Optimizing School Health With An Integrated Information System:
A Case Study At Man Insan Cendekia Sorong

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Abstract:
The task of schools is to develop the whole person and provide effective knowledge and education. In the UKS MAN Insan Cendekia Sorong, the main problem obtained is the processing and data collection that is still done manually so that it can cause patient services to be limited, less effective and efficient. The solution to solve this problem is to build a school health information system that helps school health workers in managing data about UKS. Data collection methods are carried out using questionnaires, interviews and observations. The system development method used is waterfall chosen because it is easy to implement and the resources required are minimal. This school health information system for UKS allows the management of patient data, drug data, and patient medical records to be organised and efficient.

Keywords: Optimizing, School, Information System, Waterfall Method, Health System

Abstrak:
Tugas sekolah adalah mengembangkan manusia seutuhnya dan memberikan pengetahuan dan pendidikan yang efektif. Pada UKS MAN Insan Cendekia Sorong, permasalahan utama yang didapat adalah pengolahan dan pendataan yang masih dilakukan secara manual sehingga dapat menyebabkan pelayanan pasien menjadi terbatas, kurang efektif dan efisien. Solusi untuk mengatasi masalah tersebut adalah dengan membangun sistem informasi kesehatan sekolah yang membantu petugas kesehatan sekolah dalam mengelola data-data tentang UKS. Metode pengumpulan data dilakukan dengan menggunakan kuesioner, wawancara dan observasi. Metode pengembangan sistem yang digunakan adalah waterfall dipilih karena mudah diimplementasikan dan sumber daya yang dibutuhkan minimal. Sistem informasi kesehatan sekolah untuk UKS ini memungkinkan pengelolaan data pasien, data obat, dan rekam medis pasien menjadi terorganisir dan efisien.

Kata kunci: Optimalisasi, Sekolah, Sistem Informasi, Metode Waterfall, Sistem Kesehatan

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1. INTRODUCTION

Schools as one of the fundamental organizational platforms that have an important role in education, but also provide opportunities to improve health and participate in society [1]. In improving health in schools, the presence of School Health Units or often called UKS is a must for every school. The School Health Unit (UKS) is an effort made by schools to maintain and improve the health of students at every level of education, from elementary school to secondary school [2]. The role of UKS teachers and staff is very significant in achieving success in the implementation of UKS activities. In the implementation of UKS activities, there are programs that must be implemented, which include health education activities for students, maintenance and student health services, and creating a healthy school environment [3].

Health care is an activity that has an important function in any organization because it directly impacts the well-being and quality of life of individuals. In a school, the School Health Unit (UKS) is responsible for providing health services to the entire school community, with a focus on the health of the students [4]. This is in line with the regulations in Indonesia as stated in the Law of the Republic of Indonesia number 36 of 2009 concerning health "Health is a human right and one of the elements of welfare that must be realized in accordance with the ideals of the Indonesian nation as referred to in Pancasila and the 1945 Constitution of the Republic of Indonesia, every effort to maintain and improve the highest degree of public health is carried out based on the principles of non-discrimination, participation, and sustainability in the context of the formation of Indonesian human resources and increasing the resilience and competitiveness of the nation for national development." [5].

Health services also play an important role in promoting individual development by encouraging healthy lifestyles, particularly among students in the school setting [6]. The World Health Organization (WHO) in 1999 highlighted the important role of schools in promoting health through in-school activities. Through their interactions with children and adolescents, schools are an important tool in disseminating health information and encouraging healthy lifestyles [7].

Currently, health services have made many innovations to keep up with the times. Among the developments made is the information system. In various aspects of the information system has a very important role. An information system is a set of procedures organized with the aim of providing information that can support an organization in decision making and control [8]. Health information systems are used to conduct better and more organized data collection.

MAN Insan Cendekia Sorong is one of the state madrassas under the auspices of the ministry of religion located in Sorong district. MAN Insan Cendekia also provides health services through UKS. From the results of observations made by the UKS MAN Insan Cendekia Sorong, one of the main problems obtained is data and information processing where the data collection process is still carried out manually, where the process still relies on books as a media for recording data. Because UKS data processing is still done manually, it can cause limited patient services and the patient record database is not well organized [9]. In addition, because processes such as patient data management and medical records are still done manually, it takes a long time to search for patient data [10].

