

# INTERACTIVE BOOK APP IN BAHASA MELAYU FOR TYPICALLY DEVELOPING CHILDREN AGED FROM FOUR TO SIX AS A SPEECH THERAPY AID

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## ABSTRACT

Interactive book app is defined as the app which is used for practicing speech language and literacy skills for children. Language development is the process by which children come to understand and communicate language during early childhood. Delayed language development will have negative effects on children's daily life. Language development is one of the most important issues in children development. In the past few years, different kinds of interactive book apps have been developed. It has been proven that interactive story book app plays an important role in children's language development. However, it is difficult to find a suitable app for children, especially for Malay language. This study aims to develop a suitable interactive book app as a speech therapy aid for typically developing children aged from 4 to 6 years. In this research, the survey was conducted among typically developing children aged from 4 to 6 years and their parents to get the requirement for the interactive book app. The questionnaire included the basic information about parents and children, requirement of content and requirement of function. The collected data was analyzed by using the Statistical Package for Social Science. According to analysis result, the interactive book app was developed using Java and Android studio. The target for the app is speech therapy. As a speech therapy aid, the interactive book app uses three kinds of speech therapy strategies, including: Language intervention activities, Articulation therapy and Oral-motor therapy. The speech-language pathologists can use the app to help children do speech therapy activities easily and correctly.

**Keywords:** *Interactive Book App, Speech Therapy Aid, Typically Developing Children, Malay Language, Language Development*

## 1. INTRODUCTION

Language is an important way to obtain knowledge and participate in our social life. Delayed language development will have negative effects on children's daily life and education[1]. Language development is the process by which children come to understand and communicate during early childhood. Language development is one of the most important parts in children's early development. It can help children to communicate, express their ideas and receive information from outside. It also can help children to think about the question, solve the problem and take part in daily life. Language ability in early childhood is a predictor of future reading success, academic achievement, and future career prospects[2].

Language development in the early school years, children need to learn more and difficult

words than before. They can make longer sentences in different way. At this age, they also know how language sounds, and how to combine sounds to develop words and sentences[3]. This study focuses on children aged 4 to 6. Child will learn more words and understand how the sounds within language work together. He can tell some short and simple stories. He will know how to combine the words together and develop longer sentences. These skills will help him express and share ideas with others. By six years old, child can develop the adult-like conversations[3].

Speech and language therapy provides treatment, support and care for children even adults who have the problem with certain speech or language skills[4][5]. The speech and language therapy generally helps children with their language and speech problem from three levels: 1. Phonation: Children need to learn how to control tone and

mouth for their speech, such as breathing, swallowing and chewing; 2. Articulation: Children need to pronounce different words and receive an evaluation on the correctness of pronunciation; 3. Understanding: When children receive information from outside, they have to know how to use language to respond and interact with the real world.

Traditional methods for speech and language therapy are based on face to face interaction between children and speech therapist[6]. The speech therapist develops some activities for children to treat the disorders. But this way requires a large number of speech therapist to help all possible children. It is also not convenient for children and their parents. They have to make appointment with speech therapist and cannot do the speech therapy activities until therapist is available.

Thus the aim of this study is to develop a suitable interactive book app as a speech therapy aid for four to six years old children to help them practice speech language and literacy skills. But different situation, the speech therapy strategy is also different. So the requirement of the interactive book app is also different. However, it is not easy for children's parents to find a suitable app for their children, especially whose mother language is Bahasa Melayu. The needs and learning ability of children of different ages is not same, even hugely different.

In this study, the survey will be conducted among parents and typically developing children aged from 4 to 6 years and the results will be analyzed to get the requirement of the interactive book app with speech therapy elements. The interactive book app will be developed based on the requirement of app and speech therapy theory and strategies.

## 2. BACKGROUND

Interactive book is an important and effective method for speech and language therapy. It has been proven that interactive book can practice speech language and improve literacy skills for children[7]. The study evaluated the effect of interactive book on the language and literacy development. The researchers conducted an experiment. They found one hundred twenty-one children from preschool and separated them into two groups. One group used book with interactive elements, the other group used book in normal way. After assessment, they proved that children who used book with interactive elements performed

significantly better than children who used normal book on Peabody Picture Vocabulary Test-III.

Nowadays, with development of mobile phone technology, more and more people prefer to use smart phone rather than basic phone. Smart phone has become the essential pocket hardware in our daily life. A smart phone is a mobile phone built with a mobile operating system, with more advanced computing capability and connectivity[8]. With a smart phone, people can do many activities. Through the mobile apps installed on the smart phone, people can use it to listen to the music, watch TV, and play games, read books and other entertainments. With a good smart phone, people don't have to purchase digital camera, game console or PDAs.

