
SEDICD Booklets Android-Based for Health Cadres: Research and Development

Monalisa^{a*}, Suharti^b, Sovia^c

^{a,b,c}Department of Midwifery, Health Polytechnic of Jambi, Indonesia

^aEmail: monalisa.poltekkes@gmail.com

^bEmail: suharti.polytechnic@gmail.com

^cEmail: abbasiahsovia@gmail.com

Abstract

The study aims to develop Android-based Stimulation of Early Detection and Intervention of Children Development (SEDICD) learning media for midwives and health cadres. This Research and Development (R&D) using the waterfall model approach, which is an SDLC (Systems Development Life Cycle) methodology in systems and software engineering. The mean percentage of response questionnaire results to the booklet is 88.8% with an average of 3.6 very good criteria. The second trial was carried out in a small group or a module feasibility test that had been developed; the mean percentage of the response questionnaire results from this trial was 82.5% with an average of 3.32 good criteria. Field trials obtained an average percentage of the results of the questionnaire response to the Smartphone-based learning module (Android) was 78, 38% with an average of 3.14 with good criteria. The application development process based on the SEDICD Booklet is able to attract the attention and motivation of cadres in carrying out the learning process.

Keywords: Development; child; sedicd program; health cadres.

1. Introduction

Child development is a gradual development that includes biological factors in the formation of characteristics and traits that arise from their experiences. In developing countries, more than 200 million children fail in cognitive and social development related to poverty, poor health, nutrition, and lack of care [1]. The failure to thrive (FTT) indicates the lack of nutrition in the child in optimizing growth and development.

* Corresponding author.

Some definitions of FTT include body weight for ages under the third percentile; a rate of weight gain that is not proportional to the rate of gain in body length; body weight for lengths less than the 10th percentile (in children <24 months); and decreases in the 2 or more key growth percentile curves [2,3]. FTT is more common in children under 18 months of age. In America, children with FTT account for 5% to 10% of primary care pediatric patients and 3% to 5% of pediatric hospital admissions [3]. Nationally, Indonesia has implemented the Stimulation of Early Detection and Intervention of Children Development (SEDICD) program in all health centers since 1995 with the aim of carrying out early detection of children's thrive. SEDICD is under the responsibility of a midwife by the order of the Minister of Health with a target percentage of 90% [4]. Limited midwifery personnel in the program underlies empowering community members as voluntary workers committing SEDICD which is synchronized with Integrated Service Post (Posyandu) activities for mothers and toddlers that are carried out monthly [5]. Social workers or health cadres are in a good position to play a significant role in improving public health through prevention, integrated health care, and improving social health determinants [6,7]. However, to achieve the successful implementation of the SEDICD program carried out by health cadres, it should be supported by adequate knowledge related to the fields they are involved in. Adequate understanding of cadres can guarantee improved community health, improvised health systems, and reduce medical costs [8]. We have conducted preliminary observations at the study target sites with surprising results. Health workers who are responsible for the SEDICD program only screen suspected toddlers disregard the national target (all of the children under five). Lack of health workers is the main reason apart from the lengthy SEDICD format. The local cadres who were expected to be able to assist the implementation of SEDICD were also not up to expectations due to their lack of ability to grip the contents of the manual, which was quite complex or not simple, explained by the large number of assessment items. The implication of this situation can be seen from the achievement of national targets that have not yet reached the set standards. Several national studies conducted have also shown unsatisfactory results for the implementation of the SEDICD program for the same reasons we found in our initial study [9–11]. In attempting to facilitate midwives and health cadres performing SEDICD, we conducted a development research study that aims to invent SEDICD learning media based on android with an attractive appearance and simple, effective and easy-to-understand explanations.

2. Materials and Methods

2.1. Study Design

This is a Research and Development (R&D) study with the waterfall model approach which is the SDLC (Systems Development Life Cycle) methodology, the Systems Life Cycle, in systems and software engineering. This study was trialed on Health Cadres at Aur Duri Public Health Center, Jambi City from September to November 2020. Cadres were involved from pre-research to the initial trial stage (legibility test), small group trials (feasibility tests) and large group trials (field trials).

2.2. Research Phase

- Analysis of software requirements
- Determining objectives, determining material, preliminary research

2.3. Development Phase

System and Software Design (Flowchart, Storyboard, interface), Implementation and unit testing, System integration and testing, Operation and maintenance.

