

Developing A Medical Record Information System To Improve The Quality Of Health Services For Primary School Students

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KEYWORDS

Student health, information system, data needs, model design, SIREKA

ABSTRACT:

Introduction: School health services are essential to improving student health. Based on previous studies, no school health service has developed a student personal medical record information system to support effective health monitoring and intervention, especially for primary school (PS) students.

Objectives: The objectives this study is to develop a medical record information system that improves primary school students' health services and enhances health data management's efficiency and effectiveness through a user-friendly and systematic approach.

Methods: This type of research is research and development (R&D) using the ADDIE model, with five phases: analysis, design, development, implementation, and evaluation.

Results: These findings underscore the importance of integrating technology into school health services and highlight the SIREKA model's potential benefits in improving elementary school students' health management. This is the first study to develop Developing a Medical Record Information System to Improve the Quality of Health Services for Primary School Students.

Conclusions: Conclusion underscore the importance of the SIREKA model in improving health services for PS students and highlight the need for continuous evaluation and improvement of the system. The SIREKA model was positioned to significantly enhance the quality of health services provided to PS students, demonstrating its potential for widespread adoption in educational settings. The SIREKA model contributes significantly to the quality of health services for PS students by providing a structured framework for health data management, integrating health services, and ensuring that the model is tailored to meet user needs effectively.

Introduction

The implementation of routine health assessments, educators and school health professionals can detect early indicators of physical and mental health issues (De Carvalho et al., 2024). Furthermore, schools can serve as information hubs for parents regarding the significance of early detection and methods to uphold students' health. Parental engagement is crucial in the early identification of health issues in children. Parents who notice alterations in their child's behavior or physical state might promptly consult a healthcare professional for additional assessment (Kim et al., 2022). Furthermore, parents must offer adequate emotional support to students facing health challenges. A comprehensive strategy should guide the early identification of health issues in PS students (Taranushenko & Tepper, 2024). Alongside assessing physical health, it is imperative to evaluate the emotional and social dimensions of the kid. Anxiety, despair, and behavioral issues can adversely impact a child's physical health. Therefore, quality and well-documented health services are needed in schools (Choi, 2024) to improve students' health towards Golden Indonesia 2045 (Melisa et al., 2022).

School health services are essential for enhancing student well-being and academic achievement. Diverse models exist worldwide, each targeting specific health concerns encountered by students. The incorporation of health services in educational environments not only improves access to care but also elevates overall health outcomes for children and adolescents. Researchers such as (Ughasoro et al., 2024) have developed school-based health services. They created the School Health Program (SHP), which emphasizes the importance of routine health checks, immunizations, and first aid services. This suggests that we need to revise national school health policies and improve staff training. A study by Ahmed et al. (2023) has developed a pilot initiative in Cape Town that illustrates the feasibility of school-based health care, emphasizing sexual and reproductive health. In addition, school-based health centers (SBHCs) develop a range of services, including mental health care, which is essential for managing chronic diseases and improving academic performance, as studied (Itiriyeva, 2024). Other researchers have developed School Health Units/Unit Kesehatan Sekolah (UKS), which emphasize preventive health strategies, early detection, and interventions for physical and mental health (Julia Djamal et al., 2024). The development of school-based primary health care requires teamwork between health workers and educators to meet the diverse health needs of children (Sanford et al., 2022). Based on previous studies, it appears that no school health service has developed a student personal medical record information system (called the SIREKA model), which aims to support effective health monitoring and intervention, especially for primary school students.

The developed SIREKA model is an innovative solution to improve the quality of health services in schools. By integrating student health data into one platform, this SIREKA model allows early identification of health problems so that interventions can be carried out in a timely and effective manner. The main advantages of this SIREKA model include efficiency, accessibility, accuracy, interoperability, and a holistic approach. The SIREKA model is expected to improve student health outcomes, simplify health data management in schools, and support better decision-making to improve elementary school students' health. This study aims to develop the SIREKA model to improve the quality of health services for PS students.

Method

The methods used in this research are research design, data collection, and data analysis. We conducted this research at 15 PS in the city of Semarang, Indonesia.

Research design

This type of study is research and development (R&D) using the ADDIE model. The ADDIE model functions as a systematic framework for research and development (R&D) within educational settings (Hanipah et al., 2022). The ADDIE model is a structured instructional design framework with five phases: analysis, design, development, implementation, and evaluation.

1. **Analysis:** This research begins with a comprehensive needs analysis stage. At the analysis stage, two analyses are carried out: (1) factual analysis of student health data management and (2) analysis of student health data management needs. Based on the results of this analysis, the objectives of developing an effective and efficient SIREKA model are formulated.
2. **Design:** We design of SIREKA model prototype, which includes work process mapping and system design.
3. **Development:** The designed prototype is then tested for validity by 2 management information system experts, 2 medical record experts, and 2 health information experts. Experts' design validation results serve as a hypothetical model that addresses the study's needs or problems. We analyze the test results using quantitative and qualitative methods to find out how well the designed SIREKA model meets the established criteria.
4. **Implementation:** We carry out limited trials in 15 PS in Semarang, Indonesia, to measure the implementation's functionality and effectiveness. We will make product revisions and improvements based on suggestions and input from SIREKA model users when we identify

product deficiencies and errors. We then use the trial results as input to improve the SIREKA model.