From these problems, a solution can be made to handle the problem by building a school health information system. With the implementation of this school health information system for UKS, it can make the system of organizing patient data, drug data, and patient medical records can be done with good governance, so that the information can be accessed quickly and accurately. This will increase the effectiveness and efficiency of services provided by UKS.

2. Research Methods
2.1 Data Collection Methods
   a. Questionnaire
      A questionnaire is a written document containing a number of questions given to respondents. The answers to all questions that have been collected into the questionnaire will then be recorded or recorded. The use of questionnaires as a method for collecting data proves efficient if the researcher has a clear understanding of the data or information needed and how to measure the variables related to the information needed [11]. In addition, the use of questionnaires can help in obtaining personal information such as attitudes, opinions, expectations, and desires from respondents. Ideally, all respondents will be willing and motivated to answer questions or statements on the research questionnaire [12].
   b. Interview
      In collecting data through interviews, the author asked several questions about the implementation process. In accordance with the definition of Lexy.J
Moleong, an interview is a conversation conducted with a specific purpose. This method involves researchers and respondents who are face-to-face to obtain verbal information, with the aim of obtaining data that explains the research problem [13].

c. Observation

Observation is a data collection method in which the researcher makes observations of the observed phenomena, either directly or indirectly, and records them using an observation tool. Observation can also be interpreted as observation and recording activities carried out systematically on the elements seen in a phenomenon or symptoms that exist in the object of research [14].

2.2 System Development Methods

The method used is the Waterfall method, chosen because it is easy to implement and the resources required to implement it are minimal. Basically, the Waterfall model consists of five phases: planning, analysis, design, implementation, and maintenance. The advantages of the Waterfall model are that it is suitable for smaller projects where the requirements are very clear, the phases are completed and processed one by one, a model that is simple and easy to use [15].

The design process of the School Health Information System at MAN IC is web-based using the SDLC method, with traditional approaches in a sequence, namely:

a. Planning stage Researchers conduct studies related to user needs, technical and technological feasibility, compile an information system project schedule.

b. Analysis stage Researchers identify problems based on interviews with system users, recognize system components, software, objects, relationships between objects and others (the same problems as non-functional functional functions).

c. Design stage Researchers in the design stage of this method also serve to identify the hardware and system requirements needed for the entire development process.

d. Testing stage Researchers ensure the system created is in accordance with user needs or not. In the testing phase using White Box testing and Black Box testing. White Box testing is a test used to test software by analyzing and examining the internal structure and code of software programs. Meanwhile, Black Box Testing is a test method that is carried out without having to know the code structure of the software [16].

e. Implementation stage Researchers implement the system planning into a real situation, namely by selecting hardware and preparing application software.

f. Maintenance stage This stage starts the operation process until the time of using the system is over, then returns to the planning stage.

3. Result and Discussion

3.1 Planning Stage

In this planning stage there are needs or features needed to create a school health information system that will be used at MAN Insan Cendekia Sorong. The following are the features that are desired in the system by MAN Insan Cendekia Sorong:

a. Admin Features:
   1) Input features and Edit student data
   2) Input features and Edit drug stock data
   3) Input features history of sick students
   4) Input features and edit student progress data

Before these features are fulfilled, there is a feasibility study which serves to measure whether MAN Insan Cendekia Sorong is feasible to run this health information system. There are two feasibility studies, namely feasibility in technical terms and feasibility in terms of organization. The following are the results of the feasibility study conducted:

b. Technical Feasibility

The web-based school health information system is technically feasible to develop at MAN Insan Cendekia Sorong, although there are still some things that must be considered, Risks associated with unfamiliarity with the application: High Risk

- The school's UKS division does not have enough experience in operating a web-based school health information system.

Risks associated with unfamiliarity with technology: Moderate Risk

- The school's UKS division is quite familiar with the problems that occur with some web-based school health information systems.

Risks associated with the scale of the project: Low Risk

- The school UKS division knows enough about how a web-based school health information system works.

- The school's UKS division has enough facilities to support the creation of a web-based school health information system.

The project was done by 3 developers within 4-5 months.

