EFFECTIVENESS OF MOBILE-BASED INFANT GROWTH EDUCATION APP FOR STUNTING PREVENTION

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Abstract: Prevention of stunting in infants requires special attention to infant growth and development, one of which is through monitoring contained in the pink*(Mother and Child Health book)* guidebook. However, many baby mothers tend to be lazy to read and follow the guidelines in the book, resulting in less than optimal understanding and application of health education. To overcome this problem, an *Android-based* educational application was developed that serves as an alternative learning medium for baby mothers. This application contains information contained in the pink*(Mother and Child Health book)* guidebook, with an interactive design and is easily accessible anytime via mobile devices. This study aims to evaluate the effectiveness of the educational application in improving mothers' understanding of infant growth and stunting prevention. The research method used was an experiment with a pretest-posttest design on a number of mothers of infants. The results showed that this Android-based educational application was effective in increasing mothers' knowledge about infant growth and stunting prevention. The use of this application also makes it easier for mothers to monitor their baby's development more actively and independently. The findings are expected to make a positive contribution to stunting prevention efforts in Indonesia.

Keywords: *Effectiveness; Android App; Stunting; Education*

Introduction

Stunting is a health problem that is still a serious concern in Indonesia, especially in infants and children. Stunting occurs due to chronic malnutrition, which affects the physical growth and cognitive development of children. According to data from the Ministry of Health, the prevalence of stunting in Indonesia is still relatively high, and prevention efforts require the participation of various parties, including parents, especially mothers, who play an important role in monitoring children's growth and development.

One of the instruments provided by the government to help mothers monitor their children's growth is the pink*(Mother and Child Health book)* guidebook KIA*(Buku Kesehatan Ibu dan Anak).* This book contains important guidelines on nutrition, health, and child development that every mother should read and understand. However, in practice, many mothers of infants are lazy to read the book, so important information about monitoring infant health is often overlooked. The lack of interest in reading this guidebook is one of the obstacles that contributes to the lack of awareness of mothers in preventing stunting.

To overcome this problem, an innovative approach is needed that can increase mothers' interest and participation in understanding and practicing child health guidelines. Along with technological advances, the use of Android-based mobile applications is a potential solution.

Educational applications can be an effective means of delivering information in a more interesting and interactive way, making it easier for mothers to get important information about baby growth and stunting prevention measures.

This study aims to develop and evaluate an *Android-based* educational application that contains information from the pink guidebook. With this application, it is hoped that mothers can more easily access and understand important information related to baby growth, and increase awareness in stunting prevention efforts. In addition, this study also aims to measure the effectiveness of this application in increasing mothers' knowledge about infant health through pretest and posttest methods.

Through this research, it is hoped that the educational application developed can be a useful tool for mothers in monitoring children's growth more optimally and supporting national efforts to reduce stunting rates in Indonesia.

Literature Review

1. Child Stunting

Stunting is a condition of growth failure in children due to chronic malnutrition, especially in the first 1,000 days of life. Children who are stunted have a shorter height than their peers and are at risk of long-term health problems, such as decreased cognitive abilities and low endurance *(Hardinsyah, 2017*). Stunting also has a significant impact on children's future social and economic development *(MOH RI, 2020).* Therefore, prevention efforts must start early by paying special attention to nutritional intake and monitoring children's growth.

2. The role of the Pink (Mother and Child Health book) Handbook

The Indonesian government through the Ministry of Health has provided the Maternal and Child Health Book, better known as the Pink Guidebook, as an official guide for mothers to monitor their children's development and health. This book contains various important information related to nutrition, immunization, growth and development, and disease prevention in infants and children *(Ministry of Health, 2018).* This guidebook is designed so that mothers can monitor their children's development regularly, but the obstacle that is often encountered is the low reading interest of mothers, so that many important information is not conveyed optimally *(Putri et al., 2021).*