2.4. Instruments

Measuring the quality, practicality and effectiveness of the developed learning media was carried out by using a questionnaire to the participants as users of this media.

2.5. Data Analysis

We analyzed validity of the media (strongly valid, valid, fair, invalid), response of cadres (very good, good, fair, poor), participant activity (very good, good, fair, poor), and the results of the study.

3. Results

3.1. Research Phase

- ***Analysis Stage and requirements definition***

The target achievement of participants after the learning process using a Smartphone-based booklet (android) on the competency of the loop control structure is as follows: Thrive Concept (2) Thrive measurement procedure (3) Development screening (4) Thrive Stimulation. The learning materials specified in the SEDICD Module are collected from various sources, including: (1) Internet sources; (2) SEDICD Module; (3) The MCH Handbook. So far, the Guidelines for SEDICD for cadres have only been found in the MCH Handbook and SEDICD Guidelines for health workers. Previous researchers have developed guidelines in the form of SEDICD booklets for health cadres. Currently, learning needs require several effective learning methods, especially in digital form.

3.2. Development Phase

- **System and software design**

Flow Chart

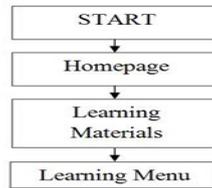


Figure 1: Application Flowchart

Story Board

The SEDICD material based Smartphone (android) storyboard consists of: (1) Home page; (2) Title; (3) Menu material; (4) starting; and (5) Exit. The results of the storyboard design form the basis for the Smartphone-based module development process (Android).

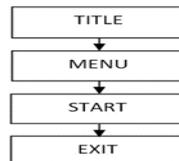


Figure 2: Story Board

Interface

The display design stages or interface design for Smartphone-based modules (Android) are designed based on story-boards using several multimedia applications, namely auto desk sketch book pro, Photoshop and adobe flash CS6.

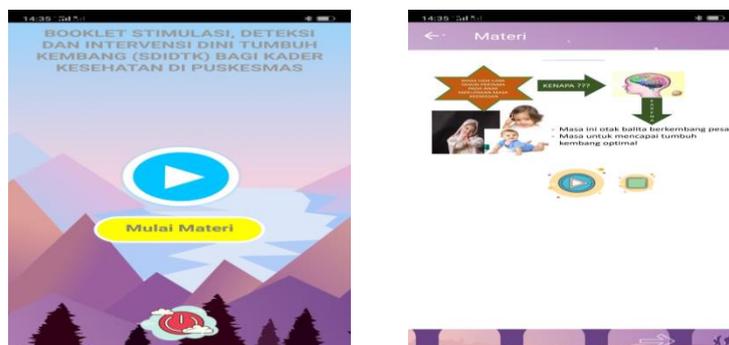


Figure 3: Main page and start page of material

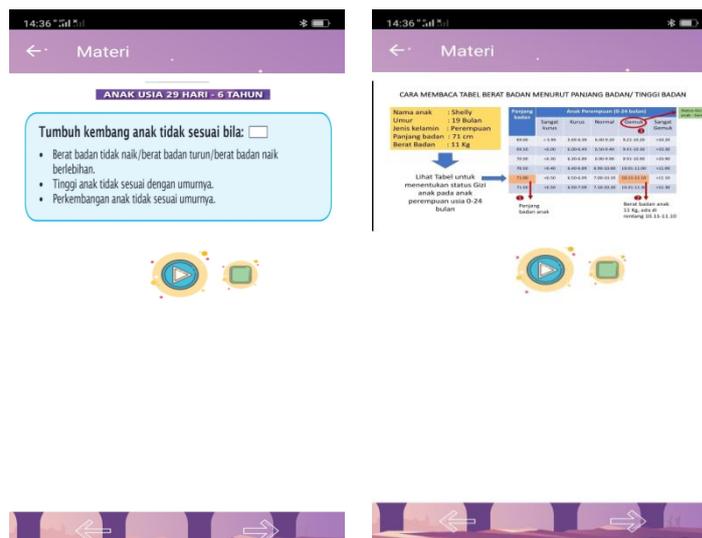


Figure 4: Thrive screening and table reading

• **Implementation and unit tests**

At this stage, the software design is realized as a series of programs or units of the program. Unit testing involves verifying the conformity of the specifications. Material experts and media experts conducted unit testing, followed by legibility testing by 2 respondents and continued with small group trials with 10 respondents. The results of the validation are used to revise the SEDICD booklet based on Smartphone (android) and become a reference for the validity level of the instruments used in this study.

