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Designing a Web-Based Student Attendance System for Madrasah Ibtidaiyah Al Hikmah Debong

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Abstract

Monitoring student attendance at school is a shared responsibility between the school and parents or guardians. However, the manual attendance system currently in use often leads to issues, such as students being absent without permission and going unnoticed. For instance, a student may inform their parents that they are going to school but fail to attend classes. This situation raises serious concerns for both the school and parents, as it impacts student discipline and supervision.

To address these issues, a web-based student attendance system is required to monitor attendance more effectively and in real time. This system is designed with the primary goal of enhancing the efficiency of attendance data management, minimizing human errors in attendance recording, and providing convenience for parents and school administrators in monitoring student attendance.

This study aims to contribute to the field of education by developing a modern, efficient, and integrated attendance tracking technology. The proposed web-based attendance system not only automatically records student attendance but also generates accurate attendance reports that can be accessed anytime by relevant stakeholders. Therefore, this system is expected to improve transparency, effectiveness, and accountability in supervising student attendance at Madrasah Ibtidaiyah Al Hikmah Debong.

***Keywords**: Student Attendance, Web-Based, Effectiveness, Design, Real-Time.*

1. Introduction

The rapid development of information technology in Indonesia has become an integral part of various sectors, including education. Initially, information technology was primarily utilized by large corporations to support business operations. However, its use has now expanded to organizations of all sizes, including primary, secondary, and high schools. Information technology not only improves work efficiency but also provides innovative solutions for managing complex data such as student records, teacher data, grades, and attendance. As highlighted by Indra et all [1], implementing information systems in the education sector significantly enhances operational efficiency and institutional performance.

In the education context, integrating information technology offers numerous benefits, including simplifying administrative processes. One such application is web-based information systems, which facilitate easy access to information for various stakeholders. Parents, guardians, or the general public can conveniently obtain school-related information by accessing the school's website. These systems not only save time and costs but are also designed to be user-friendly, requiring no specialized technical skills for operation [2].

Madrasah Ibtidaiyah (MI) Al Hikmah Debong Wetan is one of the educational institutions that still relies on manual student attendance recording using Microsoft Excel. This approach often faces multiple challenges, such as human errors, the risk of data loss, and difficulties in managing scattered data. These challenges pose significant issues for the school, especially in ensuring the accuracy and efficiency of attendance data management [3]. A common issue is students being absent from school without permission, even though they inform their parents that they are going to school. Such situations create concerns not only for the school but also for parents who cannot monitor their children's attendance directly [4]. Therefore, a technology-based solution is needed to minimize errors, enhance efficiency, and provide real-time access to attendance information.

The design of a web-based student attendance system is expected to address these challenges. This system enables more effective and efficient management of attendance data while providing convenience for schools and parents to monitor students' attendance. With real-time accessibility, the system can also deliver comprehensive and accurate attendance reports [5]. This study aims to design a web-based attendance system that can be implemented at MI Al Hikmah Debong Wetan. The research focuses on system requirements analysis, design, and testing the system's effectiveness in supporting student attendance management [6]. Additionally, the system is designed with considerations for data security and ease of use, ensuring broader applicability within the school context.

By introducing this web-based attendance system, it is expected that schools can reduce errors in attendance recording, enhance operational efficiency, and provide peace of mind to parents in monitoring their children's school activities [7]. Furthermore, this study aims to contribute to the advancement of educational technology in Indonesia, particularly in creating technology-based solutions that support more effective and efficient data management.

2. Research Methodology

The data collection methods used in this study involve three main approaches: observation, interviews, and literature review. Observation is employed to directly observe activities related to the student attendance process. As explained by Wahyuni et all [8], observation is a data collection technique that involves monitoring ongoing activities. In this study, the researcher directly observed the student attendance activities at Madrasah Ibtidaiyah (MI) Al Hikmah Debong Wetan to understand the situation in the field in detail. This technique allows the researcher to gather accurate and comprehensive information about the issues being investigated.In addition to observation, interviews were conducted to complement the collected data. According to Maimunah et all [9], the interview method is a data collection technique that involves direct question-and-answer sessions with relevant parties. The researcher interviewed the school principal, class teachers, and school operators to gather information about the challenges faced in the manual attendance system and the requirements expected from the newly designed system. The information gained from these interviews enriched the data collected through observation, providing insights that could not be obtained otherwise.