5. Evaluation: The final stage of this research is the evaluation and reporting of results, which includes a comparison between the results obtained and the initial objectives of the research. We carry out this evaluation in two stages:
 1. Formative evaluation: Conducted during implementation to ensure the system is running according to plan. This evaluation includes observation, recording obstacles, and collecting user input. We use the results to directly improve the system.
 2. A summative evaluation is conducted after implementation is complete to assess the overall impact. This evaluation uses questionnaires, interviews, and quantitative data analysis to measure user perceptions, system efficiency, and its impact on the UKS program.

Data Collection

This study involved 36 respondents from 15 PS in Semarang City to validate the importance and feasibility of the identified data elements. Through surveys, in-depth interviews, and focus group discussions (FGDs) with teachers, administrators, health professionals, and parents, this study delved deeper into understanding the challenges and needs in school health management. This multi-method approach ensures that the SIREKA model developed can meet user needs, address existing problems, and assist in monitoring and improving student health (Table 1). The variables studied were human resources (X1 and Y1), information systems (X2 and Y2), budget (X3 and Y3), and facilities and infrastructure (X4 and Y4).

Table 1. Interval class category factual and need category

Interval Value	Factual Category	Need Category
13 – 16	Very Good	Very Important
10 – 12	Good	Important
7 – 9	Less Good	Less Important
4 – 6	Not Good	Not Important

The assessment of the feasibility and criteria of the SIREKA model (Table 2) involved six experts, consisting of two management experts, two medical record experts, and two information system experts. We used expert assessments to ensure the proposed model was relevant, functional, and aligned with user needs and applicable technical standards.

Table 2. Model validity percentage and validity criteria

Eligibility Percentage	Eligibility Criteria
81% - 100%	Very valid
61% - 80%	Valid
41% - 60%	Quite valid
21% - 40%	Not valid
< 21%	Very invalid

Data analysis

We used descriptive statistics to summarize the main trends and features of the quantitative data, giving a clear picture of how it was spread out and how it varied. Reliability tests, such as Cronbach's alpha, were applied to ensure the consistency and reliability of the quantitative data collection instruments. Meanwhile, qualitative data were analyzed thematically to identify recurring patterns, themes, and categories, providing a deeper understanding of the underlying meaning and context of the data. Researchers can use the best parts of both quantitative and qualitative methods together with this mixed-methods approach, which leads to more complete and richer results. This significantly enhances the validity and reliability of research findings.

Result

The SIREKA model in PS is a framework that gathers, administers, and evaluates data about the health of PS students. The objective is to generate precise and current information to facilitate decision-making regarding the health of PS students. The development of the SIREKA model uses the ADDIE model, which consists of the analysis, design, development, implementation, and evaluation stages.

Analysis stage

Understanding the characteristics of respondents is an important step in this research. This information not only helps researchers in designing better research but also in interpreting research results accurately (Table 3).

Table 3. Respondent characteristics teachers and school principals

Variables	Frequency (%)
Age	
25-44 years	18 (50.0)
45-60 years	18 (50.0)
Gender	
Male	19 (52.8)
Female	17 (47.2)
Education	
Graduate	25 (69.4)
Postgraduate	11 (30.6)
Position	
UKS supervisor teacher	18 (50.0)
School principals	18 (50.0)
Type of primary school	
Public	26 (72.2)
Private	10 (27.8)

The age of the respondents (50%) was in the age range of 25–44 years; in terms of gender, the majority of respondents were male (52.8%); in terms of education, the majority of respondents were graduates (69.4%); in terms of position (50%), they were principals; in terms of type of PS, respondents (72.2%) were public PS and (27.8%) were private PS (Table 3).

We sent questionnaires to respondents to gather their opinions about the management of student health data at PS UKS in Semarang City. We used the results, as shown in Table 4, to obtain quantitative data.

Table 4. Respondents' perceptions of the factual conditions of student health data management

Indicator	N	Mean	Std. Deviation	Category
X1	36	12.44*	1.575*	Good
X2	36	10.50*	1.463*	Good
X3	36	8.08*	2.882*	Less Good
X4	36	9.08*	1.204*	Less Good
Average	36	10.02	1.781	Good

* Analyzed using descriptive statistic frequency

Table 4 shows that respondents generally have a positive perception of student health data management in the UKS, with an overall mean score of 10.02. Further analysis shows that all four variables (X1-X4) contribute to this positive perception, although to varying degrees. Variable X1 with the highest mean score (12.44), indicates the most positive perception from respondents. X3, on the other hand, has the lowest mean score (8.08), as well as the highest standard deviation (2.882), which shows that respondents' opinions on this issue are more varied. However, all variables, including the overall mean score, are still categorized in the "Good" category. This shows that although there are some differences of opinion, overall respondents feel that student health data management in the UKS has been carried out well.

Furthermore, this study analyzed respondents' perceptions regarding the urgency of implementing an integrated health information system for elementary school students. The results showed that respondents highly rated the importance of this system in supporting comprehensive student health recording, effective health monitoring, and simple access to data for various related parties, including schools and health services. This finding is supported by Table 5, which shows that most of the people who answered agree that an integrated health information system is crucial for finding health problems in students early and making it easier for schools and health services to work together.

