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Development of a Website-Based Teacher Management Information System to Improve Transparency and Operational Efficiency in Schools

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ABSTRACT

***Purpose**: The teacher monitoring system is an important component in efforts to improve the quality of education. However, in its implementation, there are several problems that often occur. One of them is the lack of efficiency in recording and monitoring teacher activities, which is still done manually. This causes the data produced to be inaccurate, difficult to access, and time-consuming. In addition, the lack of technology integration in the monitoring process also hinders real-time teacher performance analysis, so that strategic decision-making is less than optimal. This study aims to identify the main problems in the existing teacher monitoring system and propose technology-based solutions to improve the performance of the system. The results of the study are expected to be the basis for developing a more effective and efficient teacher monitoring system.*

***Subjects and Methods:** The background to this problem is rooted in the need to increase transparency, accountability, and effectiveness of teacher management. An information technology-based monitoring system can be a solution to overcome this obstacle. With an automated and integrated system, it is expected to provide convenience in recording attendance, evaluating performance, and reporting accurate data. Qualitative methods are research approaches that aim to understand social phenomena or human behavior in depth, based on the perspectives and experiences of the subjects involved. This approach focuses on the exploration of meaning, process, and context, emphasizing aspects of subjectivity, interpretation, and nuance.*

***Results:** Data collection methods through interviews, observations, documentation and literature studies. System development methods through data collection, activity diagrams, use cases, databases, coding and testing.*

***Conclusions:** Conclusions The website-based teacher management information system designed and developed in this study is able to provide solutions to various problems found in manual systems. This system has succeeded in overcoming data inaccuracy by providing more structured and accurate automatic attendance recording. Attendance data that was previously prone to errors can now be recorded in real-time with a 100% accuracy rate. Then the problem of slow access to information has also been successfully overcome with the report feature available in real-time, allowing principals and other.*

INTRODUCTION

In the current global and dynamic business world, leadership becomes one of the major determinants of organizational success, more so in creativity sectors. Leadership styles are essential since they determine not only where an organization is heading but also how several teams will be working together and how creativity will be fostered within the workforce. Since many businesses in creative industries including advertising, designing, film production, and technology need creativity and innovation from their workers, how managers lead such groups of people has an influence on the levels of collaboration and innovativeness in those members. Consequently, the role of leadership in determining team collaboration and innovation together with its effects on organizations competition in the current dynamic market environment cannot be overemphasized.

Improving the quality of education is one of the main priorities in human resource development. In this case, teachers play a strategic role as the spearhead of the learning process. Therefore, the management and management of teacher performance is an important aspect that must be considered by various parties, especially educational institutions and the government. However, in its implementation, the teacher management process still faces various obstacles, especially in terms of efficiency and accuracy. The process of recording and management teacher activities, which is mostly done manually, often causes the data produced to be incomplete or inaccurate. In addition, the lack of technology utilization causes access to teacher performance data to be slow, thereby hindering data-based strategic decision-making. This problem shows the need for a more effective and efficient management system. Information technology-based systems are a relevant solution, as they are able to provide features such as automatic attendance recording, data-driven performance evaluation, and integrated reporting. With an automated system, it is hoped that teacher performance management will become more transparent, accountable, and support the overall improvement of the quality of education. This study aims to identify the main problems in the teacher management system that is currently in use and design technology-based solutions that can improve the effectiveness and efficiency of the system. Thus, the results of this research are expected to contribute to the development of a modern teacher management system in accordance with the needs of the digital era.

The teacher management system itself has the meaning of a system designed to monitor, supervise, and evaluate teacher performance in the learning process in schools or educational institutions. The purpose of this system is to ensure that the learning activities carried out by teachers run well, in accordance with the established curriculum, and achieve the desired educational goals. School management can be carried out by school principals, education supervisors, or other related parties, and usually uses various methods, such as direct observation, interviews, surveys, or analysis of exam results and other activities.

Data inaccuracy, manual processes are prone to recording errors, such as incorrect input of attendance data, neglect of activity reports, and discrepancies between teaching time and planned schedules, Attendance data written manually is often incomplete, making it difficult to objectively evaluate teacher attendance levels. Slow Access to Information, because the data has to be processed and checked manually, information such as attendance reports or performance evaluations cannot be accessed in real-time by the principal or supervisor, to collect attendance data for a whole month, administrative staff need more than a week to calculate and compile reports.

