Enhancing School Health Monitoring through Teacher Training and Web-Based Applications

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Abstract. Monitoring children's health is critical for ensuring growth and development. However, non-integrated recording and reporting methods often result in inconsistent and inaccurate data. This study aims to increase knowledge and skills in monitoring children's health in elementary schools, from anthropometric measurements to recording and reporting. The method used was a quasi-experiment (non-control, non-randomization) involving teachers, school staff, and related officers (n=25). The intervention consisted of educational and training sessions in anthropometric measurements, monitoring children's growth and development, and training on using MySIMOKA, a web-based application for monitoring children's health and training. Evaluation is carried out by providing a pre-test and a post-test. The intervention significantly increased participants' knowledge (p=0.001). The calculated effect size of 0.47 shows that the intervention has a medium effect, confirming the effectiveness of education and training in increasing participants' knowledge. Participants also showed improvement skills for the children's examination. MySIMOKA system usability scale was 66.72, meaning the system still needs to be improved. Health education and training sessions and practicing MySIMOKA significantly improve participants' knowledge and skills regarding monitoring children's health in elementary schools. Further assistance and cross-sector collaboration are needed to ensure the sustainability of child health monitoring and data entry.

1 Introduction

Health is a healthy physical, mental, spiritual, and social condition, making it possible to live a socially and economically productive life [1]. Meanwhile, children are individuals who are still in the womb until they are less than 18 years old [2]. A child's health can be seen by how

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far the child can develop potential, meet needs, and develop the capacity to interact with the environment [3].Various factors influence a children's health, including freedom from disease, a good environment and nutritional status [4]. Measurement or assessment of nutritional status is based on anthropometric standards [5], where anthropometric measurements consist of body weight, height, head circumference, and upper arm circumference [6].

Indonesia is the fourth country with the largest child population in the world, with 80 million children [7]. Indonesia also has a double nutritional problem, namely the problem of undernutrition and overnutrition, which is caused by a lack of public knowledge regarding nutrition, a balanced menu, and health [8]. The prevalence of nutritional status problems in children in Indonesia is very short (6.7%), short (16.9%), very thin (2.4%), thin (6.8%), fat (10.8%), and obese (9.2%) [9]. Indonesia continues to have under five stunting prevalence of 21.6, as indicated by the 2022 Indonesian Nutrition Status Survey. Additionally, the prevalence of wasting is 7.7, which remains above the 2025 target of less than 5% [10]. Research in other developing countries, such as Ethiopia, also shows that the prevalence of wasting is 18.2%; wasting is also the primary marker of malnutrition based on anthropometry [11]. In Bangladesh, the nutritional problems that occur are children experiencing underweight (40.5%) and stunting (38%) [12].

Maintaining and improving children's health is carried out by preventing and treating disease and restoring health in an integrated and sustainable manner, a child health effort [1]. Monitoring the health of school children is generally carried out through health checks on children. However, disability registration as a form of reporting is still not integrated and is paper-based with various duplications [13]. On the other hand, the National Association of School Nurses states that Electronic Health Records (EHRs) are vital for providing care and monitoring children's health in schools efficiently and effectively [14]. EHRs have become the standard of communication and documentation in healthcare systems, where Health Information Exchange (HIE) enables accurate medical information in real-time, which is critical for optimal outcomes [15]. Apart from that, using information systems to regularly monitor children's health, which can be connected to various parties such as parents, healthcare facilities, and other stakeholders, still needs to be improved in Indonesia. Therefore, using an integrated information system for monitoring the health of school children is necessary, especially in making decisions based on accurate and continuous recording and reporting. This study aims to increase knowledge in monitoring children's health in elementary schools, from examinations to recording and reporting.

2 Methodology

2.1 Study Design and Settings

This study uses a quasi-experimental method, giving the intervention to participants without a control group and randomization. The intervention provided education and training related to health examinations for elementary school children, including weighing, measuring height, head circumference and upper arm circumference, dental examinations, and eye examinations. Apart from that, the intervention also carried out was training in using MySIMOKA to record and report the results of health examinations for elementary school children.

MySIMOKA is a web-based application developed through a needs analysis to ensure it is lightweight and user-friendly for individuals without high technical expertise [13]. This program documents the child's previous medical history, including immunization records, and tracks the child's growth through periodic anthropometric examinations. This application

is also being developed to report the outcomes of visual impairment screening and children's oral health assessments.

This study was conducted at SD Muhammadiyah Bendo, Srandakan, Bantul, a private elementary school in a rural area. This community empowerment also involved the PKU Muhammadiyah Srandakan Pratama Clinic network as clinic supervisors.

2.2 Participants and Sampling Technique

Twenty-nine participants participated in this study, but 25 completed the pre-test and post-test. Participants consisted of teachers, school staff, and related officers who were involved in monitoring the health of elementary school children. The sampling technique used in this study is total sampling with the inclusion criteria of following a series of research activities from start to finish, being 18 years old, and being willing to participate in this study. Participants fill out electronic informed consent forms, which are given simultaneously with the pre-test as a statement of their willingness to participate in this study.

