

Designing Instrument for Early Stimulation, Detection, and Intervention for Growth and Development of Children based on Android System

Heru Santoso Wahito Nugroho¹, Sunarto¹, Budi Joko Santosa¹

¹Health Polytechnic of Surabaya, Indonesia

ABSTRACT

One of the factors that is thought to be the cause of the lack of success in child growth and development monitoring programs is the use of instruments that are less practical. This study aims to make a more practical instrument that is Android-based child development detection software, considering that Android-based gadgets are a popular communication tool for health workers. The design stages included: 1) provision of hardware, software, brainware, and material books; 2) frame making, material compilation, material integration into the frame; 3) evaluation of the quality of instruments through FGDs with users, and 4) giving recommendations. Evaluation of the quality of the instrument through the 3 stages of the FGD showed that content, accuracy, format, ease of use, timeliness, and speed of operation are good. Furthermore, it was recommended for the government to use this instrument as a medium for implementing the ESDIGDC program, as well as for researchers to use and refine this design as an instrument for research on children's growth and development.

Keywords: Child development, Android base instrument

INTRODUCTION

Children in the “golden age” (ages 0-6 years) must get a positive intake, in order to achieve optimal growth and development according to their respective genetic potential. To realize this hope, the government has implemented the program of ESDIGDC (Early Stimulation, Detection, and Intervention for Growth and Development of Children). The program is carried out in a comprehensive and coordinated manner, which is held in the form of partnerships between families (parents, child caregivers and other family members), communities (cadres, professional organizations, non-governmental organizations) with professional staff.⁽¹⁾

In the implementation of the ESDIGDC Program, there are three main components, which at the same time determine the success of the program, first is input

(material, instruments, and implementers); second is the process (planning, implementation, evaluation, and monitoring); and third is output (achievement of reported programs).⁽¹⁾ One of the factors that can be suspected as the cause of the above problem is the use of instruments that are less practical (using many pieces of paper that are fragmented so inefficient), which in turn affects the performance of the ESDIGDC program implementers.

Based on the explanation above, it is deemed necessary to make a more practical instrument, which can be used quickly on all occasions (saving time), not consuming excessive space (saving space), and can be done very easily (saving energy), so that as a whole will reduce the costs that must be spent to implement the program (cost-effective). The practical instrument designed is an Android-based ESDIGDC software that can be operated through gadgets (mobile phones and tablet computers), with the consideration that Android-based gadgets are a combination of hardware and software as a communication tool that is popular in the community including health workers.

To ensure that Android-based ESDIGDC instruments

Corresponding Author:

Heru Santoso Wahito Nugroho

(heruswn@poltekkesdepkes-sby.ac.id)

Health Polytechnic of Surabaya

Pucang Jajar Tengah Street, 56 Surabaya, Indonesia

are really needed by ESDIGDC program implementers, a second phase preliminary study was conducted through the FGD which was attended by 10 midwives in community health centers, with conclusions: 1) too much use of paper-based ESDIGDC instruments inefficient, 2) ESDIGDC instruments need to be made that can be run using gadgets because this tool is already popular.

It can be predicted that these instruments will be easily accepted and applied by health workers, especially midwives as implementers of the ESDIGDC program.

METHOD

This descriptive research produced e-Health instruments in the field of early detection of child growth and development. In this study, the design of “Android-based ESDIGDC instruments” was made. The design of the instrument was limited to the “detection” aspect of child development, so specifically the production was called “Android-Based Child Development Detection Instrument” (ABCD-DI).

The “ABCD-DI” was a dynamic soft questionnaire about child development that includes four sectors, namely: 1) gross motor, 2) fine motor, 3) speech and language, and 4) socialization and independence. This questionnaire was classified into several age groups, namely: 3, 6, 9, 12, 15, 18, 21, 24, 30, 36, 42, 48, 54, 60, 66 and 72 months.⁽¹⁾ This program was designed to be installed on Android-based gadgets.