Limitations of Performance Analysis, without an integrated system, it is difficult to analyze teacher performance based on historical data. This has an impact on strategic decision-making related to improving the quality of teaching, school principals cannot quickly identify teachers who need additional training because there are no automatic reports that show teachers' performance in teaching.

Lack of Transparency, because manual reports are only accessible to certain parties, there is no disclosure of information that can be seen by other stakeholders, such as teachers and parents of

students, teachers often do not get direct feedback on their attendance or performance, which hinders efforts to improve the quality of learning. Student management is one of the three activities carried out by schools in management and evaluating the student learning process. Each school supervises in a different way. Looking back a few years ago, the process of student management was actually very simple. When our education world uses a lot of computers, the management process will be carried out with the help of spreadsheet software such as Microsoft Excel, then the results of student management at the end of the semester can be used as a reference for evaluation from students (Baihaqi & Amalia, 2023).

Attendance management is one of the important aspects of school management, which aims to ensure student accountability, evaluate academic progress, and maintain a safe and orderly learning environment (Juansen & Simatupang, 2023). A website is a collection of pages that are interconnected and can be accessed via the internet. These pages contain information in various forms, such as text, images, videos, or graphics, which are organized using web technologies such as HTML, CSS, and JavaScript. Every website has a unique address called a URL (Uniform Resource Locator) that is used to access it in the browser.

A website is usually defined as a collection of pages that display information such as text data, image data, animation data, sound, video and or a combination of all of them, both static and dynamic which form an interrelated series where each is connected by a network of pages (hyperlinks). It is static if the content of the website information is fixed, rarely changes, and the content of the information is in the same direction only from the website owner. It is dynamic if the content of website information is always changing, and the content of the information is interactive in both directions from the owner and user of the website. An example of a static website is one that contains a company profile, while a dynamic website is such as Ticket Booking or Shopping. In terms of development, static websites can only be updated by their owners, while dynamic websites can be updated by users and owners (Batubara et al., 2022).

As technology develops, website-based systems are becoming a relevant solution. With automatic record-keeping features, integrated reporting, and high accessibility, this system is able to increase transparency and efficiency in teaching staff management. This research aims to identify the main problems in the existing teacher management system, as well as develop information technology-based solutions.

METHODOLOGY

Unified Modeling Language (UML) is a "language" that has become the industry standard for visualizing designing and documenting software systems. UML offers a standard for designing models of a system. By using UML, models can be created for all types of software applications, where these applications can run on any hardware, operating system and network, and be written in any programming language (Pangestu & Ikasari, 2023).

Analysis and design of a good point of sales (POS) application is an application that covers all the specified scope. Of course, the integration aspect between parts of a POS application is very important, where the data in the POS application interacts with each other to increase speed, accuracy and convenience.

Figure 1. POS Application Konsel Framework

The image above shows the conceptual framework for analyzing and designing POS applications. This conceptual framework describes how the POS application process was created. Making this POS application starts from collecting data through observation and interviews until implementing this POS application. With this good process, it is hoped that the POS application that is built will be effective and can accommodate all business activities/processes that occur (Permana, 2015). Data collection methods are methods or techniques used to collect information from various sources in order to obtain the data needed for research or analysis. Some commonly used methods include: a) Observation and perception are carried out directly on the Sinper Computerized Printing printer. The operation of the printing service ordering system and the data used are observed. Know the issues within the framework of agreements, requests and reports. The web-based Printing Services Ordering Information System can be used to analyze discovered problems and improve its performance and structure; b) Interview, the owner of Sniper Digital Printing is the subject of a direct interview. According to interviews, one of the problems with digital printing is that the system used is not computerized, which means providing customer service and storing archives and files which is still done manually takes quite a long time; c) Literature Study, the author conducted a literature study by collecting the necessary information and looking for references related to the observations made. Journals, reports, and books whose contents discuss designing information systems for ordering similar printing products that suit the problems faced can be used as reference sources (Casro et al., 2020); d) Literature Study, at this stage a literature review is carried out from books, journals and the internet which reviews sales, sales reports and sales inventory (Audrilia & Budiman, 2020).