3. Mobile Application for Health Education

Along with the development of information technology, the use of Android-based applications as educational media has become increasingly popular. *Mobile applications* have the ability to present information in an interactive and interesting way, so as to increase user interest in learning *(Siregar, 2020).* In the context of health, several studies have shown that mobile applications can play a role in increasing public knowledge and awareness related to health and nutrition *(Nurhayati & Yulianti, 2019).* A well-designed application can be a practical solution for mothers who are lazy or have difficulty accessing information from conventional media, such as books *(Aisyah et al., 2022).*

4. Use of Technology for Stunting Prevention

Application-based technology has been used in various public health campaigns, including stunting prevention efforts. According to *Hermawan (2020),* digital applications that provide education about nutrition and child growth have proven effective in increasing mothers' awareness about the importance of adequate nutritional intake during the child's growth period. Applications that provide child health monitoring features can help mothers to more easily monitor and identify the risk of stunting *(Supriyanto, 2019).* The use of *Android-based*

educational applications is expected to be a more attractive and accessible alternative to traditional guidebooks, so that mothers are more motivated to apply the information provided.

Methodology

This research was generally carried out in two main stages, namely the design and development stage of the Android application, and the stage of testing the effectiveness of the application on the target group through a quantitative quasi-experiment method. The sample used to test the effectiveness of the app was purposively selected, involving 30 respondents *(pregnant and lactating mothers)* who lived in different villages but had similar characteristics. The instruments used to measure effectiveness were pretest and posttest questionnaires, while data analysis was conducted using the *Wilcoxon test*. The design and creation phase of the *Android app* included several specific steps or processes.

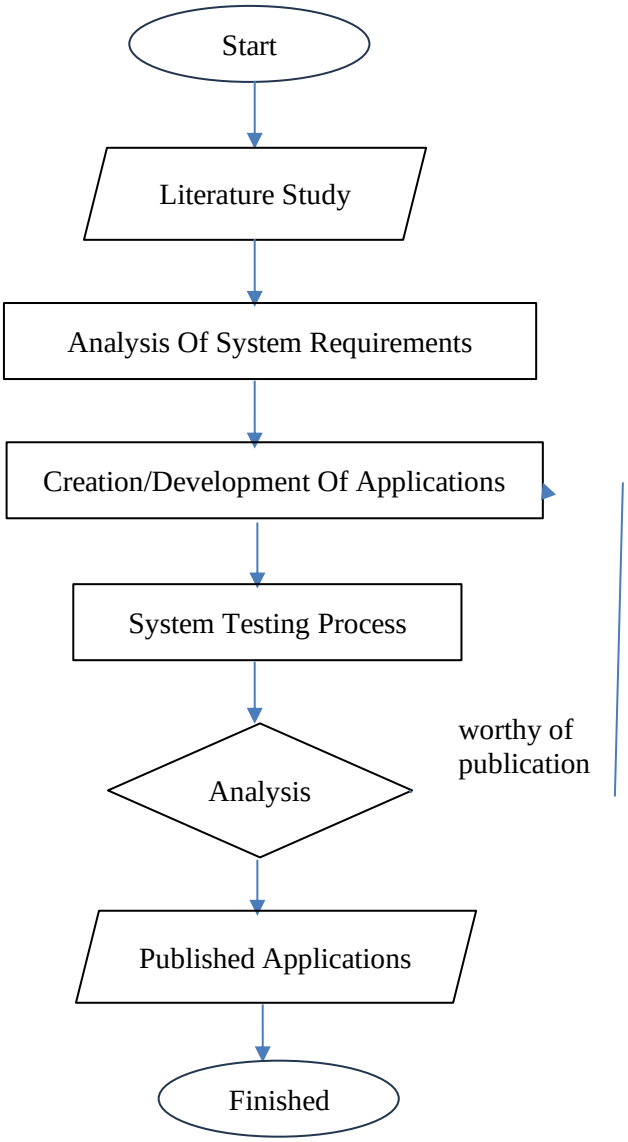

Figure 1. *Flowchart* of Application Design and Development

1. Literature Study Stage

The literature study stage aims to explore and identify the most suitable materials to be presented in the application to be developed.

2. System Requirements Analysis

System requirements analysis includes several aspects, including: target users, general description of the application, main functions and key features, additional features, technical specifications, hardware requirements, as well as ease of development and other aspects.