The first stage of steps was the identification and provision of design equipment: 1) hardware (computers / laptops, gadgets, printers, blank DVD data, external file storage, and internet service); 2) software (operation system, word processor, data base program, database creator for Android, PDF creator, icon and interface designer, and photo editor); 3) brainware (programmer, technician, and midwives as evaluator); 4) supporting material books about ESDIGDC, e-health and Android-based applications.

The second stage was the development of instrument by programmers and technicians: 1) frame making using interface designer programs; 2) preparation of material in accordance with the frame; 3) integration of material into the frame.

The third stage was the evaluation of the quality of the ABCD-DI through trials to midwives as the main users, which include: content, accuracy, format, ease of

use, timelines, and speed of operation⁽²⁾; with the FGD approach.

The fourth stage was giving recommendations to government institutions as holders of ESDIGDC program policies, and for researchers as developers of child growth and development monitoring instruments.

The study was conducted in 2016 in the Department of Midwifery, Health Polytechnic of Surabaya, while the evaluation of the quality of the instruments was conducted at the Sukorejo Health Center, Ponorogo.

The stages of data analysis were as follows: 1) descriptive presentation of the provision of hardware, software, brainware, and supporting books; 2) descriptive presentation of the results of frame making, material compilation, and material integration into the frame; 3) descriptive presentation of the results of evaluating the quality of “instruments; 4) descriptive presentation of recommendations given based on the evaluation of the quality of the instrument.

FINDINGS

The provision of hardware, software, brainware, and supporting books are as follows:

Table 1. Hardware provided for instrument design making

No	Hardware	Number	Function
1	Laptop: Dell Model Inspiron 114 3000 Series	1	Programming
2	Gadget: OPPO Joy 1	1	Programming
3	Printer: HP Deskjet 1040	1	Programming
4	Blank DVD data: Verbatim	25	Data storage
5	Memory card: SD card	2	Data storage
6	Internet service: Midwifery Department, Health Polytechnic of Surabaya	2	Literature and software searching

Table 2. Software provided for instrument design making

No	Original Software	Number	Function
1	Operation system: Microsoft Windows 8, Android system	2	Basic operating system to run all programs on the computer.
2	Word processor: Wordpad, Ms. Office Sharepoint Designer	2	As a word processor for compiling text material.
3	Database program: Database creator for Android	1	Integration of instrument data into the Android system.
4	Read only file creator: PDF Creator	1	Making read only files about instrument usage instructions.
5	Icon creator: Junior Icon Editor 4.1	1	Making the ABCD-DI program icon.

Table 3. Brainware provided for instrument design making

No	Brainware	Number	Function
1	Programmer	3	Designing programs and materials.
2	Technician	1	Helps programmers compile and run programs.
3	Evaluator	10	Evaluating (testing) the quality of instruments through FGD

Table 4. Books as supporting the design of instruments

No	Book title	Number	Function
1	Guidebook for the Implementation of ESDIGDC	1	Guidelines for making ESDIGDC material
2	ESDIGDC Facilitator Handbook	1	Guidelines for preparing ESDIGDC learning strategies
3	Information System Analysis and Design	1	Programming guidelines

The resulting ABCD-DI frames were: 1) Level I, consisting of: homepage; 2) level II, consisting of: detection of development of children aged 3 months, 6 months, 9 months, 12 months, 15 months, 18 months, 21 months, 24 months, 30 months, 36 months, 42 months, 48 months, 54 months, 60 months, 66 months and 72 months. Figure 1 shows the shape of the frame.

The material consisted of three groups, namely: 1) general instructions (how to operate ABCD_DI); 2) introduction to ESDIGDC; 3) detection of child development which includes four sectors, namely: 1) gross motor, 2) fine motor, 3) speech and language, and 4) socialization and independence. This material was classified into several age groups, namely: 3, 6, 9, 12, 15, 18, 21, 24, 30, 36, 42, 48, 54, 60, 66, and 72 months.