The system development stage in building a goods delivery expedition management information system uses the System Development Life Cycle (SDLC) development method with a process model or waterfall paradigm. Where this describes a systematic and sequential approach to software development, starting with the specification of user needs and then continuing through the stages of planning, modeling, construction, and delivery of the system to customers/users (deployment), ending with support for the resulting complete software. The stages in the waterfall model take the basic activities used in almost all software development, so it is easier to understand, especially if only used in developing software that is not so large and complex (Vikasari, 2018); a) Requirements Analysis (System Requirements Analysis), is a requirement gathering process that is carried out intensively to specify software or software requirements according to user needs, so that users can easily understand the system to be created; b) Design, is the software design design stage as an estimate before the program code is created. System design using Flowcharts, Entity Relationship Diagrams (ERD) and User Interface design; c) Development (Program Completion), This stage is the stage where the programmer implements the design of a system that has been approved at the previous stage. Before this design is implemented, a testing process is first carried out on the program to detect errors in the system that provide feedback on the system that has been created and obtain approval regarding the system; d) Testing, all units developed in the implementation phase are integrated into the system after testing carried out by each unit. After integration the entire system is tested to check for any failures or errors.

Operation & Maintenance (Maintenance), This stage is the final stage of the waterfall model. The system has been completed and carried out maintenance. Maintenance consists of correcting errors that were not found in the previous step.

Qualitative Methods

The qualitative method is a research approach that aims to understand social phenomena or human behavior in depth, based on the perspectives and experiences of the subjects involved. This approach focuses on the exploration of meaning, process, and context, emphasizing aspects of subjectivity, interpretation, and nuance.

There are several types of qualitative research approaches, including phenomenology, ethnography, hermeneutics, grounded theory, narrative/historical, and case studies. Qualitative

research develops in the fields of anthropology, sociology, psychology and then political science, humanities and education based on several axioms (Haryono, 2023).

The case study approach is preferred for qualitative research. As Patton expresses that the depth and detail of a qualitative method comes from a small number of case studies. Therefore, case study research takes a long time which is different from other disciplines (Assyakurrohim et al., 2023).

This research uses a qualitative approach to find out the needs of the system and the existing problems faced by the school. All data was collected through in-depth interviews with school authorities such as principals, teachers, employees, and other staff. And also, the researcher has made observations that lasted for two weeks and the researcher directly observed the process of recording attendance and evaluating teacher performance. So that many problems were found that occurred in this teacher management system. To review this, the researcher made a questionnaire that is useful for obtaining data on user perceptions and needs for the system.

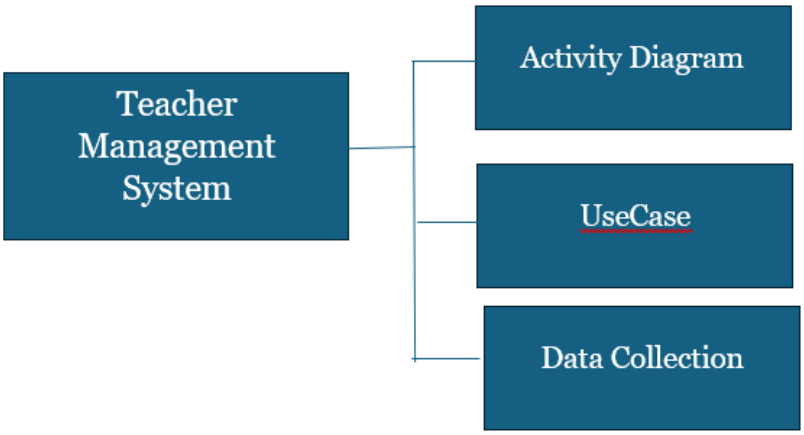

Figure 2. Method Chart

UML (Unified Modeling Language) is a visual language used to design, describe, and document software systems, especially in object-oriented software development. *UML* helps developers and other stakeholders to visualize the structure, behavior, and interactions in the system being developed.*Unified Modelling Language (UML)* is a language that is visualized in the form of images or graphics that functions to provide an overview and specification in the development and documentation of an object-oriented system *development*. *UML* provides a standard for creating a system blueprint, which can consist of business process concepts, class creation that can be outlined in a specific programming language, database design, and components needed in system development (Narulita et al., 2024).

Unified Modeling Language (UML) is a standard language used to create visual diagrams that illustrate software systems. Simply put, *UML* is like a "map" or "blueprint" that helps us understand and design a system, be it an information system, a mobile application, or any other software. *UML* is an invaluable tool for software developers and systems analysts. By understanding the basic concepts *of UML* and its various types of diagrams, we can design a better, easier to understand, and easier to maintain system (Syahputra et al.., 2024).