Media Validation

Media validation aims to assess whether the module or media being developed is valid or still needs revision. The data from the validation of experts for each learning media format were analyzed by considering the validator's assessment, input, comments, and suggestions. The total score obtained from the media validator was 56 with a percentage of 93% and an average of 3.7 (Strongly valid criteria).

Material validation aims to assess the validity of the booklet or media being developed. The results of validation from experts for each learning media format were analyzed by considering the validator's assessment, input, comments, and suggestions. The total score obtained from the material validator is 54 with a percentage of 90% and an average of 3.6 (Strongly valid criteria).

Table 1: The validation results of the media by professional

Description	Score
Efficiency	
Work-flows are easy to understand	4
Easy-to-use media operations	4
Simple in operation	4
Information in media programs is easy to understand	4
Display	
Design appeal	3
Image suitability	4
Colour composition	4
The accuracy of the illustrations used in the cover	3
The clarity of the text in the program	4
Material placement	4
Component	
Image quality	4
Image size accuracy	3
Image placement	4
Animation accuracy	3
Audio quality	4
Total	56
Mean score	3,7
Percentage (%)	93%
Criteria	Strongly Valid

Material Validation

Readability test is carried out to find out whether the module that has been developed can run well. The number of research subjects was 2 respondents. The instrument used was the Smartphone-based SEDICD Booklet (Android) and a questionnaire for respondents. The mean percentage of the response questionnaire results to the Smartphone-based SEDICD Booklet (Android) is 88.8% with an average of 3.6 (very good criteria). The results of the initial trials can be seen in Table 3.

Table 2: Validation results from material experts

Statement	Score
The material in the booklet is in accordance with the SEDICD guidelines for health cadres	4
The learning objectives are in accordance with the SEDICD activity material	4
The material in the booklet provides an overview of SEDICD activities for health cadres	4
The presentation of the material has an appeal for health cadres to understand the material well	4
The presentation of SEDICD material in a booklet is easy to understand	4
The material in the booklet is presented systematically	4
The material presented is easy in understanding performance commands and practices	3
The scope of material in the Booklet reflects preventive measures on thrive issues	3
The presentation of the material has fulfilled the principles of innovation	3
The material in the booklet can be used as a guide for cadres to help SEDICD implementation	4
The packaging of material is in accordance with the scientific approach of health cadres	4
Presenting the concept of material that must be mastered by Health Cadres	4
Provides supporting information	3
Presents a bibliography	4
Accuracy of terms	4
Total Score	54
Mean score	3,6
Percentage (%)	90%
Criteria	Strongly valid

Readability Test

Table 3: Readability test results

Respondent	Item Number										Total	Mean	%
	1	2	3	4	5	6	7	8	9	10			
1	3	4	4	3	4	3	3	3	4	3	36	3.6	90
2	4	4	4	4	4	2	3	3	3	4	35	3.5	87.5
Mean											35.5	3.6	88.8

The percentage of data from two respondents can be seen in the Figure 5

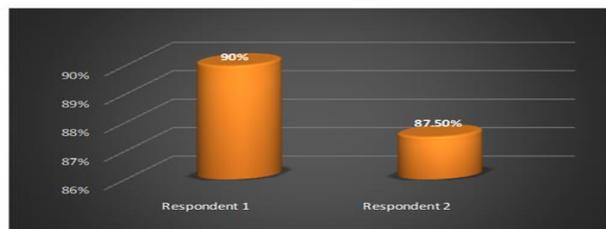


Figure 5: Comparison of Respondent's Value in the Initial Trial

Feasibility test

After conducting the initial test or legibility test, the next step is to do a small group trial or a feasibility test for the SEDICD Booklet. The number of research subjects was 10 people. The instrument used was the Android-based SEDICD Booklet and a questionnaire. Based on the test results, the following data were obtained.