Table 5. Perceptions of respondents on the need for PS student's SIREKA model

Indicator	N	Mean	Standard Deviation	Category
Y1	36	14.36*	1.742*	Very Important
Y2	36	14.11*	1.753*	Very Important
Y3	36	11.00*	1.373*	Important
Y4	36	10.80*	1.305*	Important
Average	36	12.56	1.54	Important

* Analyzed using descriptive statistic frequency

Table 5 shows the respondents' perceptions of the need for student health data management in the PS UKS. Four variables (Y1-Y4) have the highest (14.36) and lowest (10.80) values, while the overall mean value (12.56) falls within the important category. The standard deviation of each variable ranges from (1.305) to (1.742), which indicates a variation in respondents' perceptions. All variables are in the "Important" category, meaning that respondents consider student health data management to be important.

We used Kendall's Tau Test (Table 6) as a statistical test to examine the relationship between respondents' perceptions of factual conditions and the SIREKA model data needs. This test measures the strength and direction of the relationship between two ordinal or interval/ratio variables, especially when the data is nonparametric. This test is ideal for small samples, nonlinear relationships, or uncertain ranks. This test provides a correlation coefficient between -1 and 1, indicating a negative, positive, or no relationship. This test is often preferred over parametric tests such as Pearson when the data is not normally distributed, making it suitable for complex data analysis.

Table 6. The relationship between factual conditions and the needs of the SIREKA model by PS students

Kendall's Tau	Correlations		N
	Correlation Coefficient	p-value	
Factual	1.000	0.000*	36
Needs	-.220	0.045*	36

* Analyzed using Kendall's Tau

* Statistically significant at $p=0.05$

Table 6 shows the results of the analysis of the relationship between factual conditions and the SIREKA model by PS students using Kendall's Tau test. The correlation coefficient for the need variable is -0.220, with a significance value of 0.045. This indicates a significant negative relationship between factual conditions and SIREKA model needs at a 95% confidence level ($p < 0.05$). This means that the higher the factual conditions, the lower the need for SIREKA model development, or vice versa. This data is the basis for designing a relevant and useful SIREKA model.

Design SIREKA model

The SIREKA model integrates various management functions—from planning, organizing, and implementing to controlling produce output in the form of reports that are accurate and useful for various stakeholders. We use assistive software or information system development case tools to talk about how

the SIREKA model was created using information technology. We use these tools to discuss each process within the system. We designed the SIREKA model to manage student health data in PS more effectively and efficiently, including input, processing, and output. Inputs include school profile data, student profile data, school health unit teacher profile data (UKS teachers), health screening result data, UKS management policies, screening schedules, and follow-up of elementary school student health screening results. We collect this data to ensure the system has sufficient information to start the management process. The process in the SIREKA model design consists of four parts, namely: planning (P), organizing (O), mobilizing (A), and controlling (C). The management process produces output in the form of a screening report for each student, which documents the results of their health examination (Figure 1). Each school's screening report consists of a summary of the results of all student health examinations at the school. The screening report from each health center relates to the information they need about the health conditions of students in their area. The documentation of health screening activities contains detailed notes on their implementation.

Figure 1 shows the prototype flow of the SIREKA model which is based on the management functions of planning, organizing, acting, and controlling. Teachers, principals, officers, and heads of public health centers (Puskesmas), health offices, and education offices in the city of Semarang should be able to easily access structured student health data that is part of the SIREKA model. This will enable schools and health authorities to make informed decisions and implement appropriate policies. This SIREKA model functions as a comprehensive framework for health data management. By utilizing information technology, the SIREKA model can increase efficiency and effectiveness in managing student health data, as well as support decision-making. The design of the SIREKA model uses CASE software to comprehensively model each process involved in student health screening.