- Compatibility with existing systems and infrastructure: Low Risk

- The current information system is compatible
with the information system that will be developed later.

c. Organizational Feasibility
- User/Product Owner: Nur Amalia Majid
- Project Manager: Ibu Shifa
- Developer: Ahmad, Hijria, Fahrul, ghofur
- Is the vision and mission of the organization aligned with the software to be developed? Yes
- Are the tasks and functions of the organization's work units in accordance with the software to be developed? Yes, the duties and functions of the organizational work unit are in accordance with the software to be developed where the purpose of developing this web-based school health information system is to improve the performance of the existing information system at MAN Insan Cendekia Sorong. With the addition of features to assist in conducting regular data collection in the health sector.
- Does the software automate the business processes of the organization's work units? Yes
- Feasibility in terms of organization has low risk.
- Estimated Project Work
  The estimated time for working on the school health information system is 4-5 months, which will be worked on by a team of 3 people.

3.2 Analysis Stage
a. System Description
This school health information system was created with the aim of helping the work effectiveness of nurses or people in charge of uks in collecting student data to pay attention to the growth of students.

b. Functional Requirements
- Actor
  The actor who will run this information system is only one, namely the UKS officer or nurse who is also the admin of the health information system. The roles of the admin are:
  ➢ Filling in the student data base
  ➢ Fill in information about medicine
  ➢ Recording sick history
  ➢ Recording student development

c. Use Case Diagram

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**Figure 1. Use Case Diagram**

**Figure 2 Activity Diagram**
b. Non-Functional Requirements

Non-functional requirements are requirements or needs that describe how the system or software should be problematic in terms of performance, security, peace of mind, scalability, and management. Non-functional requirements are generally related to other qualities or characteristics of the system or software, in addition to features and functionality. In this research, relevant non-functional requirements will be identified. The following are the Non-Functional requirements of this research.

<table>
<thead>
<tr>
<th>No</th>
<th>Parameters</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Availability</td>
<td>Operates during school hours starting from 07.30-14.00</td>
</tr>
<tr>
<td>2</td>
<td>Reliability</td>
<td>Cannot Failed</td>
</tr>
<tr>
<td>3</td>
<td>Ergonomics</td>
<td>Improve health and increase knowledge</td>
</tr>
<tr>
<td>4</td>
<td>Portability</td>
<td>System created for Health information system</td>
</tr>
<tr>
<td>5</td>
<td>Storage</td>
<td>Capable of having a large storage space</td>
</tr>
<tr>
<td>6</td>
<td>Response Time</td>
<td>This system can be used during school hours</td>
</tr>
<tr>
<td>7</td>
<td>Security</td>
<td>The system is secure and no unwanted events occur</td>
</tr>
</tbody>
</table>

3.3 Design Stage

At this design stage, it discusses the devices that will be used in the health information system, where the devices that will be discussed start from the hardware interface, software interface and initial design or temporary description as an initial benchmark for the display design of the school health information system.

➢ Hardware interface

The hardware interface to the school health information system is required to display the view of the system. The hardware interface may also be required to perform data entry or other tasks. Next the hardware used in the school health information system:

- PC/Laptop

Personal computer or laptop is one of the most important hardware for this school health information system. Which later the nurse or UKS officer uses this PC or laptop to run this school health information system.
• Mouse and Keyboard
  The mouse functions to move the cursor on the laptop and PC, while the keyboard is one of the hardware which functions to input data into a laptop or PC.

Figure 6 Keyboard and Mouse

• Router
  Routers function as network devices that connect several computer networks and act as a connecting point between local networks and external networks such as the internet. In the context of internet network transmission, routers play an important role in channeling and directing data traffic between devices connected in the network. The router receives data packets from one network, identifies the destination address, and decides the best path to send the packet to the right destination. By performing disconnection and rerouting functions, routers enable efficient and accurate delivery of data to devices in the vicinity, thus ensuring good connectivity between the local network and the internet.

Figure 7 Router

➢ Software Interface
  The software interface of a school health information system plays an important role in facilitating effective communication between the different types of software used in the system. The purpose of these interfaces is to ensure smooth interaction between the components of the system, including interfaces with databases, operating systems, and specific programming languages.