Table 4: Results of feasibility test

Respondent	Percent	Mean	Indicator
1	85	3.4	Good
2	80	3.2	Good
3	78	3.1	Good
4	87.5	3.5	Very Good
5	85	3.4	Good
6	82.5	3.3	Good
7	80	3.2	Good
8	85	3.4	Good
9	82.5	3.5	Very Good
10	80	3.2	Good
Total	825.5	33.2	
Mean	82.55	3.32	Good

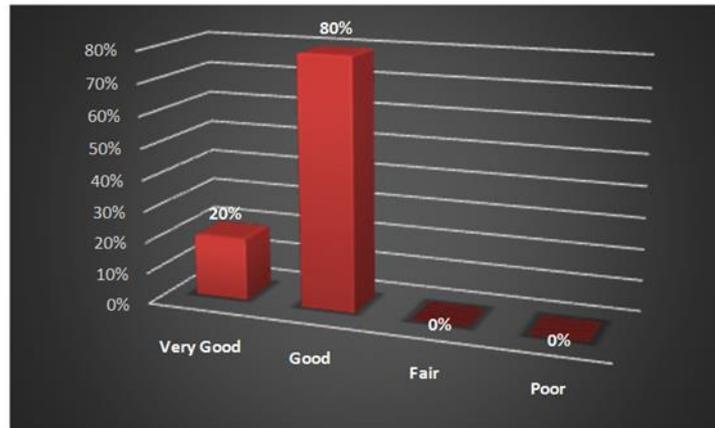


Figure 6: Percentage indicator of feasibility test

The mean percentage of small group trial results on the Android-based SEDICD Booklet was 82.55% with a mean value of 3.32 good criteria. The percentage of data can be seen in the Figure 6.

- ***System integration and testing***

At this stage, unit programs or individual programs are integrated and tested as a complete system to ensure that the system requirements have been met. After testing the system, field trials were carried out. The number of research subjects was 20 people. From the results of the field trial, the following results were obtained:

Questionnaire Response

The average percentage of questionnaire responses from the SEDICD booklet field trial for android-based health

cadres was 78.38% with an average value of 3.14 with good criteria.

Table 5: Field trial questionnaire results

Respondent	Percent	Average	Indicator
1	87,5	3,5	Very Good
2	80	3,2	Good
3	75	3	Good
4	85	3,4	Good
5	75	3,0	Good
6	80	3,2	Good
7	77,5	3,1	Good
8	72,5	2,9	Good
9	75	3,0	Good
10	70	2,8	Good
11	75	3,0	Good
12	75	3,0	Good
13	80	3,2	Good
14	72,5	2,9	Good
15	75	3,0	Good
16	87,5	3,5	Very Good
17	80	3,2	Good
18	82,5	3,3	Good
19	87,5	3,5	Very Good
20	75	3,0	Good
Total	1567,5	62,7	
Average	78,38	3,14	Good

Based on the table 5, it is known that the good assessment indicators are 70% and very good indicators are 30%. The assessment indicators can be seen in the figure 7.

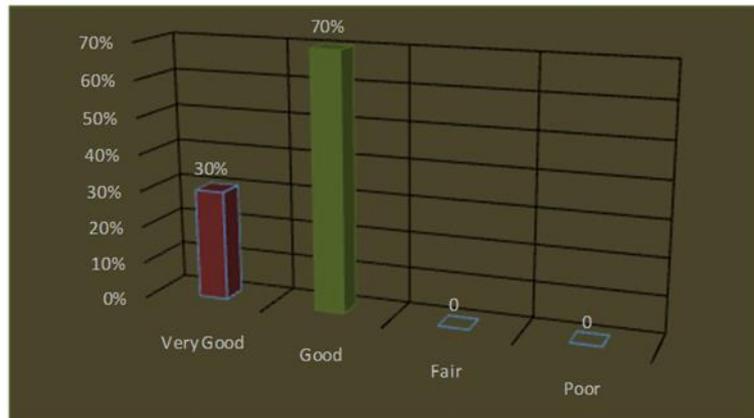


Figure 7: Percentage indicator of Field trial

Learning Outcomes Test

The test given is in the form of questions with 20 answer choices about SEDICD which carried out by the Health Cadres. The test results that have been given can be seen in the table 6.