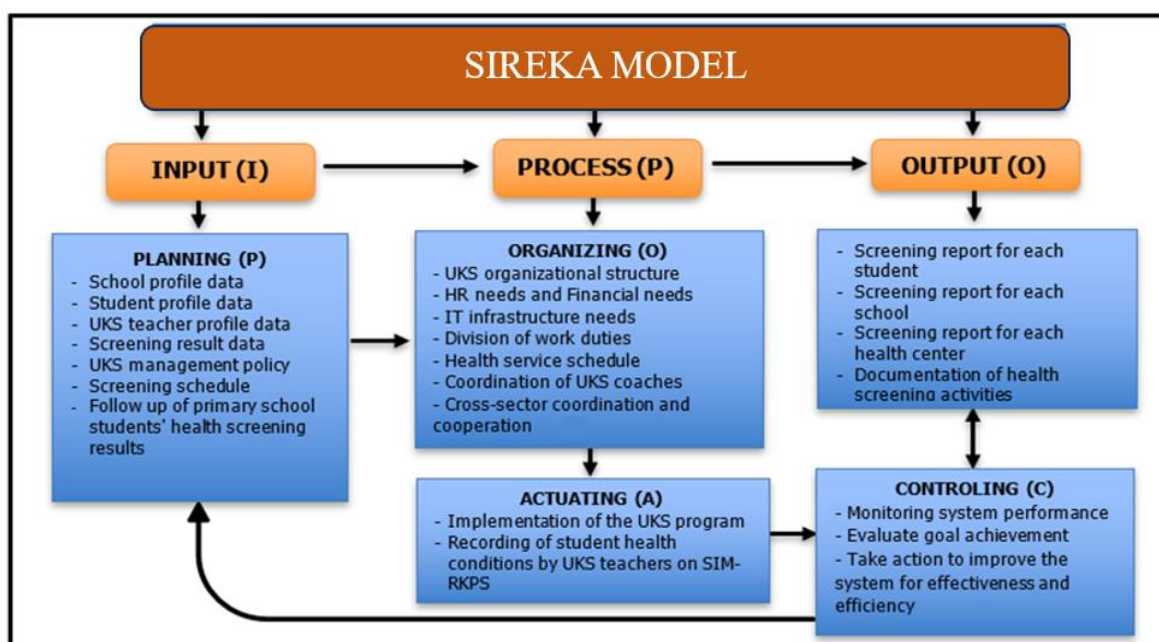


Figure 1. Prototype SIREKA model

The context diagram in Figure 2 illustrates the interaction between the main entities, namely the UKS teacher, the health center officer, and the Semarang City education and health office. This diagram clearly illustrates the data and information flow between these entities, from student data input to the reporting of screening results.

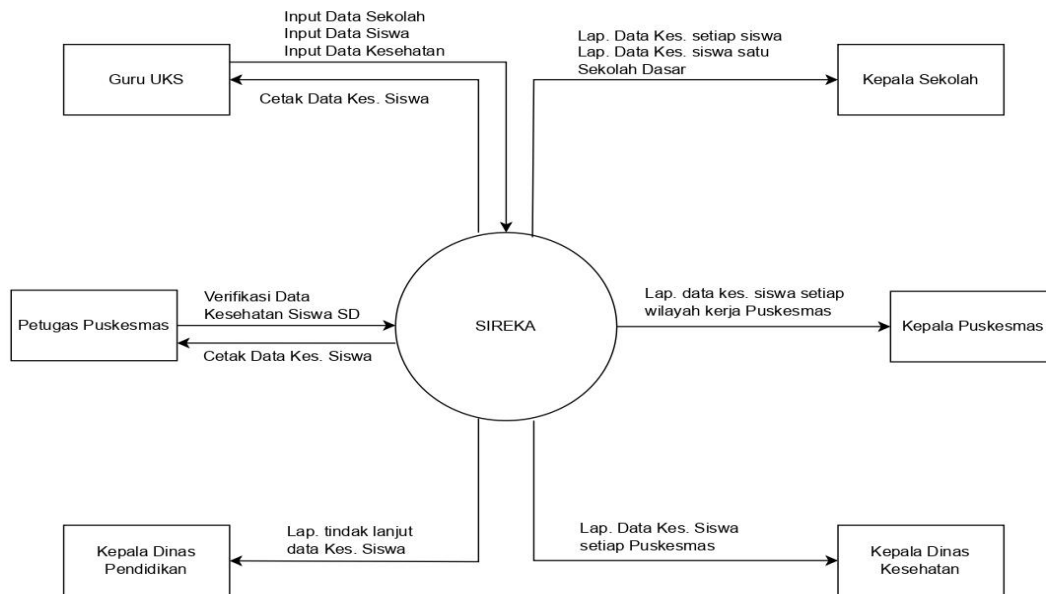


Figure 2. SIREKA model context diagram

This database design has successfully described the relationship between tables logically (Figure 3). The database design includes a health center table consisting of: health center_id, health center_name, health center_address, created_by, modified_by. The school table consists of: school_id, school_name, school_address, health center, created_by, modified_by. The class table consists of: class_id, class_name, school, created_by, modified_by. The student table consists of: student_id, student_nisn, student_name, student_birth_date, student_blood_gol_gol, student_parent_guardian, student_jk, student_dis_type, class, created_by, modified_by. The check table consists of: check_id, check_date, student_td_a, student, modified_by.

