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Design of school SPP bookkeeping data collection application

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Abstract: School tuition fee (SPP) management is still widely conducted manually, which may lead to recording errors, reporting delays, and a lack of financial transparency. This study aims to design and implement a web-based SPP bookkeeping data collection system to improve the effectiveness and accuracy of school financial administration. The research method applied is the System Development Life Cycle (SDLC) using the Waterfall model, which includes requirement analysis, system design, implementation, and testing stages. The results indicate that the developed system is capable of managing student data, recording SPP payments, and generating structured payment reports and histories. The system simplifies data retrieval and accelerates financial reporting processes. Furthermore, the web-based system reduces recording errors commonly found in manual bookkeeping. The discussion reveals that the computerized system improves time efficiency and enhances transparency in school tuition payment management. In addition, the system is user-friendly and easy to operate for administrative staff. Therefore, the proposed web-based SPP bookkeeping system is expected to support professional, accountable, and sustainable school financial management.

Keywords: School Tuition Fee, SDLC, Waterfall, Web Development, Information System.

1. Introduction

In the Indonesian education system, school financial administration, particularly related to the Education Development Contribution (SPP), plays a crucial role in supporting daily

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operations and the continuity of teaching and learning activities. However, in many remote areas, the process of recording and managing incoming and outgoing SPP payments is still done manually, using books or paper sheets, which is prone to errors, data loss, and delays in the administration of SPP payments. Research conducted at Muhammadiyah Junior High School in Medan City showed that manual recording of SPP payments resulted in reporting delays and data errors, necessitating the need for a computerized system for SPP payment administration [10].

Geographical conditions and limited infrastructure in remote areas pose challenges to implementing digital systems. However, other research also confirms that the use of web technology in payment data management can improve recording efficiency and address the issues of slow and unstructured manual posting. A study at La Tansa Salaf Kindergarten showed that developing a web-based information system helped the school manage payment data better than the previously implemented manual method [7]. Utilizing website-based information technology to record student tuition payments can replace manual ledgers that are at risk of loss or damage and accelerate data retrieval. This is reinforced by research at Widya Kutoarjo Vocational High School, which confirmed that a web-based payment information system can help make school administration processes more effective and enable parents to monitor student payment status [6].

Furthermore, the implementation of a web-based tuition payment information system at Muhammadiyah Junior High School in Medan showed that the use of a computerized system can reduce the number of recording errors and increase the speed of tuition payment administration services compared to manual recording in books. Based on these various studies, it is clear that digital transformation in school administration payment management is crucial for improving efficiency, data accuracy, and transparency in school financial reports. Therefore, this study aims to design and implement a web-based SPP payment information system for SDIT Al-Firdaus to support the management of school financial administration effectively, efficiently, and accurately.

2. Method

2.1. Research Design

The development stages of designing a system for entering and exiting school tuition fee data are using the Waterfall method, which consists of the following stages:

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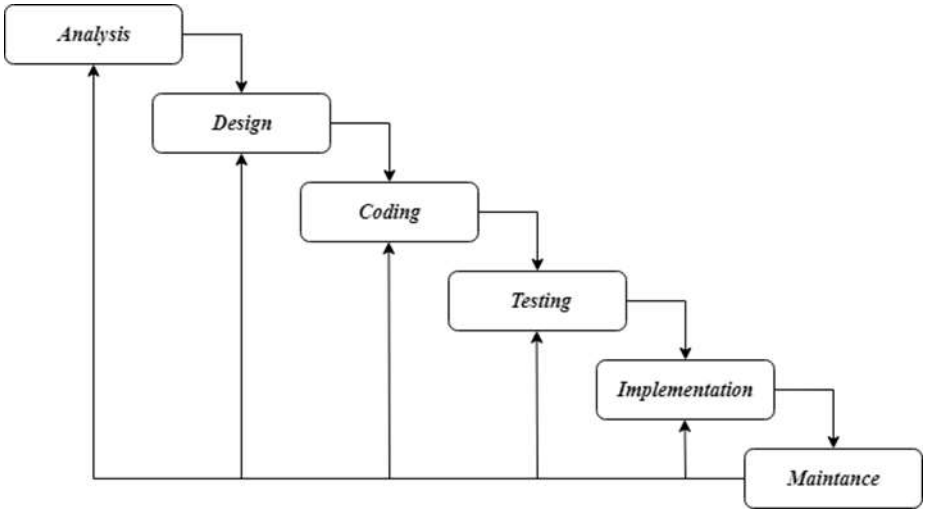

Figure 1. Waterfall Method Diagram

Analysis, This stage is carried out to gather information and system requirements from users. Data collection is conducted through direct observation at the school, interviews with administrative staff, and analysis of existing financial recording documents. The result of this stage is a system requirements specification (SRS).

