Developing Kindergarten Management System for Supporting the Regional Educational Report

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Abstract

Administrative tasks in early childhood education centers often face challenges when conducted manually, leading to delays in reporting, data inconsistencies, and limited access for parents. Unlike conventional school management systems, this study specifically targets kindergarten-level reporting that aligns with regional government formats (Korwilkersatdik) in Indonesia. To address these issues, this study focuses on designing and developing a web-based information system to help manage administrative and reporting activities at TK Dharma Wanita 91 Pesanggaran, a kindergarten in Banyuwangi, Indonesia. The research applied a descriptive qualitative method and followed a structured software development process, including system analysis, design, implementation, and evaluation. The system was built using PHP with the CodeIgniter framework and MySQL as the database. It includes modules for student registration, payment validation, attendance tracking, lesson planning, and monthly report generation. Each module was tested using black-box testing and successfully met functional requirements. The implementation of the system significantly reduced manual workload, improved reporting accuracy, and facilitated better communication with parents. The results indicate that the system effectively supports the institution's operational needs and aligns with reporting standards set by local education authorities. Future development may focus on adding mobile accessibility and analytical features to provide broader access and deeper insights for school management. This study demonstrates how a domain-specific information system can significantly improve the efficiency of kindergarten administration while meeting government reporting standards.

1. Introduction

The development of high-quality human resources (HR) is widely recognized as one of the fundamental pillars for driving a nation's growth and competitiveness in the global era. One of the most strategic ways to build competitive HR is through education[1]. Among the various strategies to build competitive HR, education remains the most strategic and sustainable investment. In Indonesia, this commitment is supported by Government Regulation No. 47 of 2008 on Compulsory Education, which mandates the provision of basic education for all citizens to ensure they acquire the knowledge and skills needed to compete globally. To realize this vision, not only the quality of teaching but also the effectiveness of educational management and administration must be continuously improved.

Furthermore, Law No. 23 of 2014 on Regional Government grants authority to local governments to coordinate and provide educational services in their respective areas. This policy covers all levels of education, from early childhood to higher education. One of the earliest formal educational institutions in this system is kindergarten, which plays a crucial role in shaping children's character and cognitive development through enjoyable, play-based learning approaches[2].

TK Dharma Wanita 91 Pesanggaran is a kindergarten located in the Pesanggaran Subdistrict, Banyuwangi Regency, East Java, Indonesia. Since its establishment in 2007, the institution has strived to provide quality early childhood education and has earned a "B" accreditation. In carrying out its daily operations, the school follows the guidelines issued by the Ministry of Education, covering key administrative processes such as student registration, preparation of learning schedules, attendance tracking, and the submission of monthly reports to the Korwilkersatdik (Coordinator of Educational Work Units). These reports must adhere to formats and timelines specified by the Ministry to ensure compliance with national education standards. However, despite the clear guidelines and commitment to service, the administrative processes at TK Dharma Wanita 91 Pesanggaran are still managed manually. This traditional approach presents several challenges, including frequent delays in report submission, difficulties for parents in obtaining up-to-date information on registration requirements, and inefficiencies in recording and tracking student attendance due to the use of paper-based records. Such challenges not only increase the workload for teachers and administrative staff but also impact the timeliness and accuracy of reporting, which is essential for monitoring and evaluation by local education authorities.

Currently, all operational processes at the institution are still conducted manually. This situation leads to several issues: delays in monthly report submission, lack of clear information for parents about the required documents for student registration, and inefficient attendance tracking due to misplaced paper records. These problems hinder the institution's ability to deliver timely and effective educational services. Several studies have explored the development of Information and Communication Technology (ICT) applications in early childhood and school management settings[3], [4]. In contrast to these works, our system specifically addresses the integration between kindergarten-level data management and the regional educational reporting system, which is less commonly discussed in previous literature. To address these challenges, it is necessary to develop an integrated information system that can streamline data management and monthly report generation in accordance with national education standards. Such a system is expected to accelerate reporting, facilitate the registration process, and improve the accuracy and efficiency of attendance tracking—thereby enhancing the overall quality of educational services in TK Dharma Wanita 91 Pesanggaran.

2. Research Method

This study employed a descriptive qualitative approach combined with a structured software development process to design and implement a web-based information system tailored to the administrative needs of TK Dharma Wanita 91 Pesanggaran. The research was conducted on-site to ensure that the system aligns closely with the school's actual needs and daily operational conditions.