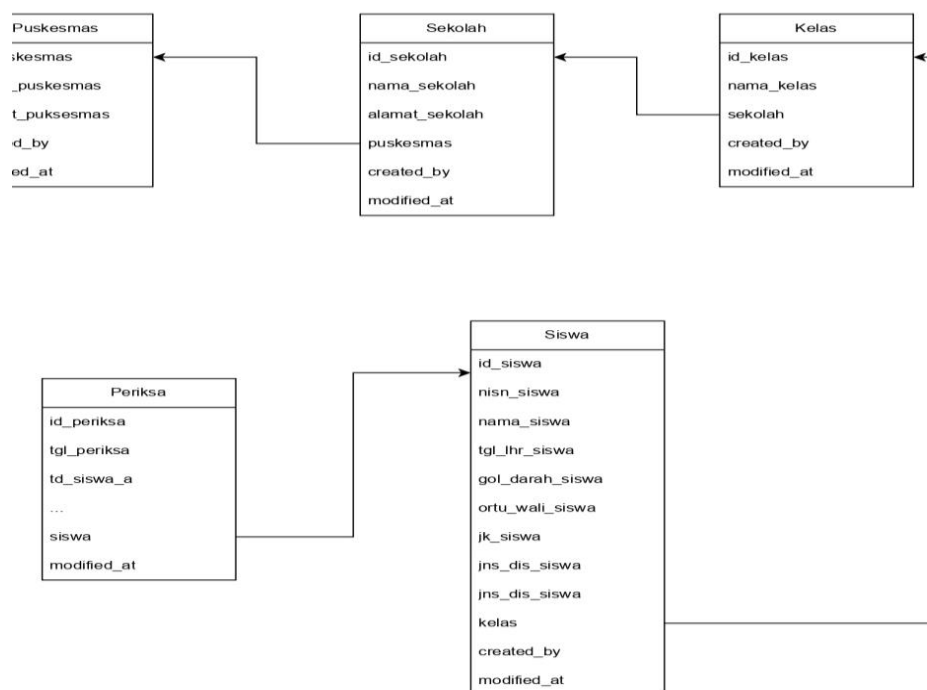


Figure 4. Database design and relationships between tables

Development

Designing the login page interface, which users use to enter SIREKA, is the first step in the SIREKA model development process. System users must first enter their email and password via the <https://sireka.org> link, as shown in Figure 5.

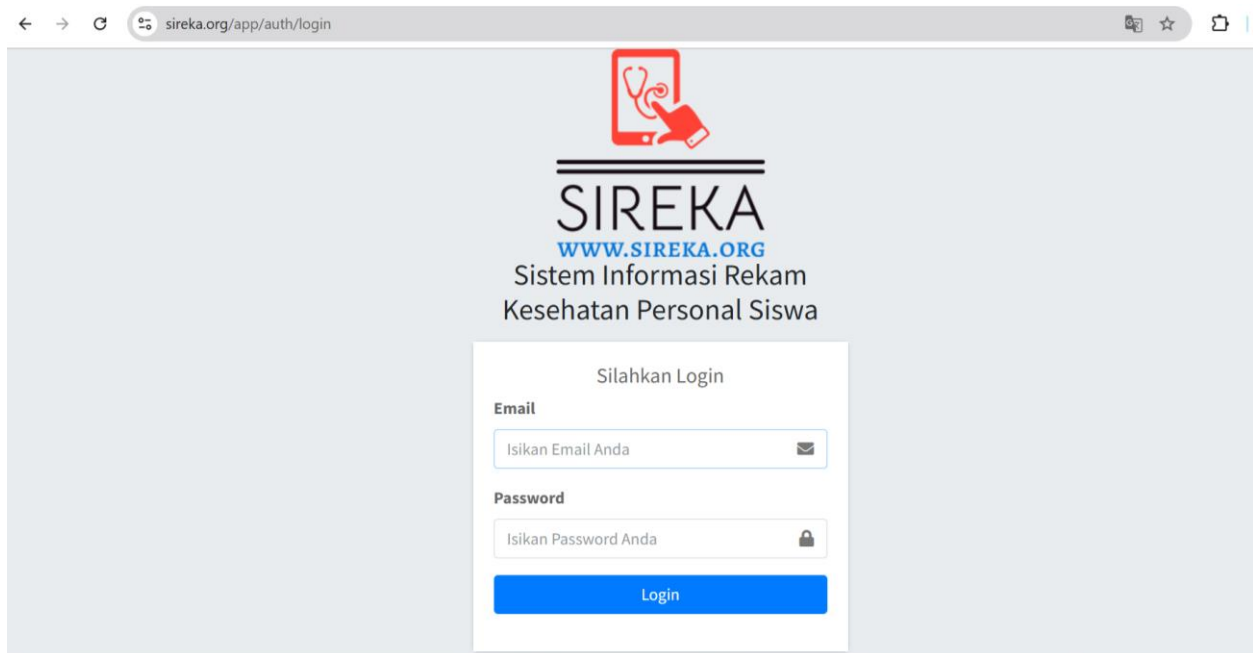


Figure 5. SIREKA model home page

The main page design or main page interface design, is a page that is used as the initial display after the user has successfully logged in to the <https://sireka.org> system. We strive to make SIREKA's main page both attractive and simple to enhance user experience. After the visitor successfully logs in, the main display looks like Figure 6.