Literature review also plays a crucial role in data collection. As stated by Astika et al [10], literature review involves gathering data from indirect sources such as books, journals, and relevant websites. In this study, the literature review was conducted to obtain theoretical and practical references that support the design of a web-based attendance system. The information gained from this review was used to understand fundamental concepts, which became the foundation for designing the system. In the analysis phase, this study adopts a descriptive qualitative approach to present field data in a structured manner. This approach aims to understand the facts and quality of education, including the student attendance process. The needs analysis is conducted to ensure that the system being developed meets the users' needs. During this process, the researcher identifies the hardware and software specifications required for the system, such as an Intel Pentium IV processor, 2 GB RAM, and an Apache web server. This analysis forms the basis for designing an efficient system that aligns with the identified needs. The system design process begins with the creation of an Entity Relationship Diagram (ERD), which illustrates the relationships between entities in the system. ERD is used to visualize the database structure, ensuring that data relationships are well understood. This diagram helps ensure that the data stored in the system can be accessed and managed effectively.

In addition to ERD, Unified Modeling Language (UML) is used as a visual modeling tool., UML is a modeling method that aids in the structured design and description of systems. UML is used to create various relevant diagrams, such as activity diagrams and class diagrams. The activity diagram depicts the workflow in the system, while the class diagram maps the relationships between objects in the system, including the attributes and functions of each object. With these structured methods and phases, this study aims to design a web-based attendance system that can improve administrative efficiency at MI Al Hikmah Debong Wetan. It is expected that the system will minimize data errors, streamline attendance processing, and support data-driven decision-making. The implementation of this system will not only provide technical benefits but also contribute to the enhancement of educational quality through improved administrative processes.

3. Result and Discussion

The primary objective of this study was to analyze and develop a more efficient and structured student attendance system at MI Al Hikmah Debong Wetan. The data collection process was conducted using various methods, such as observations, interviews, and literature reviews, which helped identify existing problems and needs. The results of this system analysis were then translated into a system capable of automatically processing student attendance data and assisting the school in making data-driven decisions based on accurate information.

One of the key results obtained from the developed system is the daily attendance report generated by the system. This report plays an essential role as a tool for reporting student attendance to the school principal and homeroom teachers. The report is printed on paper with two copies, distributed every day. Each report contains comprehensive information about student attendance, which helps monitor their discipline levels. In this context, the report also facilitates the school principal and homeroom teachers in identifying frequently absent students and planning appropriate measures to improve discipline. The attendance data, collected daily by the teachers, is submitted on paper to the administrative department for processing. The administrative department is responsible for summarizing and processing the attendance data accurately and storing it in the system's database. This process is crucial for ensuring that the recorded data is reliable and can be accessed easily by relevant stakeholders, including the school principal and the student affairs department.

The student affairs department then analyzes the attendance data processed by the administration. They identify students with high and low absenteeism levels. This analysis is essential for designing programs or activities aimed at improving student discipline. For example, for students with high absenteeism, the student affairs department can develop strategies for disciplinary recovery or impose appropriate sanctions in accordance with school policies. This analysis also serves as a consideration for the principal in determining the next steps.

The school principal plays a crucial role in decision-making regarding attendance management. After receiving the reports and analysis results from the student affairs department, the principal provides guidance and policies needed to address absenteeism issues. The principal also monitors and evaluates the attendance data processing to ensure the system is functioning as intended and delivering optimal benefits. The decisions made by the principal will influence the steps taken by teachers and the administration in managing student attendance data.

Additionally, parents play an active role in this system. The school regularly provides information about students' attendance to parents, allowing them to actively participate in improving their children's discipline. Communication between the school and parents is essential for enhancing student attendance, especially for those with high absenteeism. With a system that integrates all involved parties, the attendance management process becomes more effective and efficient. To better illustrate this, the following is a Flowchart that shows the flow of attendance data processing at MI Al Hikmah Debong Wetan. This flowchart depicts the interaction between teachers, administrative staff, student affairs, the principal, and parents within the new attendance system. Each element in the system has clear roles and responsibilities, starting from the teacher recording attendance to the parent receiving information and coordinating with the school.