Design, This stage involves designing the system structure, including interface design (UI), process flowcharts (or UML), and database design. The goal is to provide a technical overview of how the system will work and how data will be managed.

Coding, After the system design is complete, the program code development process is carried out according to the designed specifications. The system is built using the PHP programming language and MySQL database, tailored to the school's needs and the capabilities of the available hardware.

Testing, This stage is carried out to verify whether the system is functioning as expected. Testing is carried out on key functions such as student data input, payment recording, expense recording, and report generation. The goal of this stage is to find and fix bugs or errors in the system.

Implementation, After the system has been tested and declared feasible, it will be implemented in the school environment. Users will be given a brief briefing to ensure they are able to operate the application properly.

Maintenance, After the system is in actual use, a maintenance phase is carried out to correct any errors encountered during use and to make adjustments if the school's needs change. This phase is ongoing to maintain system performance and sustainability.

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2.2 Types of Research

The types of research used in developing this web-based school tuition accounting system include the following approaches.

Requirements Planning, The initial planning and analysis of system requirements was conducted to identify problems and determine the features and functions required in the system, based on conditions at SDIT AL-FIRDAUS Bogor.

Observation, Data collection was conducted by directly observing the school's ongoing tuition administration process to understand the manual workflow and frequently encountered obstacles.

Interviews, Information was gathered through interviews with relevant parties, such as the school treasurer, administrative staff, and the principal, to obtain data on system requirements and technical challenges in the field.

SDLC (System Development Life Cycle)[11], The system development used the Waterfall Model approach, which consists of the stages of analysis, design, implementation, testing, and maintenance. This model was chosen because its process is structured and suitable for developing systems with a clear scope and stable needs.

2.3 Population and Sample

2.3.1 Population

The population in this study consists of all parties involved in school financial administration activities, specifically those related to the recording of tuition payments and expenditures at SDIT AL-FIRDAUS Bogor. This population includes, Administrative staff or school treasurer, Principal, School data operator, Homeroom teachers (who are responsible for student financial reporting)

2.3.2 Sample

A sample is a portion of the population selected to serve as a data source for this study. The sample was selected using purposive sampling, based on specific considerations consistent with the research objectives. This sample selection was conducted to ensure the data obtained was truly relevant to the system design to be developed and to ensure that the system could meet the actual needs of users at the school.

2.4 Data Collection Techniques

The following are several data collection techniques that can be used in the research project "Designing a Web-Based School Tuition Recording System" : Field Observation Directly observe the school tuition recording process to understand the manual workflow and identify system requirements. Aspects that can be observed, Recording frequency and time required, Student data sources, Report formats and storage media, Interviews. Conducted with administrative staff or the school treasurer to obtain information about obstacles, needs, and expectations for the system to be developed. Parties that can be interviewed: School Principal,

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School Operator, School Teachers, Documentation Study. Review documents related to school financial records, such as cash books, receipts, and financial reports, as references in designing the system structure. Literature Study, Review previous research and theories related to information systems, school financial systems, and software development.

2.5 Research Objects

The research object in this study is SDIT Al-Firdaus, which serves as a case study in designing a web-based school tuition accounting system. This research does not cover the entire school administration system, but rather focuses on tuition payment management, as tuition payments are a crucial component of the school financial system, requiring accurate recording and timely reporting [9]. This research object is divided into several sub-objects as follows: Student Data, which includes student identification such as name, Student ID Number (NIS/NISN), class, and academic year. Student data serves as the primary data basis for recording and managing tuition payments, so data accuracy is crucial to avoid administrative errors[5]. SPP Payment System, which includes the process of recording students' monthly tuition payments, determining payment status (paid or outstanding), and grouping payment data by class and specific period. A web-based tuition payment system is considered capable of increasing data management efficiency and minimizing errors that frequently occur in manual systems[9].

Payment Reports and History, a system component that displays each student's payment history in a structured manner. These payment reports can be used for evaluation and financial accountability to the treasurer and school administration, and assist in the preparation of financial reports quickly and accurately [2].

User Interface, the system display used by school administrators or treasurers to manage student data, record tuition payments, and print reports. A user-friendly and informative interface is essential for effective system operation by users without requiring specialized technical expertise [8].