In the initial phase, a requirement analysis was carried out through direct observation, interviews with the school principal and administrative staff, and a review of existing manual documents used for registration,

attendance, payment records, and monthly reporting. This process helped identify the main administrative problems and define the functional requirements that the new system should address.

Next, the system design stage involved creating system models and database structures including input output flowchat (IOFC) were developed to map the interactions between users and the system. The database schema was designed using MySQL to store and manage data efficiently and securely. Prototypes of user interfaces were also created to ensure the system would be user-friendly for teachers and staff with limited IT experience.

In the implementation phase, the system was developed using the PHP programming language and the CodeIgniter framework. CodeIgniter was selected over other PHP frameworks due to its lightweight footprint, ease of deployment, and suitability for educational institutions with limited IT infrastructure[5], [6], [7]. It also offers built-in security features such as input filtering and session management, which help safeguard sensitive data[8], [9], [10]. In terms of data protection, basic security considerations were implemented, including user authentication, role-based access control, and secure storage of student and guardian data to prevent unauthorized access. Uploaded documents (e.g., birth certificates and payment receipts) were stored in restricted directories with access limited to authorized administrative users only. The main modules implemented include student registration, payment validation, attendance tracking, lesson planning, and monthly report generation.

Once implementation was complete, the testing phase was conducted using the black-box testing method. Each module was tested to verify that it performed its intended functions correctly, such as ensuring that data input forms work as expected and reports are generated accurately according to the Ministry of Education's required formats.

Finally, the system underwent evaluation involving actual users—teachers, administrative staff, and selected parents. User feedback was collected to assess system usability, reliability, and its impact on reducing manual workload and improving reporting accuracy. The evaluation results provided valuable insights into the effectiveness of the system and highlighted potential areas for future improvement, such as mobile accessibility and additional data analytics features.

3. Result and Discussions
This section describes the design and development stages of the web-based administrative information system created for TK Dharma Wanita 91 Pesanggaran. The design process was carried out based on the results of the requirements analysis to ensure that the system meets the institution's operational needs.

Data collection was carried out using three techniques: observation, interviews, and document analysis[11]. Observation was conducted to study the actual workflow and the problems occurring in the field[12]. Interviews [13] were conducted with administrative staff, the principal, and teachers to gather detailed information about their roles, challenges, and needs. Document analysis was performed on official forms such as student registration sheets, attendance records, lesson plans, and monthly reporting formats provided by the local Education Office.

The analysis stage involved identifying inputs, outputs, control, and file components (IOFC) for each process to clarify how the system should operate[14]. Additionally, a cause-effect analysis was conducted to map out the root causes of delays and inefficiencies in the existing process. This analysis served as the foundation for designing a solution in the form of a structured information system[15]. Figure 1 illustrates the Input-Output-Function Chart (IOFC) for the monthly reporting module, showing how input data is processed and transformed into structured reports according to the school's standard format. Figure 1 shows the input-output-function chart (IOFC) for the monthly reporting module. It illustrates how raw data (e.g., student attendance, teacher logs) flows through the system to produce standardized reports required by the education authority.
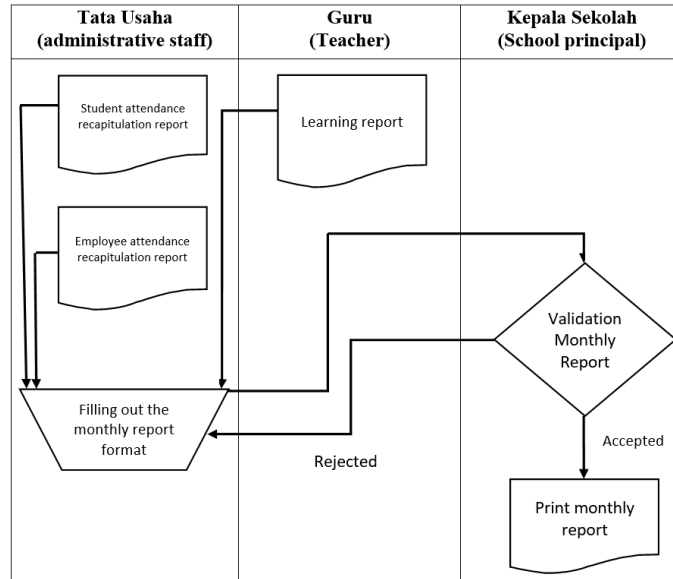
Figure 1. IOFC monthly report of the TK Dharma Wanita 91 Information System