The research method used this time is using *Activity Diagram* and *UseCase*. This systematic approach aims to design and understand the flow of information systems, especially in the context of developing teacher management information systems.

Data Collection

Data collection is a systematic process to obtain relevant and accurate information to support research or system development. In the context of developing a website-based teacher

management information system, data collection aims to understand user needs, identify problems in the old system, and determine the technical specifications of the new system.

Interviews are conducted to get direct information from the parties involved, such as principals, teachers, and administrative staff, understand their needs and obstacles in the existing teacher management system, how is the attendance recording process carried out today? What are the obstacles that are often faced in management teacher performance? And what features are expected in the new system?

Observation is carried out by directly observing the work process in the field, such as recording attendance or evaluating teacher performance, Identifying gaps between planned and implemented procedures, Observing how administrative staff record teacher attendance, Record the time needed to conduct manual evaluation, This study involves analyzing relevant documents, Manual attendance book, Teacher performance evaluation report, Administrative staff work guide, Understand existing workflows and evaluate shortcomings in manual system documentation.

Questionnaires are used to obtain data from many respondents in a short period of time. Questions can be multiple-choice or likert scales, Measuring the user's perception and needs of the proposed system. How often do you have difficulty recording attendance? What are the most important features in a teacher management system?

Activity Diagram

Activity Diagram deep *UML (Unified Modeling Language)* is a diagram used to illustrate the workflow or process in a system. This diagram visualizes the steps or activities that must be taken to achieve a specific goal, as well as how the flow between those activities interacts. Activity diagrams are often used to document business processes, workflows, or execution sequences within an application.

An Activity Diagram is a diagram that depicts the flow of functionality from a system. In the system modeling stage, activity diagrams can be used to show the work flow of the system and can also be used to illustrate the flow of events (Dirgantara & Suryadarma, 2021).

Activity Diagram is a way to reveal procedural logic in business processes and work circulation in several cases/incidents. *Activity diagrams* have a similar role to flowcharts, but the difference with *flowcharts is that they are an activity diagram* that describes activities from start to finish, while flowcharts describe mechanisms by adjusting logic to algorithms. In other words, an activity diagram describes the many streams of activity in the system that are being designed, how each circulation begins, the decisions that may occur, and how they end. Activity diagrams can also describe parallel processes that may occur in some cases (Hafsari & Maulana, 2023).

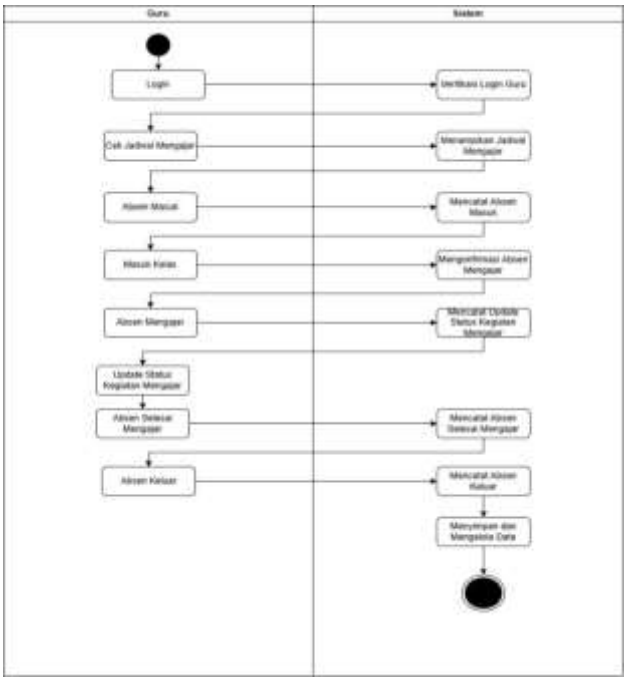

Figure 3. *Activity Diagram*

At *Activity Diagram* The above describes the interaction between the teacher and the system in a flow related to teaching. The first thing that teachers do is *Login* into the system after which the system will verify *Login* If successful, the process will continue. Second, the teacher will check the teaching schedule and then the system will display the relevant teaching schedule, third, the teacher will make an incoming absence as a sign that they will start teaching and then the system will record the teacher's absence. Fourth, the teacher will enter the classroom to start teaching, the system will confirm that the teacher is really in the classroom according to the teaching schedule. Fifth, the teacher will mark that the teaching activity is in progress and then the system will record or record it.*Update* the status of teachers' teaching activities. Sixth, teachers will update the status of teaching activities if needed, for example completing certain tasks and then the system will record the update. Seventh, the teacher is absent as a sign that the teaching session is over and the system will record the absence after teaching. Eighth, the teacher will do an exit absence to mark that they are complete with all activities and then the system will record the exit and manage the data. And lastly, the system will store and manage all the data recorded during the above process.