By limiting the scope of this research to these sub-objects, it is hoped that the system analysis and design process can be conducted in greater depth and focus. This focus is aimed at addressing problems that frequently occur in manual tuition payment systems, such as the risk of recording errors, delays in preparing financial reports, and a lack of transparency regarding student payment status

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2.6 Framework of Thinking

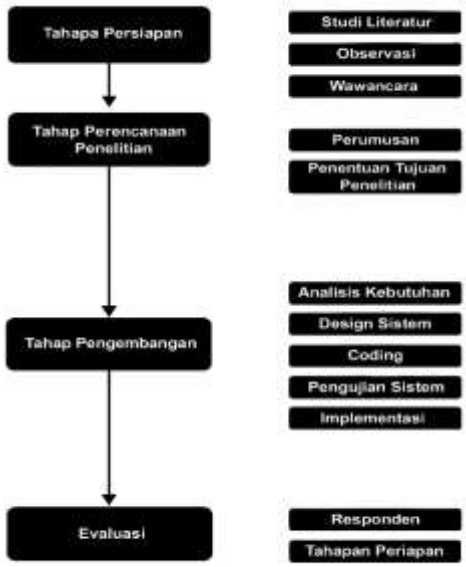

Figure 2. Framework of Thinking

A conceptual framework is a foundation of thought that contains interrelated concepts, theories, facts, and observations and serves as the basis for developing scientific research. A conceptual framework helps researchers understand the relationships between variables, organize the research's logical flow, and formulate hypotheses systematically, thus making the research more focused and scientifically consistent. In information systems research, a conceptual framework is used to conceptually explain the relationships between the variables under study and ensure that all elements of the research have a strong theoretical foundation and are relevant to the research focus [3].

2.7 Literature Review

A literature review is the initial stage in the research process, aiming to establish a strong theoretical foundation and identify previous research relevant to the topic being studied. A literature review is conducted by reviewing various sources, such as scientific journals, articles, previous theses, and related documents discussing information systems and research methodology. A literature review also helps researchers understand the strengths and limitations of the methodological approaches used in previous research, thus providing a strong foundation for formulating hypotheses and designing research [4].

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2.8 Data Analysis Techniques

The data analysis technique in this study was descriptive qualitative, using data from observations, interviews, and documentation to understand the system requirements and workflow for managing tuition fees in schools. Using a qualitative approach allowed researchers to explore phenomena in depth and understand the social and technical context of the data obtained. This aligns with qualitative research methodologies widely used in information systems research, where techniques such as interviews, direct observation, and document reviews are considered effective in capturing the complexity of the phenomena being studied [1]

The data was then presented in narrative form and visualized, such as flowcharts and system designs (DFD and ERD), to facilitate understanding of the system's structure and function. Conclusions were then drawn and verified with relevant parties to ensure that the developed system met the needs in the field. The final stage of the analysis was an evaluation of the developed system to assess whether it functioned as intended and facilitated the process of recording incoming and outgoing school tuition fees.

3. Results and Discussion

3.1 Implementation of Results and Discussion

3.1.1 Dashboard Display

1) Login Page

Figure 3. Login Page

The login page is the first screen that appears when users access the application. Users are prompted to enter a username and password to access the dashboard.

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2) Dashboard

Figure 4. Dashboard

After successfully logging in as an Admin, users will be directed to the dashboard page, which contains several main navigation buttons for managing the tuition system.

3.1.2 Dashboard Buttons

1) Number of Classes

Figure 5. number of classes

The number of classes displays data on all students from grades 1-6, along with information on the payment status of each student.

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2) Students

Figurer 6. Students

Displays a list of students in a table and provides CRUD (Create, Read, Update, Delete) features. Student data displayed includes Student Identification Number (NISN), Name, Class, Address, and Telephone Number.