➢ Temporary Design
  Temporary design here as an initial reference material for the appearance of the interface design of the school health information system. In making a temporary design of this school health information system using the Figma application. The following is a temporary interface design that has been made using the figma application:

a. Login Page

Figure 8 Login Page

b. Dashboard Page

Figure 9 Dashboard Page

c. Student Data Page

Figure 10 Student Data
3.4 Testing Phase

After completing the creation of the school health information system, the next step is to conduct testing to ensure that the information system is in accordance with user needs. Testing is carried out using two methods, namely White Box testing and Black Box testing. The purpose of this testing is to identify potential problems and ensure that the system functions properly before it is fully implemented.

- **White Box Testing**
  
  The following are the results of white box testing.

  a) Login

  ![Flowchart of Login](image)

  ![Flowgraph of Login](image)

<table>
<thead>
<tr>
<th>Flowchart</th>
<th>Flowgraph</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Diagram]</td>
<td>[Diagram]</td>
</tr>
</tbody>
</table>
Path 1 = 1-2-3-4-5
Path 2 = 1-2-3-2-4-5

\[ V(G) = E - N + 2 = 5 - 5 + 2 = 2 \]

\[ V(G) = p + 1 = 1 + 1 = 2 \]

b) Add data

Flowchart

Flowgraph

Flowgraph Lines | Cyclomatic Complexity
---|---
Path 1 = 1-2-3-4-5-6 | V(G) = E - N + 2 = 6 - 6 + 2 = 2
Path 2 = 1-2-3-4-3-4-5-6 | V(G) = p + 1 = 1 + 1 = 2

c) Edit Data

Flowchart

Flowgraph

Flowgraph Lines | Cyclomatic Complexity
---|---

Path 1 = 1-2-3-4-5-6
Path 2 = 1-2-3-4-4-5-6

\[ V(G) = E - N + 2 = 5 - 5 + 2 = 2 \]

\[ V(G) = p + 1 = 1 + 1 = 2 \]

d) Delete Data

Flowchart

Flowgraph

Flowgraph Lines | Cyclomatic Complexity
---|---
Based on the results of white box testing that has been carried out to check the school health information system that has been created, getting good results where all logic flows or flowcharts applied to the school health information system program run according to the desired logic flow.

- Black Box Testing
  The following are the results of Black Box testing.

<table>
<thead>
<tr>
<th>Table 2 Black Box Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testing Activity</td>
</tr>
<tr>
<td>Logging in to an account</td>
</tr>
<tr>
<td>Add student data</td>
</tr>
<tr>
<td>Editing student data</td>
</tr>
<tr>
<td>Delete student data</td>
</tr>
<tr>
<td>Add student sick history</td>
</tr>
<tr>
<td>Delete a student’s sick history</td>
</tr>
<tr>
<td>Copying data</td>
</tr>
</tbody>
</table>

Path 1 = 1-2-3-4-5
Path 2 = 1-2-3-2-4-5

\[
V(G) = E - N + 2 = 5 - 5 + 2 = 2
\]

\[
V(G) = p + 1 = 1 + 1 = 2
\]
Based on the results of black box testing that has been carried out, which only focuses on inputs and outputs that state the suitability of the school health information system that has been made with the desired specifications and some additional simple features. The test results of the black box above show that the success rate of the school health information system that has been made successfully operates around 90%, which means that there are still some features that are erroneous in the school health information system that has been made. Where the failure is in the add student data feature and the edit drug data feature. In the add student data feature, errors occur in the date of birth and address section which do not appear after entering the data. While in the edit drug data feature, the error occurs in the drug dosage column whose data disappears after editing the data.

3.5 Implementation

This implementation stage is a stage which displays the results of the interface design of the finished school health information system display. The following is a view of the school health information system (SINKES). In addition, the system used to create this school health information system uses PHP as a programming language with Visual Studio Code as a code editor, and MySQL database. The use of PHP as a programming language, Visual Studio Code as a code editor, and MySQL as a database allows this system to have reliable and efficient capabilities.