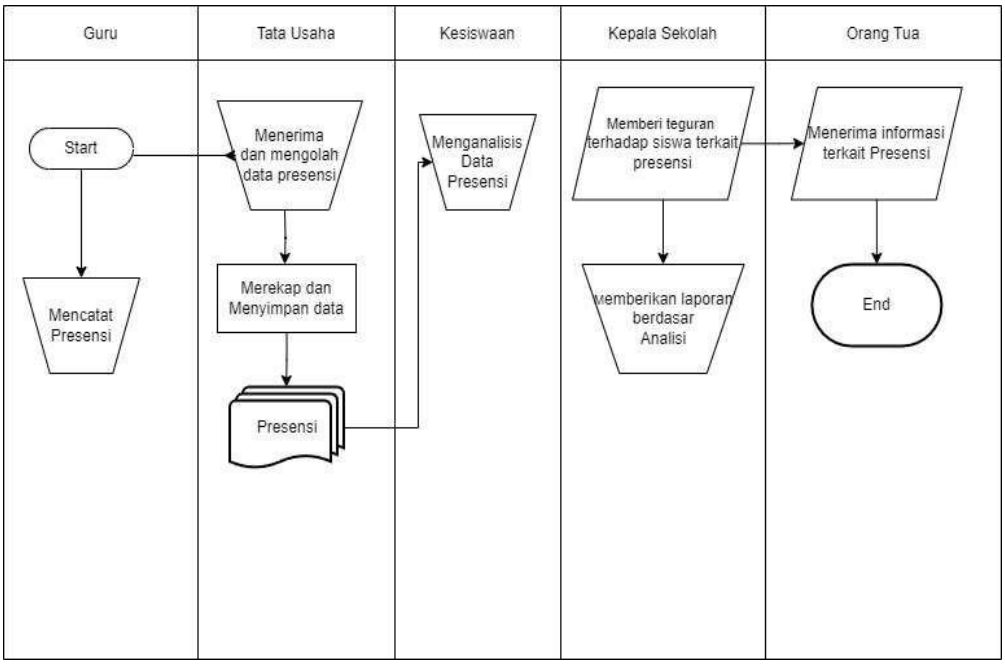

Fig. 1: Flow of Document for Student Attendance

This flowchart visualizes how attendance data moves through the system, from collection by teachers, processing by the administration, analysis by student affairs, evaluation by the principal, to communication with parents. With this structured system in place, it is expected that all involved parties will be able to work more efficiently and effectively. The implementation of technology in this system provides benefits in terms of faster, more accurate data processing and easier monitoring.

Overall, the implementation of the web-based attendance system at MI Al Hikmah Debong Wetan has had a positive impact, both in terms of administrative efficiency and data-driven decision-making. Moving forward, this system can be further developed to include other aspects of school administration, such as grade reporting and extracurricular activities, to enhance overall school management quality.

3.1. Usecase Diagram

In the context of managing student attendance data at MI Al Hikmah Debong Wetan, the developed system involves three main actors: Admin, Principal, and Teacher. Each actor has distinct roles and functions related to the processing of student attendance data, presented in the form of a **Use Case Diagram** to illustrate the interactions between the actors and the system. This diagram helps visualize the process flow within the attendance system, which involves activities such as login, data management, and report printing.