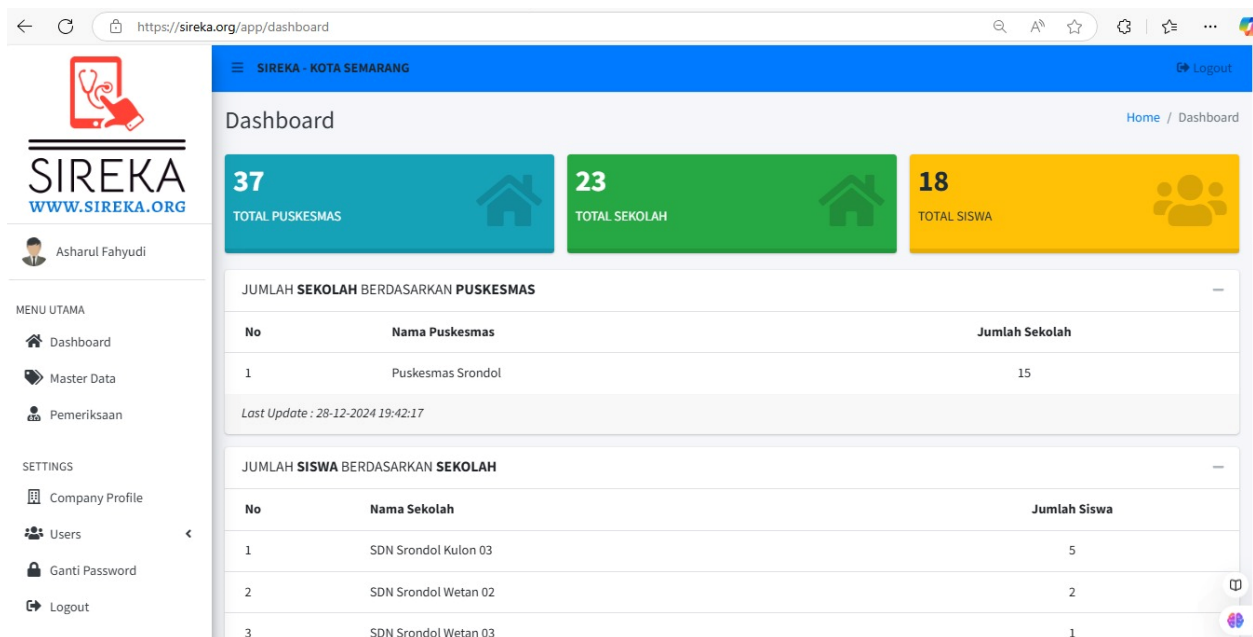


Figure 6. Dashboard SIREKA model

The expert panel's eligibility test showed that the SIREKA model had a very high level of eligibility (84.22%), which means it is very likely to work. Thanks to the experts' in-depth experience and expertise, the eligibility process was carried out comprehensively, covering technical, functional, and business relevance aspects. As a result, the SIREKA model not only meets user expectations but also has the potential to increase efficiency and effectiveness in improving PS student health monitoring and management, such as decision-making, data management, or customer service.

Implementation

We tested the SIREKA model that we had developed to determine its effectiveness. Implementation began with a field trial in 15 PS that had active UKS in Semarang City, Indonesia. The schools selected as trial locations were representative, both in terms of conditions and needs, so the trial results could reflect the potential for wider system implementation. In the early stages of implementation, SIREKA was integrated with devices already available in schools, such as computers or tablet-based devices, to ensure compatibility and ease of use. For the implementation to run smoothly, intensive training was provided to all main users, such as principals, teachers, and UKS officers. This training aims to provide users with an in-depth understanding of the main features of the SIREKA model, including how to enter data, monitor program implementation, and create reports. The approach used in the training included direct simulations of system use, question and answer sessions, and the provision of written guides to make it easier for users to understand the system's functions. In addition, during the trial period, direct assistance was provided by the research team to ensure that obstacles or technical difficulties faced by users could be resolved immediately. We also provided communication channels like WhatsApp groups or email to facilitate quick interaction between users and the technical support team. We collected initial feedback from users after they had used the system for a certain period. We collected this data through questionnaires, interviews, and focus group discussions to understand the user experience. The aspects measured included the ease of use of the system, the speed in managing SIREka data in the PS health unit, and the benefits of the system in supporting the implementation of the school health unit program. We then used the implementation results to identify technical issues, improve features, and refine design aspects. We revised the SIREKA model to address deficiencies based on the findings from this phase. We carried out this revision process with a focus on improving system stability, frequently used features, and a more intuitive user interface. Overall, the SIREKA field trial was an important step to ensure that the system was ready for widespread use. Through this process, we were able to identify areas that needed improvement and improve the overall quality of the system. The implementation results will be the basis for future SIREKA development.

Evaluation

The evaluation stage is the final step in the SIREKA model development research. This evaluation aims to assess the success of the system based on the objectives that have been set. Two approaches, namely formative and summative, carry out the evaluation. Formative evaluation takes place during implementation to ensure that the system is running according to plan. This activity involves directly observing users operating the system, documenting technical limitations, and gathering user feedback on the provided training. The findings from the formative evaluation become the basis for direct improvements to the system before the summative evaluation stage. Once the whole system is up and running a summative evaluation is done to see how well and how much of an impact the SIREKA model had. At this stage, we collect data through questionnaires, in-depth interviews, and quantitative data analysis. We use questionnaires to gauge user perceptions of the system's benefits, ease of use, and level of satisfaction. We conduct in-depth interviews to delve deeper into the user experience and gather suggestions for future improvements. In addition, quantitative data, such as the time required to manage SIREKA data before and after using the system, are analyzed to assess the resulting efficiency. The formative and summative evaluations show that the SIREKA model has been well received and can improve the effectiveness, efficiency, and openness of the UKS program management. This implies that numerous elementary schools can implement it universally.