To depict the interaction between the system and its external actors, a context diagram [16] was created (see Figure 2. Element names are presented in Indonesian to match the school's operational terminology). This diagram shows six main actors: administrative staff (tata usaha), curriculum coordinator (Ka kurikulum), teachers (Guru), principal (kepala sekolah), staff, and parents (orang tua siswa), each with different interactions with the system. The administrative staff handles student registration, validates payment, and manages data; the curriculum coordinator inputs the learning plan; teachers manage classroom activities; and the principal validates monthly reports. Parents are responsible for registering their children and uploading payment proof. Figure 2 visualizes the interaction between the main actors and the system. It clearly defines which roles perform input and validation tasks (e.g., administrative staff, teachers) and which external actors (e.g., parents) engage with the system for registration and document uploads.
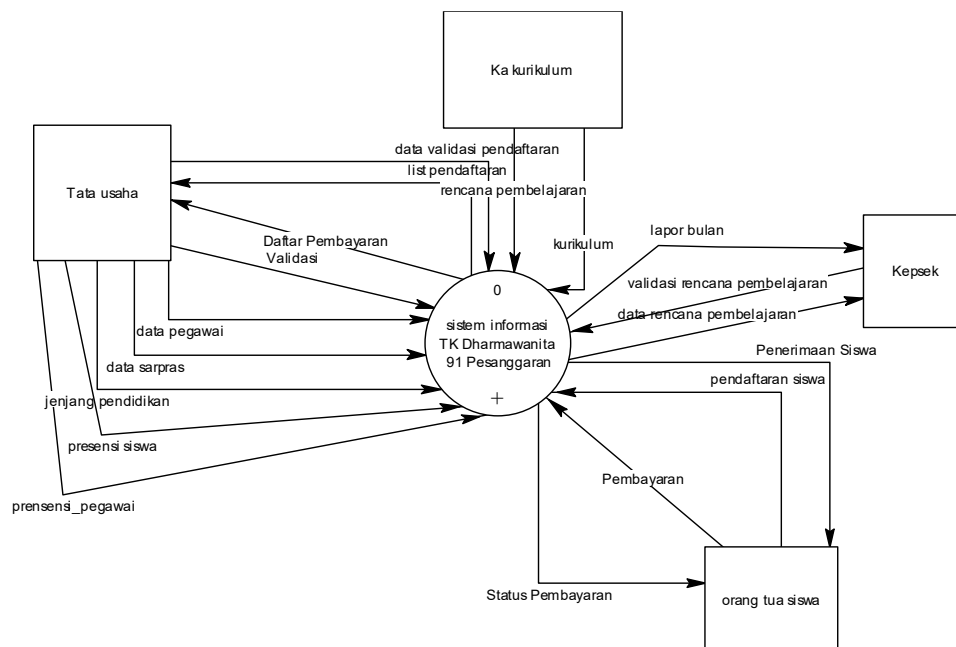
Figure 2. Context Diagram of the TK Dharma Wanita 91 Information System

