user requirements across different access levels. The testing documentation is illustrated in Figure 14, which shows the evaluation sessions with users.



Figure 14. System Testing with Users

Based on the testing results, all core functionalities including authentication, data submission, approval, and reporting worked correctly. The Operator interface successfully displayed and managed achievement data on the public homepage. Teachers could submit activities, view assignment status, and record achievements within their profiles. The Head of Administration was able to verify and forward activity proposals to the Principal, who then performed approval and task letter issuance. Meanwhile, the Vice Principal could monitor and export activity data in Excel format for reporting purposes.

A summary of the test outcomes is presented in Table 1, which consolidates the system's main features, expected results, and validation status. All functional components were validated successfully, indicating that the system met its operational and usability objectives.

Table 1. Summary of Black-box Testing Results

System Feature	Expected Result	Test Status
User Login (All Roles)	Dashboard appears after valid credentials entered	Valid
Activity Submission (Teacher)	Form displayed, data stored, and forwarded for approval	Valid
Activity Approval (Head of Administration & Principal)	Approval, revision, or rejection recorded correctly	Valid
Achievement Management (Operator)	Achievements displayed on homepage	Valid
Profile and Achievement Editing (All Roles)	User data and achievements updated successfully	Valid
Report Generation (Vice Principal)	Data exported to Excel (.xls) correctly	Valid

The successful testing results confirmed that the Academic Achievement Information System of SMK Negeri 1 Suak Tapeh performed according to design and met user expectations for efficiency, transparency, and reliability in data management.

DISCUSSION

The discussion highlights the evaluation results and practical implications of implementing the *Sistem Informasi Pendataan Kegiatan Guru dan Prestasi Siswa* at SMK Negeri 1 Suak Tapeh. Based on implementation and black box testing results, all core features including user authentication, activity submission, approval workflow, and achievement publication performed according to functional expectations. Each user role (Operator, Teacher, Head of Administration, Principal, and Vice Principal) could carry out tasks in line with their specific access privileges, validating the effectiveness of the role based access control (RBAC) approach.

The system effectively replaced the previous manual process that relied on Microsoft Word and Excel, improving efficiency, data accuracy, and accessibility. Teachers are now able to independently submit activity and achievement data, while administrators and school leaders can review, approve, and issue task letters directly through the system. This digital workflow enhances transparency, accountability, and documentation quality within the school's administrative operations.

The black box testing results confirmed that all functional modules produced valid outputs under both valid and invalid input scenarios. The system's architecture, developed with PHP, MySQL, and Tailwind CSS within the Laragon environment, demonstrated stable and responsive performance across both desktop and mobile devices. The adaptive

web design ensures that users can conveniently access the system on various platforms without experiencing significant interface or functionality issues.

Although the current version fulfills its intended purpose, future developments could include advanced data analytics dashboards, integration with existing academic databases, and notification features for real time task updates. These enhancements would further support the school's digital transformation efforts and promote more efficient, transparent, and data driven management practices.

CONCLUSION

This study successfully developed and implemented the *Sistem Informasi Pendataan Kegiatan Guru dan Prestasi Siswa* for SMK Negeri 1 Suak Tapeh to digitalize and streamline data management related to teacher activities and student achievements. The system effectively replaced the previous manual process using Microsoft Word and Excel, resulting in a more structured, efficient, and accessible workflow. The role-based access control (RBAC) design enabled each user including the Operator, Teacher, Head of Administration, Principal, and Vice Principal to perform their respective tasks according to predefined privileges, ensuring accountability and transparency in the school's administrative operations.

The adoption of the Agile Scrum methodology contributed significantly to the success of the system development process. Iterative development and user feedback ensured that the resulting features including activity submission, validation, approval, and official document generation were aligned with user needs. Testing using the Black-box method demonstrated that all system modules functioned properly and produced expected outputs. Furthermore, the system was verified to be responsive across mobile and desktop platforms, ensuring usability in diverse operational contexts.

For future work, several improvements are recommended. Regular user training sessions should be conducted to help teachers and administrative staff adapt to the system and maximize its benefits. Periodic system maintenance and implementation of multi-layered security measures are essential to ensure long-term stability and data protection. Additionally, integrating the system with other institutional platforms and expanding public achievement publication through digital channels could further enhance the school's visibility and strengthen its digital identity.

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