Discussion

School health services are essential components of public health systems, designed to protect student health. These services have shown significant evolution over the past century, adapting to changing health concerns and emphasizing preventive treatment (Jansen et al., 2019). Integrating school health services with primary healthcare can enhance student health outcomes. We have effectively created a medical record information system (SIREKA) to enhance the quality of health care for PS students. The creation of SIREKA utilized the ADDIE methodology, which encompasses the phases of analysis, design, development, implementation, and evaluation. At a 95% confidence level ($p < 0.05$), the study results showed a strong negative relationship between the facts and the need for the SIREKA model (Table 6). The more favorable the factual conditions, the lesser the necessity to employ the SIREKA model. We formulate the SIREKA model to address the health issues of PS students, which arise from suboptimal factual situations. We design the SIREKA model as a system to administer student health data cohesively and effectively, particularly at the primary school level. This system integrates multiple management functions, including planning, organizing, executing, and controlling. The SIREKA model design process comprises four components: planning (P), organizing (O), mobilizing (A), and controlling (C) (Figure 1). Engineered to thoroughly and efficiently manage student health data, especially in elementary schools, is the SIREKA model. This system functions as an assistant that oversees all information regarding student health, encompassing personal data and health examination outcomes. The health service model, which manages student health data, plays a crucial role in improving student well-being and academic achievement. This concept combines technology and data management to deliver prompt health treatments, thereby mitigating health inequities among students.

To show how each part of the system works, the SIREKA model context diagram design uses case tools or software to help with system development (Figure 3). The use of these case tools is very helpful in visualizing and better understanding the system as a whole. In addition, case tools also allow us to simulate and analyze the system before implementation so that we can identify potential problems and make improvements early on. Utilizing CASE tools markedly enhances the visualization and comprehension of systems in software development. These tools enhance the modeling of business processes and system components, promoting clearer communication and design. The primary advantages of CASE tools in this scenario are improved visualization, enhanced efficiency, and decreased errors. CASE technologies show system parts visually, which helps developers and other stakeholders understand complicated architectures. Applications like Microsoft Visio and BPwin make it easier to create detailed diagrams that show how business processes work. This helps find problems early in the design phase (Gojgić et al., 2012). The incorporation of CASE technologies expedites the software development process by automating operations like data modeling and scripting (Ye, 2012). E-CASE solutions improve this efficiency by letting people work together from afar and integrating with online technology, which makes them fit the needs of modern workplaces (Arman, 2013). Case tools make it easier to formalize the specifications of parts, which improves syntax and cuts down on misunderstandings and mistakes in system design (Yannuzzi, 2007).

We also create database designs and inter-table relationships to describe the relationships between tables based on their relationship levels (Figure 4). The main purpose of this design is to ensure data integrity and consistency and to facilitate decision-making based on accurate data. By designing the right relationships, we can avoid data duplication, maintain referential integrity, and facilitate the database maintenance process. The design of databases and the relationships among tables are essential for developing efficient and successful information systems. These relationships dictate the interaction between tables, safeguarding data integrity, and reducing redundancy. Diverse approaches and models, such as the entity-relationship (ER) model, enhance the design process by clearly depicting these linkages. The entity-relationship (ER) model shows important parts of database architecture and how tables interact with each other. It shows how tables interact with each other, how to set up relationships, and how these relationships are used in the real world. Table relationships protect data integrity by imposing constraints via foreign keys that connect tables (Sinha et al., 2013). Normalization-based academic systems (Joefrie & Kalatiku, 2012) demonstrate that well-structured relationships minimize data duplication. Joefrie & Kalatiku, (2012) show that well-structured relationships reduce the amount of data that is duplicated. It is possible for methods like those described by Zeng et al. to automatically

find links between tables, depending on the type of database and its topology (Chakravarthy & Navathe, 1993). Employing super schemas can enhance the interconnections among various tables, thereby improving storage efficiency (O'Neil, 1994). Many tables control different sets of data in complex databases, like those used in e-commerce. Clear links between these tables are essential for efficient querying and data management (Simon, 2023).

Researchers have developed the Mobile Health Platform Leong et al. (2022) For student health services, enabling students to efficiently manage their health information and fostering proactive health management and awareness. Big data technology enables the collection, analysis, and monitoring of vast amounts of health data. This leads to a more empirical way of managing student health (Wang et al., 2021). Intelligent systems evaluate health data to deliver tailored health recommendations, motivating students to participate in physical exercise and enhance their overall well-being (Yakovenko et al., 2024). Collaborative strategies between educational institutions and healthcare services improve student learning and address healthcare requirements (Beierwaltes et al., 2023). The SIREKA model has undergone a validity test by two management specialists, two medical record authorities, and two information systems professionals. Professionals do a validity test that makes sure the SIREKA model is both technically sound and can be changed to fit the needs of each user and the real operational environment. We performed expert evaluations to confirm that the suggested model is pertinent, operational, and compliant with relevant technical standards. The SIREKA model's validity test, resulting in a score of 84.22%, has significant potential for effective implementation. The validity test is a fundamental component of healthcare systems, affecting access to essential medical services. People have established diverse frameworks and criteria to test validity, illustrating the complexity and heterogeneity of health service provision across various locations and systems.