The process of preparing ESDIGDC material was: 1) text or narration made using Wordpad and Microsoft Office Sharepoint Designer; 2) a graphic vector image created and edited using Inkscape 0.48; 3) photographic images edited using Photo Pos Pro 1.87; 4) animated images created and edited using Sothink SWF Quicker 5.3 and Pivot Stickfigure Animator 2.2.6; 5) video edited using Honestech Video Editor 8.0. To change the video file format, the Any Video Converter 3.2.7 program is used; 6) After the frame is filled with complete material, then an icon is created using the Junior Icon Editor 4.1; 7) making read only files regarding instructions for using ABCD-DI using PDF Creator 9.

The next stage was the integration of all material that has been successfully collected into the frame that has been prepared previously (Figure 1).



Note:

Halaman utama = Homepage
Petunjuk umum dan Pengantar SDIDTK = General instruction and introduction of ESDIGDC
Deteksi perkembangan = detect the development of child

Gerak kasar, gerak halus, bicara dan bahasa, sosialisasi dan kemandirian = Gross motor, fine motor, speech and language, socialization and independence
Figure 1. Results of integration of materials into frames (in Indonesian version)

There were two stages of material integration into the frame: 1) filling in the Level I frame (homepage), in this case, the frame homepage is filled with two material namely “General Guidelines” and “Introduction to ESDIGDC” (Figure 2).

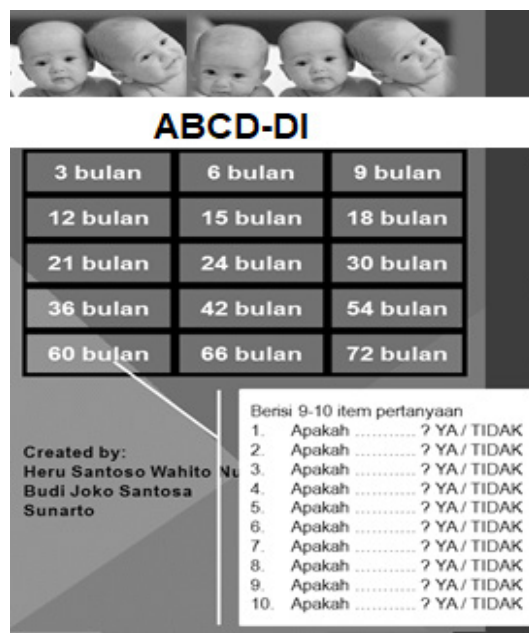


Note:

Halaman utama = Homepage
Petunjuk umum = General instruction
 Berikut ini adalah cara penggunaan = This is the instruction to use
Pengantar SDIDTK = Introduction of ESDIGDC
Program SDIDTK adalah = ESDIGDC program is

Figure 2. The content of Level I (homepage) (in Indonesian version)

At the top of the main page was included general instructions on how to operate the program, then at the bottom is presented about the general concept of ESDIGDC; 2) filling in Level II frames (detection of child development), in this case, the frame of child development detection is filled with the Child Development Pre-Screening Questionnaire, starting from the age group of 3 months, then proceeding sequentially and ending in the 72 month age group (Figure 3).



Note:

3 bulan = 3 months
Berisi 9-10 pertanyaan = contain 9 to 10 questions
Apakah? YA/TIDAK = Is ? YES/NO

Figure 3. The content of Level II (detection of child development) (in Indonesian version)

Questionnaire for each age group consisted of 9-10 items, and each item had 2 answer options “Ya (yes)” and “Tidak (no)”. After all Level II frames were filled in, a calculation formula was made with 3 output categories, namely: a) Development of “*Sesuai* (accordance)”

children if the total “Yes” answer was 9-10; b) the development of the child “*Meragukan* (doubt)” if the total answer “Yes” was 7-8; c) the development of the child “*Penyimpangan* (deviation)” if the total answer “Yes” was 0-6.

The last step was to provide follow-up choices based on the output categories as follows: a) if the child’s development was “accordance”, then the follow-up given was “continue stimulation”; b) if the development of the child “doubt”, then the follow-up given was “do the most test 2 times, with 2 week intervals, if the results are still asking, must be recommended to the health service institution; c) if the development of the child was “deviation”, then the follow-up given was “recommended to the health service institution”.