Table 6: Cadre's knowledge based on the results of the pretest and posttest

Respondent	Pre test		Post test	
	Value	Indicator	Value	Indicator
1	70	Fair	80	Fair
2	70	Fair	80	Good
3	70	Poor	80	Fair
4	70	Fair	100	Fair
5	60	Fair	80	Good
6	60	Fair	70	Fair
7	60	Fair	70	Fair
8	70	Fair	80	Good
9	50	Fair	70	Good
10	60	Fair	70	Fair
Total	1120		1500	
Average	60	Fair	75	Good

Based on the average of pre and post test scores, knowledge of cadres regarding SEDICD has increased from an average score of 60 to an average of 75, which increase 25%. Based on the pre-test value, 70% knew how to measure growth, such as measuring height and weight, but 60% answered incorrectly about the notion of growth, 60% answered the misunderstanding of development, 90% did not know the tools used to measure development, 80% do not know how to assess the development of a toddler, and as many as 65% do not know how to conduct stimulation.

- **Operation and maintenance**

At this stage, maintenance is carried out on the application to keep the stability of the system in order to be mass produced. This stage is the longest phase of the life cycle. Maintenance includes corrections to errors emerged during the testing such as various errors that were not found in previous stages. For the development of the Smartphone-based SEDICD Booklet (Android) until the time of the field trial, there were no issues or errors in the applications that had been developed.

4. Discussion

All of the health cadres in *Aur Duri's* public health center are housewives, on average they have been health cadres for less than five years, health cadres who have served at public health center for a maximum of 12 years, and the newest health cadres have served for two years. The average cadre aged 30 years with an average educational background is Senior High School, and mostly with a local cultural background, namely the Malay tribe. Research and development is defined as a systematic study of complete scientific knowledge or understanding of the subject under study. This research is classified as basic or applied in accordance with the objectives of the researcher, namely how the process of developing the SEDICD Booklet for Smartphone-based

health cadres (android) and whether the SEDICD Booklet based on the Smartphone (android) developed is valid, practical, and effectively used. The development research intended in this study is to develop a Smartphone-based SEDICD Booklet (Android) which was tested during the research.

- ***Module development process***

Based on the waterfall model used, the SEDICD booklet development process based on a Smartphone (android) uses several multimedia applications, namely auto desk sketch book pro, Photoshop and adobe flash CS6. The initial stage of application development is done by making an application flowchart about what menus will be presented. After making the flowchart, the second step is to create an application story board and arrange the placement of the menus and images in the application. Furthermore, the coding process is carried out to activate the buttons in the application. If all buttons are functional, the final step is rendering the application and confirming it into a single file with the * APK format which can be installed on all (Android) Smartphone and can be tested from the validation stage, initial trials, small group trials, and finally in field trials.

- ***Validity and field trials***

The level of validity is determined based on the material and media expert's assessment of the developed module. The expert will see and analyze the media that has been developed and provide suggestions and responses to the media whether the media developed is valid or needs revision. The description of the results of the validator assessment data analysis, both material and media is as follows:

Practicality

Dewi and Primayana states, a module is categorized as practical if it can be used with anyone relatively easily [12]. The practicality of the resulting learning module is determined by the results of the questionnaire, which is more than an average of 2.5. Based on trials using respondent questionnaires in initial trials, small group trials, and field trials, the average results of good criteria indicate that the SEDICD booklet based on Smartphone (Android) for health cadres has been developed is easy to use and includes the following indicators, including: use easily and flexibly; The content of the material is clear and systematic; The content is easy to understand; can be used anywhere.

Effectiveness

The effectiveness of the Smartphone-based SEDICD Booklet (android) was assessed by conducting a learning outcome test. The percentage of passing tests that have been given to 20 cadres after using the SEDICD booklet based on a Smartphone (Android) is on average with good criteria. According to Prasetyo and his colleagues (2019), it is stated effectiveness if it can increase interest and motivation if after learning students become more motivated to study harder and get better learning outcomes. Android-based learning media is effective in improving student learning outcomes [13].

5. Limitation

The strength of a study can be determined by the large number of participating respondents, therefore we consider that the number of respondents in our study is still not representative to determine the strength of this development study.

6. Conclusion

We have succeeded in developing SEDICD-themed application software for health cadres that is simple, easy to understand, and with an attractive appearance.

7. Recommendation

As a first step to digitizing learning in ordinary people such as health cadres, this application needs to be developed in the future with more sophisticated software, for example integrated in virtual reality which may be easier for health cadres to understand. For this reason, this opportunity needs to be used as an opportunity in the development of strategies for improving public health services.

Acknowledgement

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