2.3 Data Collection

Data collection in this study is done by providing a pre-test and post-test via Google Forms before and after education and training sessions. The questionnaire consists of 12 questions in the form of statements with answer choices TRUE-FALSE. The questionnaire has been face-validated, and its construct validity has been confirmed through expert review.

2.4 Data Analysis

The data obtained during this community empowerment session was analyzed using SPSS software. Data analysis began with a normality test on the total pre-test and post-test scores obtained. Furthermore, due to the normality test results showing that the data was not normally distributed, a difference test was carried out using the Wilcoxon Signed-Rank Test to determine the difference between the pre-test and post-test scores. Apart from that, effect size analysis was also carried out to measure the strength of the intervention's effect.

2.5 Ethics

This study has received ethical approval from the Health Research Ethics Committee of the Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta, with No. 043/EC-KEPK FKIK UMY/I/2024. In addition, approval for willingness to become a participant was obtained through e-informed *consent* before data collection.

3 Results and Discussion

A total of 29 individuals took part in this study. However, 25 completed both the pre-test and post-test. The study primarily consists of women, accounting for 88% of the participants. Furthermore, participants are between the age range of 20 to 30 years, comprising 56% of the total. Furthermore, most participants possessed job experience or a duration of time employed in their respective professions, ranging from 1 to 10 years (68%). The participant characteristics are fully displayed in Table 1.

Table 1. Participant Characteristics

Variable	Category	n	Percentage (%)
Gender	Man	3	12.0
	Woman	22	88.0
Age	20 – 30 years	14	56.0
	31 – 40 years	7	28.0
	>40 years	4	16.0
Last education	Senior high school	4	16.0
	Diploma/Bachelor	21	84.0
Work	Teacher	22	88.0
	Employee	1	4.0
	School guard	1	4.0
	Private	1	4.0
Length of work	<1 year	6	24.0
	1 – 10 years	17	68.0
	>10 years	2	8.0

This study gathered data by conducting pre-tests and post-tests. The collected data is initially subjected to normality testing before proceeding with other tests. The Shapiro-Wilk test was conducted to assess the normality of the data, given the number of participants was less than 50. The results indicated that the data was not normally distributed, with p-values of 0.19 for the pre-test and 0.12 for the post-test (Table 2). Subsequently, due to the non-normal distribution of the data, a Wilcoxon Signed Ranks Test was conducted to determine any significant differences.

Table 2. Normality Test and Difference Test (Wilcoxon Signed Ranks Test)

	Shapiro-Wilk			Min.	Max.	Wilcoxon Signed Ranks Test			
	Statistics	df	Sig.			Mean	SD	Z	Sig.
Pretest Score	0.900	25	0.019	5	10	8.32	1.18	3.325	0.001
PosttestScore	0.891	25	0.012	7	12	9.96	1.72		

df=degree of freedom, Min.= minimum, Max.=maximum, SD=standard deviation, sig.=significance

The results of the analysis using the Wilcoxon Signed Ranks Test indicated that interventions in the form of education and training, ranging from health checks to recording and reporting, had a statistically significant effect on enhancing participants' knowledge (p=0.001). The effect size calculation was conducted to ascertain the intervention's impact on the participants. Here are the findings of the effect size calculation:

$$r = \frac{Z}{\sqrt{n}} = \frac{3.325}{\sqrt{50}} = \frac{3.325}{7.071067811865475} = 0.4702260094890541 = 0.47 \quad (1)$$

The intervention has a moderate effect, as indicated by the effect size calculation of 0.47. This finding confirms the efficacy of education and training in enhancing participants' knowledge. During the training session, participants effectively performed anthropometric measurements and basic health checks for children, as evidenced by researchers' observations. Additionally, participants were observed trying to input health examination and measurement data into the MySIMOKA application.

Table 3. System Usability Scale of MySIMOKA

Item Questionnaire	**Average Score (n=17)**
I think I want to use this system often.	3.6
I think this system is too complicated.	2.8
I think this system is easy to use.	3.5
I think I need support from a technical person to use this system.	1.1
I think the functions in this system are well integrated.	3.3
I think there are too many inconsistencies in this system.	3.2
I think most people will learn to use this system very quickly	3.3
I find it challenging to use this system.	2.6
I feel very confident in using this system.	3
I would recommend this system to others.	3.4
System Usability Scale of MySIMOKA	**66.72**

The school provided sufficient laptop devices and an excellent internet network to facilitate testing MySIMOKA applications during training sessions. Furthermore, the system usability scale (SUS) questionnaire was completed by seventeen informants (Table 3). The system requires further improvement, as the SUS obtained was 66.72. There is a mean score of 1.1 for the item about about needing technical assistance to use this system. Moreover, several obstacles were encountered, as follows:

1. teachers still take notes on paper and then enter them into the application, resulting in double documentation and allowing for additional workload,
2. some application features still need to be improved and completed gradually,
3. completing data entry is time-consuming due to teachers' need adaptation in the task.