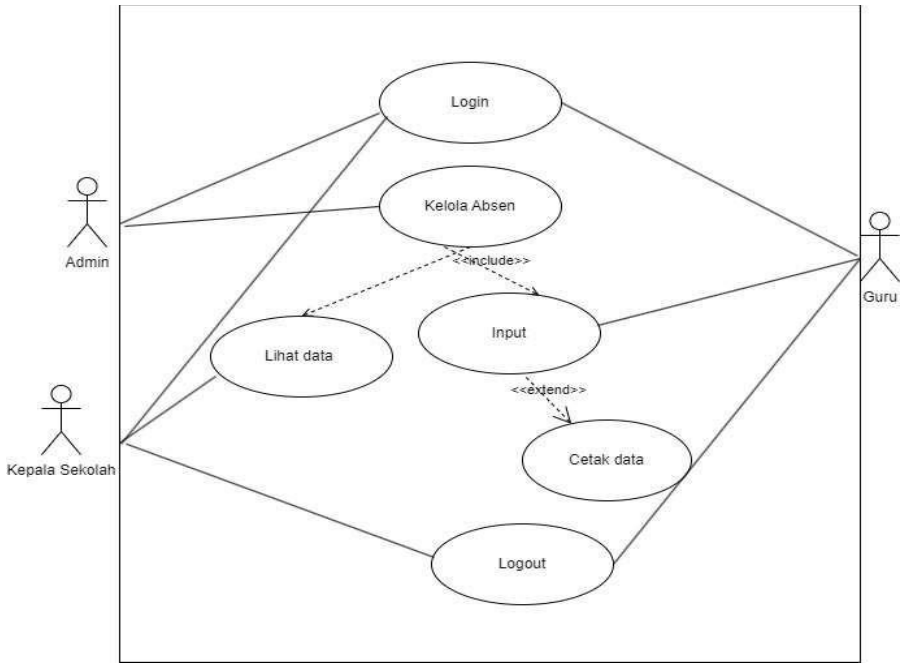

Fig. 2: Usecase Diagram of Student Attendance

The Admin, as the main system manager, plays a crucial role in the operation of the attendance system. The Admin can access the system by logging in first to ensure data security. Once logged in, the Admin has the ability to perform several important actions, such as managing student attendance data, i.e., entering daily attendance data submitted by the teachers. The Admin can also print attendance reports to be

handed over to relevant parties, such as the Principal and Teachers. The ability to print attendance reports is vital in providing information regarding student discipline. The Principal, as the decision-maker at the managerial level, also has access to the system after logging in. The Principal's main function is to view the student attendance data that has been processed by the Admin. With this access, the Principal can monitor student attendance levels and take necessary actions to improve discipline. For example, if there are students with high absenteeism rates, the Principal may formulate policies or instruct the Teacher or Admin to take further steps. After reviewing the data, the Principal can log out to maintain system access security.

The Teacher, who is directly responsible for recording daily student attendance, also plays an important role in this system. The Teacher can log in to the system with their account to begin inputting attendance data. Every day, the Teacher records student attendance and enters the data into the provided system. The Teacher also has the right to print the attendance report as proof of attendance, which will be reported to the Administration or Principal. This printing feature greatly assists the Teacher in verifying student attendance directly.

This Use Case Diagram illustrates the interconnections between the actors and the system. The interaction between the Admin, Principal, and Teacher is clearly depicted, with each actor having different access rights. The Admin focuses on data management and report printing, the Principal has the right to monitor and analyze data, while the Teacher is primarily focused on inputting daily attendance data. This diagram clearly shows that each actor plays an essential and supportive role in achieving an efficient attendance management system. The login process is a crucial starting point for each actor. Each actor must first log into the system to access the functionalities provided. With login credentials, the system ensures that only authorized actors can perform certain actions, such as data management or report printing. Data security is highly prioritized in this system, so login becomes a critical step in safeguarding the confidentiality of student information.

Next, the Admin has full authority over managing student attendance. The Admin can input attendance data collected by the Teacher, verify its accuracy, and then print reports to be distributed to the relevant parties. This task includes important administrative duties to ensure that all student attendance data is managed well and accurately. This process also guarantees that the generated data is valid and accountable.

The Principal's function is to monitor and evaluate student attendance data that has been processed by the Admin. The Principal can view the overall student attendance data to gain an overview of student discipline. From this data, the Principal can determine necessary steps to address absenteeism issues, such as designing programs or imposing sanctions on students with high absenteeism. With the ability to directly view the data, the Principal can make informed decisions to support student discipline management. The system also facilitates interaction between the Teacher and Admin through the printing of attendance reports. After inputting attendance data, the Teacher can print the report for administrative purposes or to hand it over to relevant parties, such as the student's parents or the Principal. The report printing feature makes the reporting process more efficient and transparent. Overall, the Use Case Diagram for the student attendance system provides a clear depiction of the interactions between the actors in managing attendance data. This system optimizes the role of each actor by granting access rights based on their respective duties and responsibilities. It is hoped that this system will enable more efficient, secure, and transparent management of student attendance.

3.2. Class Diagram

In this section, the Class Diagram is discussed, which illustrates the structure and relationships between classes within the student attendance management system at MI Al Hikmah Debong Wetan. This Class Diagram serves as a visual representation of the system's elements, including the main classes, attributes, and methods. In the context of this attendance system, the Class Diagram provides an overview of how student attendance data is processed, stored, and managed by various actors within the system.