To elaborate the internal logic of the system, a data flow diagram (Level 1) was designed (see Figure 3. Element names are presented in Indonesian to match the school's operational terminology)[17]. It describes the flow of data across key processes[18], including student registration, payment, curriculum planning, attendance tracking, and monthly reporting. Each process receives input from actors, processes it internally, and produces output that flows into other modules or is reported externally. Figure 3 presents the internal flow of data between system modules. It shows how processes like student registration and payment validation interconnect, reflecting the actual logic used by the system to handle daily administrative workflows.
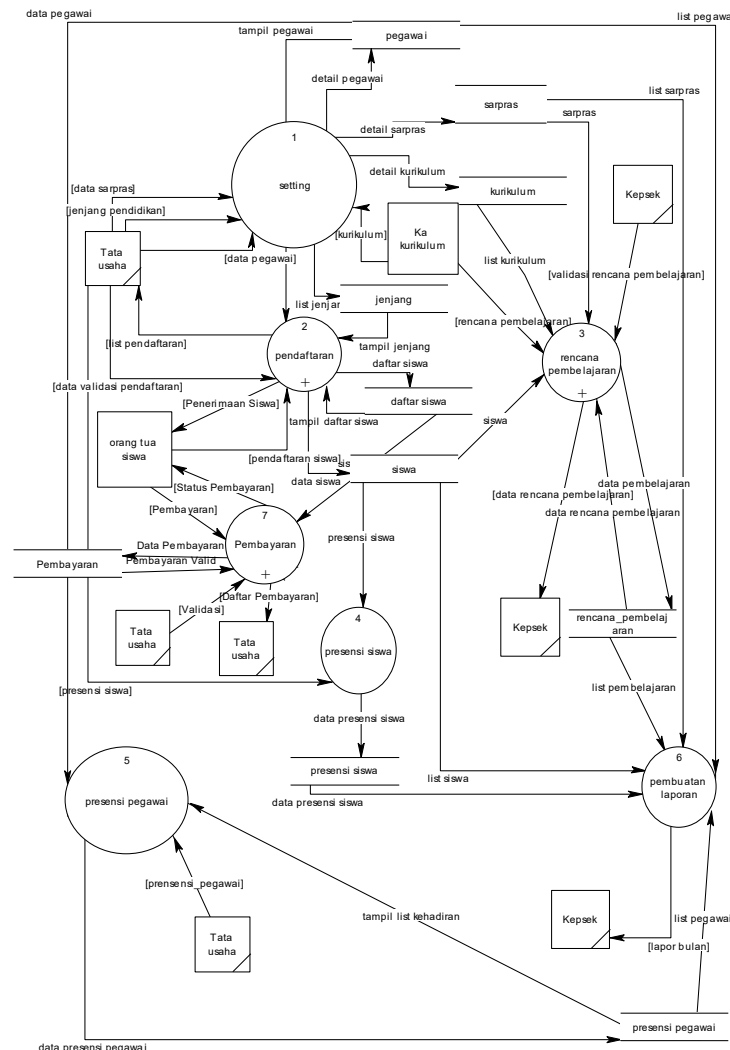
Figure 3. Data Flow Diagram Level 1 of the System

The next phase involved the design of the system's database structure. An Entity Relationship Diagram (ERD) was developed to model the logical relationships [19] between core entities such as students, staff, attendance records, payment, curriculum, and learning implementation. The ERD outlines how one student can only register once, how each registration is linked to one educational level, and how learning activities relate to specific curricula, facilities, and instructors. To convert this logical model into a structure suitable for implementation in a relational database, a Physical Data Model (PDM) was created (see Figure 4)[20]. This model defines the structure of 15 tables used in the system, including fields, data types, primary keys, and foreign key relationships. Figure 4 is the physical schema of the database. It outlines 15 interrelated tables and depicts key fields such as primary/foreign keys. This schema ensures that all educational records are stored relationally and allows accurate querying for reporting purposes.
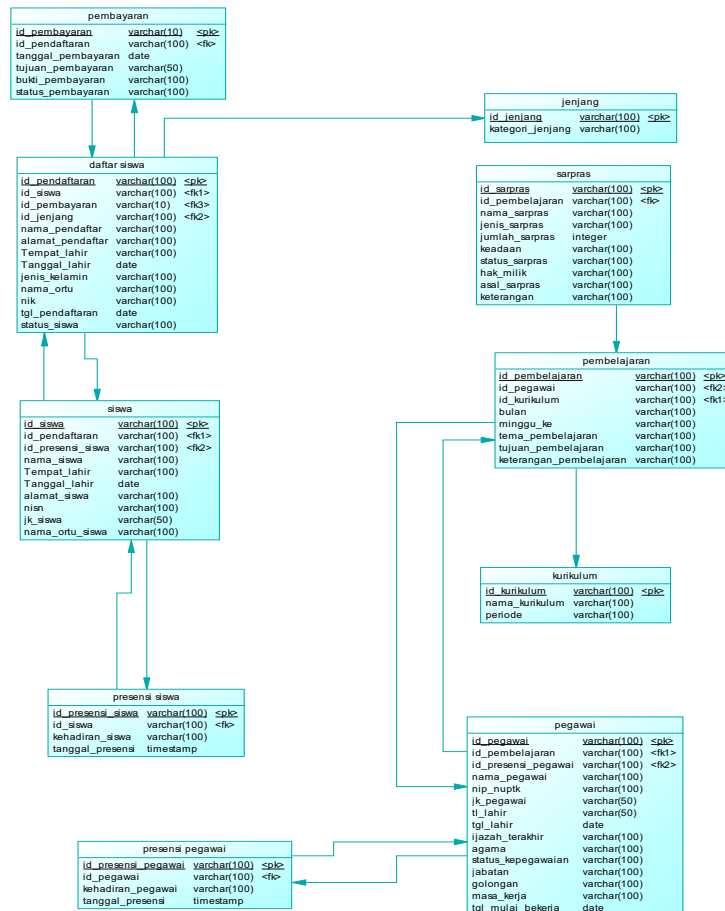
Figure 4. Physical Data Model of the Information System