UseCase

UseCase is a term used to describe the way a system or product is used by its users to achieve a specific goal. Use cases are often used in software development and system analysis to describe the interaction between users (actors) and systems.

The UseCase Diagram depicts the relationship between the user and the overall system (Pratama et al., 2024).

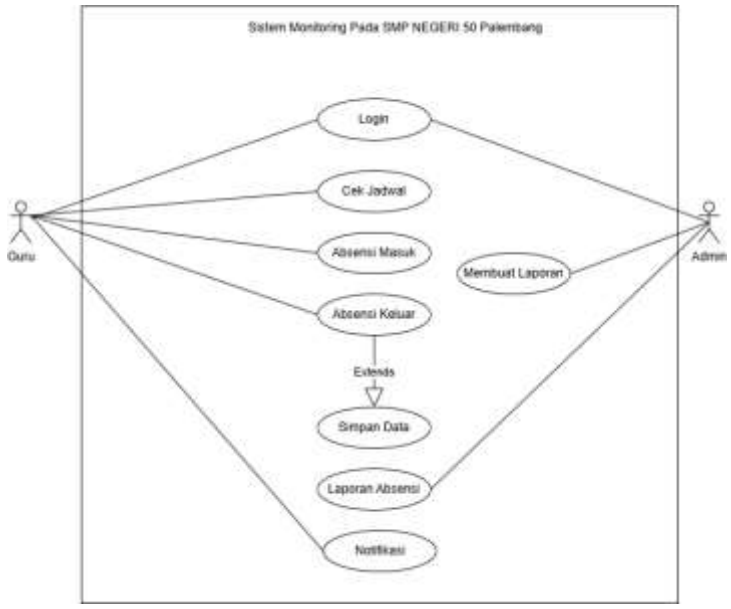

Figure 4. *usecase*

The *UseCase* above describes the interaction process between teachers and admins. Teachers and admins will log in because they have to log in to the system to get access to other features, then teachers can check the teaching schedule or activities that have been registered in the system. Then the teacher will record attendance when starting teaching activities, and the teacher will also record attendance when finishing the activity or teaching. Attendance data will be saved into the system as a record. Teachers can also view or access reports related to attendance. The admin will be tasked with creating reports based on attendance and schedule data. Teachers get notifications or notifications related to schedules, data changes, or other important information.

RESULTS AND DISCUSSION

To run the data processing application, this is done using the Netbeans and Xampp programs. The steps to carry it out are as follows: 1) Click start; 2) Select Xampp, then click the start button on Mysql Server; 3) Then open the Netbeans program; 4) Select and click the project you want to use, and run the application by pressing the F6 key.

Next, in this stage, we will explain the steps to operate the application.

This Main Menu page consists of 4 parts, namely the home page, school data page, subject data page and teacher data page. In a teacher management information system, results refer to information or outputs obtained after the management process is carried out, which can be used to evaluate teacher performance, the development of the learning process, or other relevant aspects. As in the following picture.

The Teacher Data page is a page that is managed by the admin by inputting, managing and editing teacher data. Processing teacher data includes input number, employee identification number, NUPTK, teacher name, subject, position. So that every teacher can see and manage materials and teaching materials. The Teacher Data menu displays all teacher data.

Figure 5. Teacher data

The Subject Data Page is a page for inputting subjects by the admin starting from the subject code, the subject, the teacher who teaches, the Employee Identification Number. The input for this subject is input by the admin, processing by the admin, while the subject teacher can upload or insert files or data during the teaching and learning process. The subject Data Menu displays all subject data so that teachers can easily see the teaching and learning schedule. And teachers can see the NIK and the subjects that will be included.

Figure 1.2 Subjects data

The School Data page contains about us, about us is a comprehensive introduction to the school, SMP N 50 Palembang is a state school located on Jalan Letjen Bambang Utoyo Number 119A, Ilir Timur III District, Palembang City, South Sumatra 30114. Apart from a brief introduction to the school on the website monitoring system there is our program, this is an introduction to academic programs, extracurriculars and leadership training programs. Our page also contains the facilities at SMP N 50 Palemabng, starting from the computer laboratory, library, sports fields and other supporting facilities. Our contact also contains the social media address and telephone number and cellphone number for the school marketing department. On the School Data Menu, it displays all programs and facilities in the school.