Validity tests in health service include multiple elements that guarantee the appropriate selection of people for clinical trials and healthcare programs. These elements are essential for optimizing patient safety, enhancing clinical trial participation, and guaranteeing equitable access to services. According to (Ramaswami & Uldrick, 2024), validity criteria are set to find patients who are most likely to benefit from a clinical trial while also reducing the risk. These criteria usually include laboratory values and performance status. The use of stringent criteria may impede enrollment and marginalize underrepresented individuals, influencing the generalizability of clinical trial outcomes (Ramaswami & Uldrick, 2024). The formulation of validity criteria must reconcile the study's objectives with ethical norms and clinical contraindications (Foulkes, 2005). A validation test is necessary for healthcare programs. Determining validity for healthcare assistance programs requires the evaluation of patient data, including age, household structure, medical conditions, and financial means (Jones, 2023). We compare this evaluation with established criteria and probabilistic models to determine the likelihood of eligibility for benefits (Leong et al., 2022).

The implementation of the SIREKA model in elementary schools is crucial for enhancing health management and documentation. This system enables effective documentation and access to student health information, hence enhancing health outcomes. Rimawati & Pratama, (2024) Assert that medical records streamline administrative duties, enabling educators to efficiently access and handle student health data. Medical records offer a detailed account of a student's health history, crucial for prompt intervention and assistance. Comparable research indicates that web-based systems, like the Eye Health Information System, facilitate online appointment booking and consultations, hence promoting proactive health management among students (Ramadhan et al., 2024). According to Mohammad et al. (2023), the Health Screening Information System (SIPEKASDA) makes it easier to process and report data, which greatly reduces the errors that come with writing things down by hand. Effectiveness of Health Education. Field trials indicate that the incorporation of health education inside medical record information Systems can markedly enhance students' understanding and behaviors concerning health matters, including tobacco consumption (Lwegaba, 2005).

The formative and summative evaluations indicated that the SIREKA model effectively satisfied user requirements and accomplished developmental goals. This is demonstrated by enhanced efficiency in

student health data management, elevated user happiness, and substantial contributions to the enhancement of the UKS program's quality. The user satisfaction survey results indicated that 90% of respondents expressed high satisfaction with the use of SIREKA. SIREKA has significantly aided in the surveillance of student health and the enhancement of the UKS program within their educational institutions. Successful collaboration with community health centers enhances the execution of health initiatives, as evidenced in schools with robust relationships (Wijayanto & Hermawan, 2023). Evaluations show that the quality of health services varies; for example, a study showed that 66.7% of health centers met structural standards, but only 50% of staff carried out their duties satisfactorily (Washi & Saadoon, 2023). In certain regions, health service practices were deemed substandard, with 89.46% of schools in Wassit province exhibiting insufficient service delivery (Sameeha Naser Abed et al., 2022). Prevalent problems encompass inadequate resources, the absence of a specific budget, and insufficient facilities for health services (Rizk et al., 2021). Recommendations highlight the necessity for enhanced training for healthcare providers and more effective resource allocation to elevate service quality (Olabimpe et al., 2022). The evaluation results indicate the significant potential of SIREKA as an effective instrument for enhancing the quality of health care in educational institutions. As SIREKA continues to grow, it will be able to add features like interacting with the national health information system, better data analysis for finding disease patterns, and online learning courses to help school health professionals do their jobs better. Moreover, additional research is required to assess the long-term effects of SIREKA utilization on student health.

Conclusion

We designed the SIREKA model, a medical record information system, to enhance health services for elementary school students. Its research and development led to several important conclusions, such as the creation of an effective system that works well with health services; widespread positive feedback; the statistical significance of impact; the need for more research; user feedback; system improvement; and future improvements. The ADDIE methodology, which includes the analysis, design, development, implementation, and evaluation phases, successfully developed the SIREKA model. This system meets the specific needs of elementary school health services thanks to this structured approach. This study highlights the importance of integrating school health services with primary health care. Improving student health outcomes and ensuring effective health service delivery in schools depend on this integration. During the implementation phase, the formative evaluation yielded valuable insights into the user experience. User feedback was instrumental in identifying technical issues and areas for improvement, leading to a more intuitive user interface and increased system stability. Users responded positively to the SIREKA model, according to the results of the formative and summative evaluations. The effectiveness, efficiency, and transparency of health management increased, suggesting its universal application across elementary schools. The analysis revealed a significant negative relationship between the actual condition of student health data management and the need for the SIREKA model. As the condition improves, the need for the SIREKA model increases, demonstrating its usefulness in addressing specific health management issues. The study also shows the potential for future development of SIREKA, such as integration with the national health information system and improving data analysis capabilities. These improvements can better support school health professionals in their roles. The study concluded that further research is necessary to understand the long-term impacts of SIREKA on student health. This shows how important it is for schools to continue to review and change their health services. These conclusions underline the importance of the SIREKA model in improving health services for PS students and highlight the need for continuous evaluation and improvement of the system. The SIREKA model contributes significantly to the quality of health services for PS students by providing a structured framework for health data management, integrating health services, and ensuring that the model is tailored to meet user needs effectively.

Recommendations

By implementing these recommendations, the SIREKA model can be further refined to improve health service quality for primary school students, ultimately leading to better health outcomes and enhanced user satisfaction.

Limitations

These limitations underscore the importance of careful planning, resource allocation, and ongoing support to ensure the successful implementation and sustainability of the SIREKA model in enhancing health services for primary school students.

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Conflict of Interest

We declare that there is no conflict of interest.

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