The implementation of the system was carried out using PHP 7 as the programming language, supported by the CodeIgniter framework and a MySQL database. The development environment included Visual Studio Code and XAMPP, with the system deployed on a machine running Windows 10 Pro. The system's interface was designed to be web-based, ensuring accessibility and ease of use for various stakeholders. To provide a clear overview of the implementation stage, several figures below present the user interface of the developed website as it operates in the actual environment. These figures display the appearance and functionality of each core module, including CRUD report and print document report (Figure 5,67 & 8). Figures 5 to 8 showcase the web-based interface and printed outputs of the monthly reporting module. These figures confirm that the visual layout matches official government templates and supports quick report generation in PDF format.
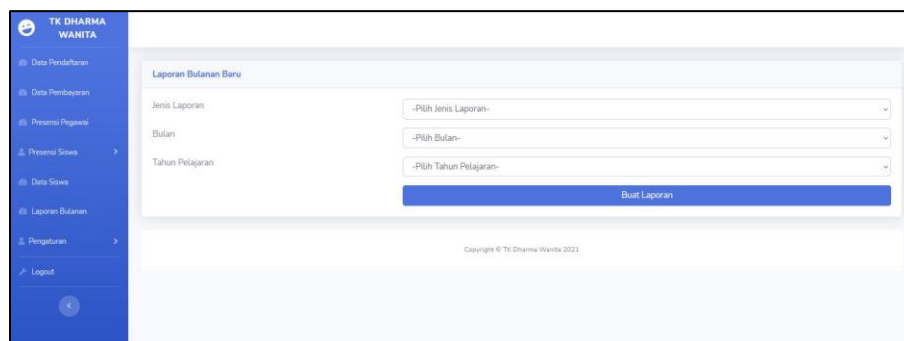
Figure 5. Interface of Creating Monthly Report

Figure 6. Table containing monthly report data

Figure 7. Monthly report printout layout - Student

Figure 8. Monthly report printout layout – Employee and Staff

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To verify the functionality of each module, black-box testing was conducted. The test cases included new student registration, validation of registration, payment confirmation, lesson planning, attendance input, and monthly report generation. Each test confirmed that the system produced the expected output given valid and invalid inputs. In the final stage, the system was evaluated through user feedback. Administrative staff, teachers, and parents were invited to use the system and report their experiences. The testing process was carried out to verify that each module meets the defined functional requirements. Table 1 shows the black-box testing results for the "Tambah Lapor Bulan" feature, which is responsible for submitting monthly reports. The results confirm that the feature operates correctly and produces accurate outputs as intended. To validate the reliability of the monthly report module, a black-box test was performed. The test focused on the "Tambah Lapor Bulan" (Add Monthly Report) feature, which is central to fulfilling the school's reporting obligations to the local education office.

Tabel 1. Monthly report add feature test results

Function Name	Lapor Bulan (The feature page is illustrated in Figures 5 and 6)
Procedure (In bahasa)	This feature allows users to input the report type, month, and academic year, and then automatically generates a summary in the system according to the specified type, month, and year.
Input	Jenis laporan : Laporan bulanan Periode : Oktober Tahun pelajaran : 2021
Output	If the test is **successful**: ➔ Displays print results as in **figure 7** and **figure 8** If it **failed**, displays a page like the one below:
Test result	**Functioning as Expected**

Figure 9. Test Result Function Lapor Bulan

Table 1 details the test scenario, input data, expected output, and actual system response. The results confirm that the feature performed correctly and produced standardized printable outputs (as shown in Figures 7 and 8), which are ready for official submission.