3. System Design

System design aims to design the application workflow and technology to be used, as well as determining the most appropriate type of technology to support application development.

4. Designing *User Interface (UI), User Experience (UX),* and *Educational Materials*

The process of designing UI, UX, and educational materials is aimed at producing an optimal and attractive design, in order to meet the needs of the system that has been determined. An attractive design can increase user interest in using the application, by paying attention to effective graphic design principles.

5. Application Development

The Android-based application was developed using animation designs from PowerPoint *(PPT)* which were then converted into APK format. This approach simplifies application development and speeds up the completion process.

6. Application Testing

Application testing is done to check its functionality. This test uses the White Box Testing and Black Box Testing methods. White Box Testing was conducted by the developer during the application development process, while Black Box Testing was conducted by five participants. If the evaluation results show that the *EduKIA* application is ready to be published, the application will be distributed through the installation barcode. In addition, the effectiveness test of the *EduKIA* application is carried out through several stages.

To test the effectiveness of this application is done in several stages, namely:

1. Pre-Intervention Stage *(Pre-Test)*

At this stage, an initial survey was conducted to review the field conditions, determine the appropriate target group to be given the intervention, and collect secondary data on adolescents who will be involved in the intervention.

2. Intervention Stage *(Post-Test)*

At this stage, the research was conducted using the quasi-experimental method. This intervention process includes:

a. A purposively selected sample of 30 respondents *(pregnant and lactating mothers)* from two neighborhoods in Rancamanyar village with similar characteristics were combined into one WhatsApp group. They were then asked to download and install the *EduKIA* mobile application on their phones.
b. Respondents were directed to open the pre-test link, which contained a questionnaire to assess knowledge before receiving education through the media provided. They were asked to complete the questionnaire.
c. After that, respondents were asked to access the educational materials in the application and study them in depth.
d. Respondents were then asked to open the post-test link and fill it in. They were given the freedom to complete the post-test within 1-3 days after studying the educational materials in the app.

Results & Discussion

The results of this study are an android-based stunting education application called the *EduKIA* Application and the results of its effectiveness test on breastfeeding mothers. The *EduKIA* application works well and has been published through the installation barcode taken by *Google Drive*. *EduKIA* android application is made with PowerPoint which is converted through the Spring application (converting to html format) and an additional application in the form of HTMLtoAPK *(converting html format to apk format*). This method is used because the design and manufacture does not require a long time.

The EduStunting application has 9 main features, namely:

a. user profile feature,
b. educational material features consisting of educational material:
   1. stunting education,
   2. newborn/neonate education *(0-28 days)*,
   3. education for children aged 29 days-6 years,
   4. education on meeting nutritional needs and child development,
c. and nutrition consultation features.

The features in the application are designed to be simpler and more focused for future development and use. The application display is shown in Figure 2.

Figure 2. EduKIA Application

The results of the effectiveness test of the *android-based* stunting education application to the target group, namely, mothers who are breastfeeding at 2 in Rancamanyar village(baleendah, kab. bandung), with a total sample of 30 respondents, are illustrated in table 1 to table 2.

Table 1. Results of Knowledge Analysis Before and After Intervention Using Wilcoxon Test

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Pengetahuan setelah intervensi - Pengetahuan sebelum intervensi	Negative Ranks	0[a]	.00	.00
	Positive Ranks	30[b]	15.50	465.00
	Ties	0[c]		
	Total	30		

Bivariate tests were conducted using a non-parametric test, namely the *Wilcoxon test*, as shown in Tables 1 and 2. Table 1 shows that out of 30 respondents after getting knowledge about educational applications, there was an increase for Mean Rank of **15.50** and for Sum of Ranks of **465.00.**

Table 2. Test Statistic

Test Statistics[a]

	Pengetahuan setelah intervensi - Pengetahuan sebelum intervensi
Z	-4.826[b]
Asymp. Sig. (2-tailed)	<,001

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

. Based on this table, it can be concluded that the *Android-based* educational application is effective in increasing knowledge about stunting by looking at the significance value **<0.05**, so the hypothesis is accepted.

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