3) Bills

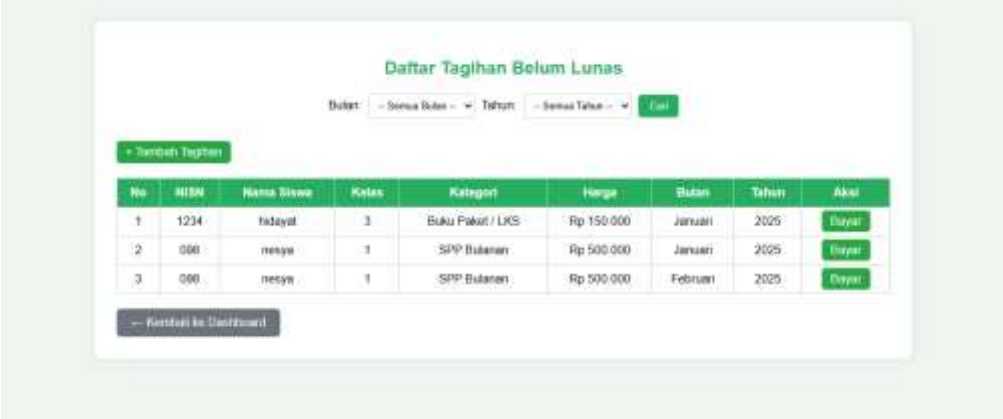

Figure 7. Bills

The Outstanding Bills List page displays information on all outstanding student bills, including monthly tuition bills and other categories such as textbooks or uniforms. At the top of the page, there's a search feature by month and year, making it easy to filter billing data by specific year and month. In the upper left corner, there's also a (+) Add Bill button, which is used to manually add new bills for students.

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4) Category

Figure 8. Category

The Category Data page displays a list of payment types available in the system, such as Extracurricular Activities, Monthly Tuition Fees, Re-registration, and Textbooks/LKS. Each category is displayed along with its price. This page is read-only, so users cannot edit it directly from here.

5) Payment Report

Figure 9. Payment Report

The Payment Report page displays data on payment transactions made by students. Each row in the table displays the student's name, payment month, payment category, amount paid, and payment date. In addition to providing a summary, this page also features a Print Receipt button in the action column.

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4.1.3 Flowchart

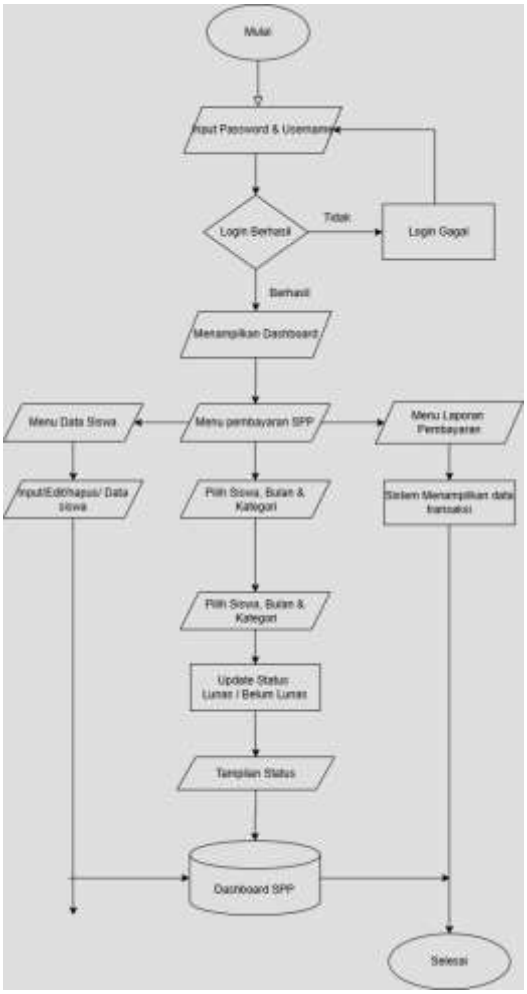

Figure 10. Flowchart

This flowchart illustrates the flow of the tuition payment system, which begins with the admin login process. The system validates the username and password; if unsuccessful, it returns to the login page; and if successful, the system displays the dashboard. Through the dashboard, admins can manage student data, make tuition payments, and view payment reports. All processed data will be displayed back on the dashboard, and the process ends once the admin has finished using the system[1].

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4. Conclusion

Based on the results of the problem identification, needs analysis, and system design in this study, it can be concluded that the manual tuition fee (SPP) bookkeeping system in many schools, particularly in remote areas, has many significant weaknesses. The manual recording process is prone to errors, data loss, reporting delays, and difficulties in transparently tracking the flow of funds. This undoubtedly impacts the efficiency of school administrative staff and has the potential to hinder school financial accountability.

Overall, the SPP bookkeeping system designed through this study represents a concrete and applicable solution that can address the challenges of school financial management in areas with limited infrastructure. It is hoped that this system will be used not only at the school where the research took place but also be developed and implemented in other schools with similar needs. Thus, modernization of school financial management can be achieved equitably, supporting better governance.

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