TK Dharma Wanita 91 Pesanggaran is a kindergarten institution located in Banyuwangi Regency, East Java. Established in 2007, it is situated in the coastal tourism area of Pantai Lampon, and has been accredited with a 'B' rating by the local Department of Education. As a private early childhood education institution, it is responsible for carrying out educational services, managing administrative tasks, and regularly submitting monthly reports to the regional education authority (Korwilkersatdik). To address the issues encountered in manual data management, a web-based information system was developed to handle the school's core

processes: new student registration, planning and implementation of learning activities, attendance tracking, and generation of monthly reports. This system was implemented using PHP 7 with the CodeIgniter framework, supported by a MySQL database. The application was developed and tested on a system with Windows 10 Pro, utilizing software tools such as Visual Studio Code and XAMPP.

The system comprises several modules, including new student registration, payment validation, attendance management for both staff and students, curriculum planning, and monthly reporting. Each module was implemented with a user-friendly interface, designed specifically for users including school administrators, teachers, and parents.

During the implementation phase, several functional components of the system were tested using the black-box testing method. The test results confirmed that all system functionalities performed as expected. For example, the student registration module successfully verified age eligibility and confirmed the registration process with appropriate messages. The validation module allowed the school admin to approve or reject registrations based on the data provided, such as family card numbers (NIK) and uploaded documents. The system also facilitated the online submission and validation of registration payments. Parents were able to upload proof of payment, and school administrators could verify the details against internal records. Once validated, students were officially admitted into the school's database.

Other critical features include the staff attendance module, where attendance data is entered by the administrative staff and stored in the system automatically, minimizing the risk of data loss or delay. Similarly, the student attendance module allows for daily input by class teachers and is integrated with the monthly reporting feature. The academic planning module enables the curriculum coordinator to schedule learning plans based on existing curriculum structures, which are then validated by the principal. The system streamlines the process of lesson planning, implementation tracking, and resource allocation by associating plans with specific learning themes, facilities, and responsible teachers.

Furthermore, the monthly reporting module aggregates data from all subsystems—attendance records, student demographics, academic activities—and formats it according to the reporting standards required by the education authority. The system allows these reports to be exported as PDF documents, facilitating efficient submission and archiving.

Overall, the development and deployment of the system significantly improved the administrative operations of TK Dharma Wanita 91 Pesanggaran. It addressed the core issues identified during the problem analysis phase: delays in report submission, lack of accessible registration information, and inefficiencies in attendance tracking. By automating these processes, the system reduced manual workloads, minimized errors, and enhanced the timeliness and accuracy of educational reporting.

4. Conclusions and Future Works

The development of the information system for TK Dharma Wanita 91 Pesanggaran has successfully addressed several key administrative challenges identified during the initial analysis. The system streamlined processes that were previously conducted manually, such as student registration, validation of registration and payments, attendance tracking, lesson planning, and monthly report generation. Each of these features was carefully designed and implemented to match the workflow and reporting standards required by the regional education authority.

The implementation of this system resulted in significant improvements in efficiency and data accuracy. Administrative staff reported that the time required to compile monthly reports was greatly reduced, as the system was able to automatically aggregate relevant data into a standardized format. Parents also benefited from the system, as they could register their children online, receive automated notifications, and upload necessary documents and payment proofs without needing to visit the school in person.

The system was tested using black-box testing methods and demonstrated high reliability in processing inputs and generating expected outputs. The integration of various modules such as academic planning and attendance management ensures that the institution is better prepared to meet both internal operational needs and external reporting obligations.

However, there are still opportunities for future improvement. One potential direction is to enhance the system by incorporating mobile accessibility, allowing users to access and interact with the system through smartphones. This would increase accessibility for parents and teachers who may not always have access to a desktop or laptop. Another important enhancement would be the integration of data analytics features, enabling school administrators to gain insights from historical data, such as trends in student attendance, learning progress, or resource usage.

Furthermore, future work may also explore integration with regional or national educational databases to facilitate automated data submission to government systems. This could reduce redundancy and improve consistency across schools under the same jurisdiction.

In conclusion, the information system developed for TK Dharma Wanita 91 Pesanggaran demonstrates how tailored digital solutions can significantly improve the quality and efficiency of educational administration, particularly in early childhood institutions. Continued development and refinement of such systems will be essential as schools increasingly adopt digital tools to support their operations and stakeholder engagement.

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