In developing the system interface, HTML, CSS, and JavaScript technologies are used, which are often used together in web development. HTML is used to build the structure and content of the page, while CSS is used to organize the appearance of the page. In addition, JavaScript is used to add dynamic interactions and functions. By combining these three technologies, developers can implement pre-designed interface designs. Moreover, HTML, CSS, and JavaScript play an important role in developing responsive and interactive interfaces.

a. Login View

In this login view, the admin or UKS officer logs in by entering the username and password that has been stored in the data base.

b. Dashboard Page

On this dashboard page there is a display of data on the number of students and data on the number of
c. Data Student Page
The student data page displays data on name, date of birth, address, telephone number, gender and actions in which there are buttons to delete and edit. In addition, there is a button to access the add student data page and there are also buttons to copy data, make data into pdf files, make data into JSON files, and print data.

d. Page Add Student Data
On the add student data page there are columns for inputting NIS, name, date of birth, cellphone/telephone number, address, and gender and there is a button to save the data and if it has been saved it will immediately return to the student data page. In addition, there is a back button to return if you do not want to add student data.

e. Student Progress Page
On this page there are columns containing data on name, class, age, height, weight and actions to delete and edit data. In addition, there is a button to add student development data and there are also buttons to copy data, make data into pdf files, make data into JSON files, and print data.

f. Add Student Progress Page
On the add student development data page there are columns for inputting name, age, and class, height, and weight and there is a button to save the data and if it has been saved it will immediately return to the student development data page. In addition, there is a back button to return to the student development data page if you do not want to add data.

g. Page Medicine Data
On this page there are columns containing data on drug names, drug descriptions, drug dosages and actions to delete and edit data. In addition, there are buttons to add drug data and there are also buttons to copy data, make data into pdf files, make data into JSON files, and print data.

h. Page Add Medicine Data
On the add drug data page there are columns for inputting drug names, drug descriptions, and drug
dosages and there is a button to save the data and if it has been saved it will immediately return to the drug data page. In addition, there is a back button to return to the drug data page if you do not want to add data.

Figure 18 Page Add Medicine Data

i. Sick History Page
On this page there are columns containing data on check date, student name, complaint, drug, disease type, drug name and action to delete data. In addition, there is a button to add drug data and there are also buttons to copy data, make data into pdf files, make data into JSON files, and print data.

Figure 19 Data Riwayat Sakit

j. Page Add History Sick
On the add sick history data page there are columns for inputting names, complaints, diagnoses, drugs, diagnoses and examination dates and there is a button to save data and if it has been saved it will immediately return to the sick history data page.

Figure 20 Page Add History Page

3.6 Maintenance
After the implementation of the school health information system (SINKES), it is important to carry out a maintenance phase to maintain the performance and security of the system. The maintenance phase involves several important steps, such as active malware management, performing regular defragmentation, performing hardware checks, and backing up important data. These steps are necessary to ensure that SINKES continues to operate properly and smoothly without interruption.

By carrying out proper maintenance, the school health information system can continue to function optimally, protect sensitive data and avoid security issues that may arise. Regular maintenance also helps prevent hardware failures, extends the life of the system and ensures the availability of critical data in emergency situations. With a commitment to regular and disciplined maintenance, SINKES can provide ongoing benefits to users and promote efficiency in the management of health information in the school environment.

4. Conclusion
Based on this research, one of the main problems found in Man Insan Cendekia Sorong school is data and information processing where the data collection process is still done manually. From these problems, the school health information system at Man Insan Cendekia Sorong has been developed by creating a web application. This web application provides various features in it such as student data features, drug stock features, sick student history features, and student data development data features so that it can be done with good governance, and the information can be accessed quickly and accurately. This will increase the effectiveness and efficiency of the services provided by the UKS. The method used in this research is the Waterfall method, chosen because it is easy to implement and the resources required to implement it are minimal. In addition, there are several UML diagrams used to assist in designing and analyzing system development.

The testing phase is carried out using two methods, namely White Box testing and Black Box testing. The conclusion of the results using these two methods is that the school health information system (SINKES) can run as expected even though there are still some features that do not work properly but this does not interfere with the performance of the system. This school health information system (SINKES) has not implemented access features for users. In addition, this study succeeded in developing a feature that is very helpful for students in monitoring their growing development, which is a feature of student development data collection. This feature is one of the features that has not been implemented in previous
research. With this system, it is expected to increase the effectiveness and efficiency of UKS (School Health Unit) services at Man Insan Cendekia Sorong.

Future research is expected to add more detailed and personalized user access features in SINKES. It is also necessary to design a strong authentication and authorization mechanism. It is also important to develop user management features, including account management, access permission settings, and activity monitoring. Consider developing a more intuitive and responsive user interface and integrating SINKES with other information systems in the school to improve the effectiveness and efficiency of the whole system.

Reference