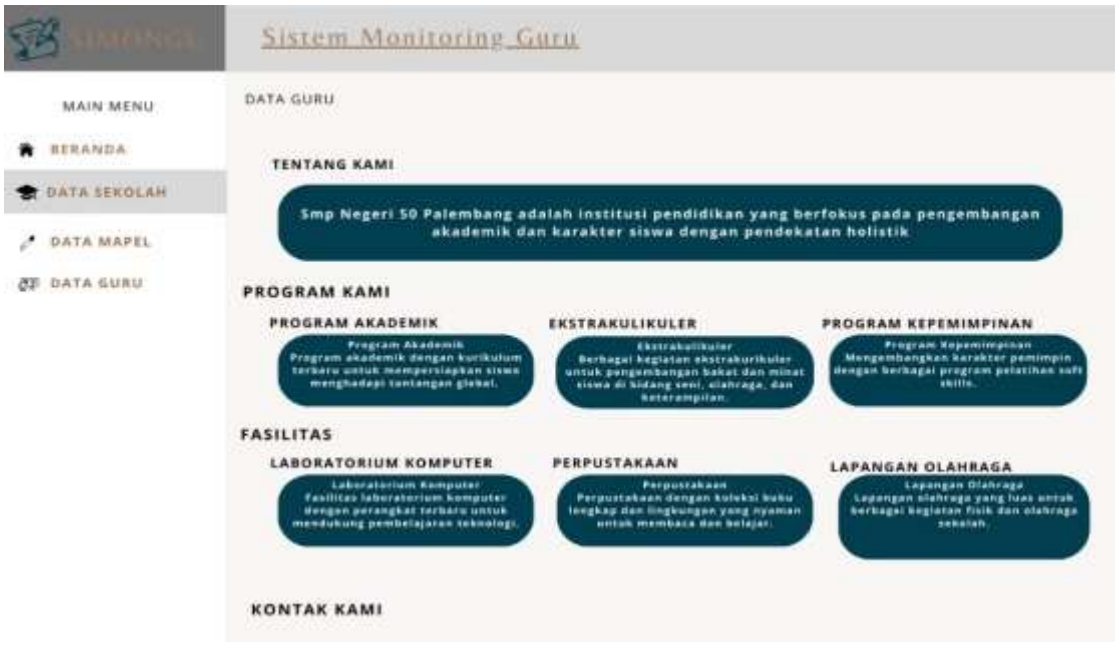

Figure 6. school data

The main page of the home page menu contains a dashboard of the total number of teachers, the number of teacher absences, whether present or not present. The home page of this book can find out in real time the number of teachers who have been absent and those who have not. So with the following display, stakeholders in the school environment can know the presence of teachers at school. Furthermore, on this home page we can see and find out the performance of teachers in schools with one platform so that all teachers can access the following home page.

Figure 7. Homepage

On the home page, the total number of teachers in the school, teachers who are present at that time and teachers who have not yet attended.

CONCLUSION

The website-based teacher management information system designed and developed in this study is able to provide solutions to various problems found in the manual system. First, the system successfully addresses data inaccuracies by providing more structured and accurate automated attendance recording. Attendance data that was previously prone to errors can now be recorded in real-time with a 100% accuracy rate. Second, the problem of slow access to information has

also been successfully overcome with a report feature that is available in real-time, allowing principals and other stakeholders to access information quickly and efficiently. This has a direct impact on a faster and more timely decision-making process.

In addition, this system answers the limitations of performance analysis through historical data-based evaluation features. School principals can now monitor teacher performance in depth, including identifying training needs or interventions to improve the quality of learning. The problem of lack of transparency has also been successfully overcome through reporting that can be accessed by various parties, including teachers, thereby increasing accountability and trust in the management of teaching staff.

The implementation of this system shows an increase in school operational efficiency of up to 40%, especially in the preparation of reports and data analysis. With the integration of web-based technology, this system not only makes it easier to manage school administration but also contributes to the creation of a more modern, transparent, and professional educational environment. The overall results show that this system provides a significant and relevant solution in answering the problems faced by schools in the digital era. As such, the research provides a solid foundation for further development, including integration with academic systems and the development of mobile applications for wider accessibility.

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