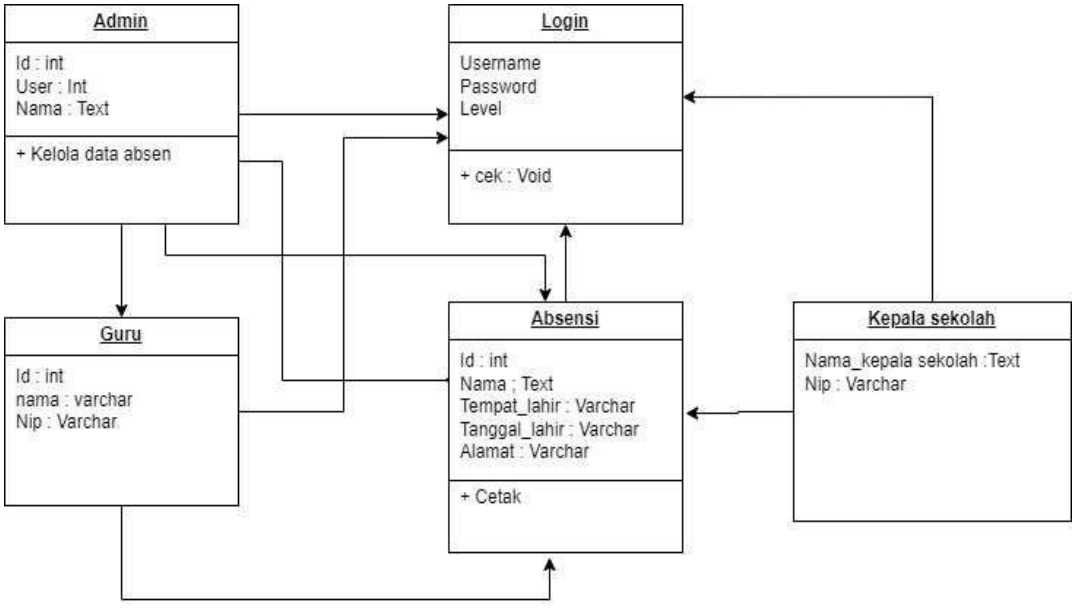

Fig. 3: Class Diagram of the Student Attendance

The primary classes in this Class Diagram include the Admin, Teacher, Headmaster, and Student Attendance classes. Each class has attributes and methods relevant to the role it plays in the system. The Admin class is responsible for managing the overall attendance data. This class has attributes such as name, email, and access rights to manage attendance, as well as methods like login, manage attendance, and print reports. The login() method is used for authentication, while the manage Attendance() method allows the Admin to input, modify, or delete attendance data. The Teacher class plays a primary role in inputting daily attendance data. Attributes within this class include

name, teacher ID, and the class being taught. Methods in this class include input Attendance(), which is used to record student attendance on a given day, and print Report(), which allows the teacher to print attendance reports that have been entered into the system. This class directly interacts with the Student Attendance class, which stores the attendance data in a structured format. The Headmaster class is responsible for monitoring the attendance data that has been managed by the Admin and Teacher. Attributes in this class include name, position, and access to view attendance data. The Headmaster can access attendance data using the view Data() method, which enables the headmaster to monitor student attendance levels, identify attendance issues, and issue policies related to attendance management. This class interacts with the Student Attendance class to gain a comprehensive view of student attendance at the school.

The Student Attendance class stores detailed information about student attendance on a daily basis. The main attributes of this class are StudentID, date, and attendance_status (present, permitted, sick, or absent). This class has methods such as add Attendance() to add new attendance records and remove Attendance() to delete invalid records. The attendance data stored in this class will be accessed by the Admin and Teacher for further management and by the Headmaster for data analysis. The relationships between the classes in this Class Diagram illustrate the interactions between the actors and attendance data. The Admin manages the attendance data entered by the Teacher and oversees the data, while the Teacher has the right to input and print attendance reports. The Headmaster monitors the attendance data managed by the Admin and provides direction regarding student attendance policies. The Student Attendance class functions as the central data storage that can be accessed by all actors in the system for reporting and evaluation purposes.

The structure of this Class Diagram also reflects the application of object-oriented programming (OOP) principles, where each class serves to group data and methods related to specific actors and tasks within the system. These classes are connected through associations and the use of methods that allow access to or manipulation of data in other classes. This demonstrates the importance of encapsulation, inheritance, and polymorphism in designing efficient and maintainable systems. Through this Class Diagram, the flow of student attendance management becomes clearer and more organized. Each actor has appropriate access rights and responsibilities, and the classes supporting this process interact in an organized manner. With this diagram, developers can more easily understand the flow and relationships between system elements, which in turn facilitates the implementation and maintenance of the student attendance system at MI Al Hikmah Debong Wetan. Overall, this Class Diagram provides a comprehensive and efficient design to support student attendance management. By ensuring clear role division between the Admin, Teacher, and Headmaster, and by designing classes that interact effectively, this system is expected to operate smoothly, providing ease of use for all involved actors and meeting the goal of accurate and effective attendance management.