The study findings indicate a significant impact on increasing participants' knowledge and skills about monitoring the health of elementary school children through health education and training sessions. Previous research also found that education or health education increased knowledge, where education was carried out using lecture methods, audio media, teaching aids, and booklets [16]. This finding aligns with research in Pakistan, which shows that health education effectively increases participants' knowledge and practice [17]. Increasing a person's knowledge based on human behavior theory is influenced by several aspects, such as social, technological, and psychological aspects. Increasing a person's knowledge based on human behavior theory is influenced by several elemets, such as social, technological, and psychological aspects [18]. Other influencing factors need to be considered are cultural perceptions, beliefs, and extrinsic motivators [19].

The participants could practice anthropometric examinations and essential student health examinations, such as screening for vision problems and dental and oral health, despite the difficulties they perceived during the initial training session. Teacher training is essential for effectively surveilling students' health status, as it enables teachers to assess the anthropometry of their students reliably [20]. These findings align with prior research conducted in India, which has demonstrated the usefulness of eye examination training in facilitating the teacher's ability to screen students compared to the ophthalmologist standards [21]. In contrast, a study conducted in Indonesia revealed no notable differences in teachers' knowledge, attitude, and practice before and after the initial training on oral health [22]. Therefore, the public's ability to monitor children's growth must be periodically refreshed. A standardized and rigorous training and evaluation program was created to ensure that the community is proficient in accurately measuring the physical dimensions of students[23].

Using MySIMOKA for recording and reporting has the potential to help teachers connect with health services and parents to monitor children's health jointly. Other research also shows that using mobile applications to monitor and manage children's health together can

improve communication between parents and teachers and enable teachers to carry out school administration [24]. Applications for monitoring children's health can also be used to collect and analyze health data for early disease detection and remote monitoring [25]. Other research also states that information systems will automatically collect health data that can help assess acute and chronic diseases among school children [26]. The use of electronic applications in health programs in elementary schools can improve the quality of information and make recording and reporting more integrated, accurate, and efficient, resulting in improved health services [27]. The principle of using an information system is the timeline or speed of the information system in responding to what the user does, presenting data quickly and up to date, resulting in increased use of the information system [28].

This study is significant since monitoring the health of school children plays a vital role in influencing academic performance, where the health of school children from the dimensions of self-perception, autonomy, and the school environment significantly impacts academic performance [29]. Children's health and academic achievement at school have a statistically significant relationship, where healthy children have a lower risk of experiencing school problems than unhealthy children [30]. Health and education is can not be separated due to many children's absences from school affect their academic assessment [31]. In Ukraine, monitoring primary school children's health impacts children by evaluating the school environment and involving all stakeholders in planning and managing school children's health [32].

However, this research found that the initial implementation of the MySIMOKA application still needs to be improved according to the System Usability Scale (SUS). Early application implementation may result in a low SUS for various reasons, including inefficiency, complexity, and a lack of user comprehension regarding the application's features [33]. Furthermore, a lack of user experience contributes to lower ratings on the system usability scale, while a wealth of experience results in higher and more favorable SUS scores [34]. Numerous studies indicate that early implementations may lack refinement, straightforward user guidance, and simplicity, all contributing to lower SUS scores.

In this study, several obstacles to using the application were identified. This aligns with implementing information systems for recording and reporting in various studies, which also encounter different obstacles. A research in Saudi Arabia states that the obstacles that occur in the use of information systems are slow internet speed, lack of training, high costs, lack of technical support, lack of computer use skills, and lack of knowledge [35]. Research in Kenya and Laos states that implementing digital health systems has significant obstacles: workload, lack of motivation, and limited resources [36]. Lack of governance, data analysis, and evidence-based decision-making also hinder health information systems [37].

This study has strengths and limitations that need to be considered. The connection between the clinic and the school owned by Muhammadiyah contributes to the smooth execution of this health education and potential future sustainability. The study's limitation is that it only evaluates the increase in teachers' knowledge regarding health examination and monitoring children's growth and development using the MySIMOKA application. Further assistance is needed to ensure the sustainability of the use of recording and monitoring applications. Apart from that, cross-sectors such as health facilities are vital so that admitted children's health, growth, and development can be used in determining school health policies.

4 Conclusions

Interventions by health education and training and using integrated information systems such as MySIMOKA have effectively increased participants' knowledge and skills about monitoring children's health in elementary schools. Although the usability scale of this

system needs to be improved, it has the potential to improve efficiency and accuracy in recording and reporting, support improved health services, and enable early disease detection. This research provides a solid basis for schools and educational institutions to monitor children's health and development and utilize technology. Cross-sectional roles are required to continuing update teachers' capacity and follow up on the data collected by the health information system to achieve optimal student health outcomes.
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