In accordance with a predetermined plan, a quality evaluation of “ABCD-DI” was conducted through an FGD on 10 midwives at the Sukorejo Health Center, Ponorogo. The topic of evaluation refers to the assessment of system quality or information technology-based applications according to Chin & Lee, which included 6 dimensions: 1) content, 2) accuracy, 3) formats, 4) ease of use, 5) timelines, and 6) speed of operation.⁽²⁾ Evaluations were carried out in 3 stages, and improvements are made after the first and second stages of evaluation. The results of the third stage of the evaluation showed that overall, the instrument has been assessed as being of high quality.

The recommendations given were: 1) the government as the holder of the ESDIGDC program policy (Ministry of Health of the Republic of Indonesia, Provincial Health Office, District / City Health Office and community health center) utilizes “ABCD-DI” as a medium for implementing ESDIGDC programs for health workers; 2) researchers use “ABCD-DI” as a research instrument, or develop it into a better research instrument.

DISCUSSION

Provision of the ABCD-DI drafting device can run smoothly, despite several obstacles. Obstacles to meeting hardware needs are more likely towards the problem of limited availability of funds. Some hardware is not purchased with available funds. Provision of hardware is indeed one of the obstacles for making information technology-based application designs. This is in line with Al Fatta’s statement that one of the obstacles in

the development of information and communication technology-based applications is the lack of hardware. As a solution, most hardware is prepared by borrowing.⁽³⁾

During the design process, there were obstacles to getting high compatibility web creator software. Initially researchers have prepared two selected software: 1) Microsoft Frontpage; 2) Drupal; but programmers and technicians lack the mastery of how this software works.

As a solution, researchers are constantly looking for suitable software, namely Microsoft Office Sharepoint Designer that is not commercialized, so it can be downloaded for free via the internet. Microsoft Office Sharepoint Designer Service Pack 1 provides stability and performance improvements that are important to customers, also ensures security for users.⁽⁴⁾

Brainware needs as a support for the design process can be adequately fulfilled because the three research teams can act as programmers, so they do not require additional external programmer work. A researcher focuses on the activity of making frames and integrating material into frames, while the other two researchers focus more on making material that will be integrated into the frame. Technicians as a companion programmer mainly focus their activities on the process of making materials, especially photographic, animation, and graphic materials, which are then integrated into the ABCD-DI frames.

Evaluator staff were taken from 10 midwives at the health center, whose role was to try out the system that had been designed. Each midwife is tasked with studying the ABCD-DI system that has been given to them for 1 x 24 hours. Their next task is to provide a critique of the shortcomings found in the instrument, while providing input for system improvement, through the FGD.

Supporting material books for design can be fulfilled, but there is one problem, namely that the basic reference book that is up to date is only available towards the end of the research process. The book is the Guidebook of ESDIGDC Implementation 2012. The books used in the previous design process were books published in 2007.

The results of the ABCD-DI quality evaluation indicate that midwives have given a “good” assessment of this instrument. The six dimensions of quality that refer to the quality dimension according to Chin & Lee⁽²⁾

have all been assessed well by midwives as users.

With the status of a “good” assessment of the overall dimensions above, it can be said that “ABCD-DI” has been qualified according to the user’s perception. This is in accordance with the definition of quality according to Moeliono, namely “the level of good and bad things”.⁽⁵⁾ “ABCD-DI” has been rated well by users, meaning “ABCD-DI” has been rated as having high quality in the eyes of users. The quality of “ABCD-DI” according to user perceptions is the most realistic quality. This is based on the statement of Simamora which expressly states that in the concept of “perceived quality”, consumer perception is reality. In this case, the most important thing in quality assessment is the perception in the view of consumers. This is similar to Kotler’s statement in Simamora that quality is the totality of features and characteristics of a product or service that enables the product or service to satisfy customer needs.⁽⁶⁾

CONCLUSION

Based on the results of the study, it can be concluded that the procurement of equipment and the development of the “ABCD-DI” design as a developmental detection instrument can be carried out properly, and is considered quality based on the results of evaluation by health personnel as users.

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