4. Conclusion

The processing of attendance data at MI Al Hikmah Debong Wetan has been carried out manually using paper media. In this process, teachers are required to record student attendance daily in an attendance book and then submit the data to the administrative staff for further processing and storage. Although this system has been functioning well for years, it has several limitations that can affect the effectiveness and efficiency of data processing. One of the main issues faced is the high potential for human error in recording and processing data manually. Such errors could include writing mistakes or miscalculations, which in turn can affect the accuracy of the attendance reports submitted to the school principal and parents. Additionally, data processed manually is highly vulnerable to loss or damage. The paper media used for data recording is susceptible to physical damage, especially in the event of natural disasters, fire, or other physical mishaps. Dependence on paper as the medium for data storage makes it difficult to search for and retrieve information when needed. In the case of data loss or damage, it can be detrimental to the school's reporting and further management of attendance data.

In light of these problems, the design of a computerized attendance system could be a suitable solution to replace the current manual system. The information system designed for attendance at MI Al Hikmah will enable teachers to record student attendance directly through an easily operable application. By using this system, attendance data will be easier to store, process, and access without concerns about data loss or damage. This system will provide higher accuracy and better efficiency in attendance data processing. A computerized system also allows for real-time data integration, where any changes made by the teacher in recording attendance will be immediately reflected in a secure database. This not only reduces the chances of errors in recording but also enables the administration to manage data more quickly and accurately. Furthermore, attendance reports can be printed automatically without waiting for the manual process, providing convenience for both teachers and administrative staff.

Another advantage offered by this computerized system is the ease with which attendance reports can be generated. Teachers can directly print student attendance reports in the specified format without having to perform manual calculations. These reports can also be customized based on the needs, whether for daily, weekly, or monthly reporting. This will undoubtedly save time and effort that was previously spent on creating manual reports. Overall, the processing of attendance data through a computerized system provides numerous benefits, such as time efficiency, data accuracy, and error reduction. With this system, teachers no longer have to worry about losing attendance data or making incorrect calculations. Instead, they can focus more on teaching activities, while attendance data management can be handled automatically and efficiently.

However, the implementation of this computerized system also requires careful planning and support from the school, particularly in terms of providing adequate hardware and software. In addition, training for users, especially teachers and administrative staff, is crucial to ensure that they can use the system effectively. Without adequate training, the possibility of errors in using the system remains. Therefore, while the use of a computerized system offers many advantages, the challenges in its implementation also need to be addressed. The successful management of this system will heavily rely on the availability of sufficient resources and the preparedness of all involved parties to use the system. It is hoped that the computerized attendance information system can function optimally and provide long-term benefits for MI Al Hikmah Debong Wetan. Based on the conclusions presented, the researcher suggests that MI Al Hikmah should immediately shift from the manual attendance data processing system to a more modern and efficient computerized system. The use of a computerized information system will make attendance data processing easier with higher accuracy, reduce the risk of recording errors, and prevent data loss due to damage or natural disasters. Therefore, it is crucial to design and implement a system that meets the school's needs as soon as possible.

Additionally, the designed attendance information system must prioritize user-friendliness for its users, particularly teachers and administrative staff who may not be very familiar with technology. The system's features should be designed to be easily accessible and used without requiring high technical skills. For example, the user interface should be simple and intuitive so that teachers and administrative staff can immediately understand how to use the system without difficulties.

It is also important to ensure that this attendance information system is equipped with sufficient features to support various administrative needs, such as automatic report generation, student attendance data management, and the printing of reports in accordance with the school's standards. By doing so, the system will not only make it easier for teachers to record student attendance, but it will also provide convenience for the school principal in monitoring student attendance and making decisions based on accurate data.
Moreover, it is essential to provide the necessary infrastructure to support attendance data management, such as hardware (computers, printers, etc.) and appropriate software. Without adequate resources, the implementation of this computerized system will not function smoothly. Therefore, the school must plan and allocate funds to purchase the required equipment to ensure the proper functioning of the attendance information system.

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