Therefore a new kind of interactive book model is the interactive book app. Interactive book app is designed to combine the multimedia technology with traditional book to enable users to interact with story in sight, touch and so on. On a smart phone, user has many ways of interactive activities. For example, when user move fingers on screen, touch the button, or select the app, the smart phone will respond to you immediately. In most applications, interaction is based on menu navigation and use interface to achieve the goal. Interactive book app provides interactive activities with storyline and multimedia content such as pictures, sounds, animation, games and so on.

Mobile phone has the potential to increase student motivation, prolong focus, and build confidence[9][10]. However, to improve student achievement using mobile phone, or any other medium, the activities must have a clear focus that is connected to student needs and one or more of the areas identified by research as essential for proficient reading, spelling, and writing—letter identification, phonemic awareness, phonics, fluency, vocabulary, and comprehension. To engage learners for sustained, focused practice, an app must also have a professional design. These characteristics distinguish effective apps: a) accurate content validated by research; b) appropriate scaffolding to assist learners; c) timely feedback; d) professional sound and images to support learning; and e) intuitive and user-friendly interface with clear instructions[11].

Mobile technology provides opportunities for speech and language development. If this technology is used properly by speech therapist and children, it will accelerate the progress of speech and language development for children with delayed language development[12]. The interactive book app can provide multimedia information and

tutorial videos for patient. The app will be beneficial for a future speech therapist because the app is selected based on criteria of affordability, functionality and quality. Nowadays, the information technology is quickly expanding, such smart phone or tablet. The traditional speech therapists should adapt to these changes in the digital age. They should combine their speech therapy with new technology to improve the effect and treatment on speech and language development[13].

### 3. METHODS AND DATA COLLECTION

#### 3.1 Research Methodology

Figure 1 shows the main flow chart of research methodology. The research methodology includes three parts: requirement, development and evaluation.

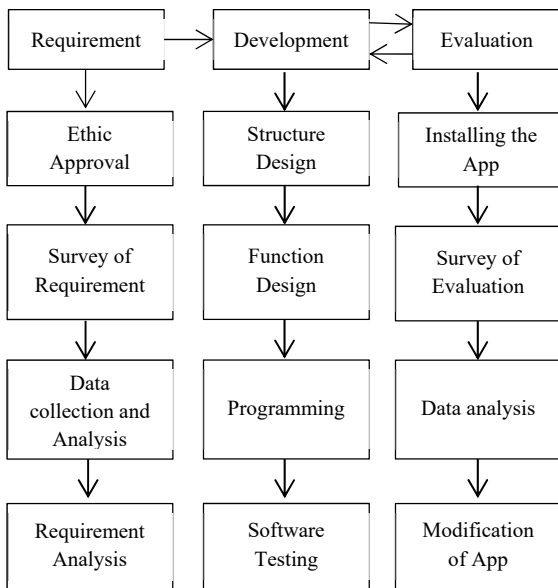


Figure 1: Main Flow Chart of Research Methodology

The part of requirement of interactive book app has four steps: ethic approval, survey of requirement, data collection and analysis, and requirement analysis. In the ethic approval step, the ethic approval application forms will be downloaded, filled out and submitted to the ethic committee to get the ethic approval. In the survey of requirement step, the questionnaire of requirement of interactive book app will be designed and carried out. In the data collection and analysis step, the data and answers of questionnaire will be collected and analyzed. In the requirement

analysis step, the requirement of interactive book app will be analyzed.

The part of development of interactive book app has four steps: structure design, function design, programming and software testing. In the structure design step, the structure of the app will be designed according to the requirement analysis step. In the function design step, the function of the app will be designed according to the requirement analysis step. In the programming step, using Java as programming language and Android Studio as programming platform, the app will be developed. In the software testing step, the app will be tested whether meets the requirement and the usability of the app will also be tested.

The part of evaluation of interactive book app has four steps: installing the app, survey of evaluation, data analysis and modification of app. In the installing the app step, the app will be installed on user's smart phone. In the survey of evaluation step, the questionnaire of evaluation on the interactive book app will be designed and carried out. In the data analysis step, the answers from the survey of evaluation will be analyzed. In the modification of app step, the app will be improved according to the results of evaluation on the app.

#### 3.2 Survey Equipment

The questionnaire of requirement of interactive book app in this study is adapted from the questionnaire[14][15]. The questionnaire has been verified by mobile learning expert and speech therapy specialist. The questionnaire consists of three sections. Figure 2 shows the structure of questionnaire for requirement.

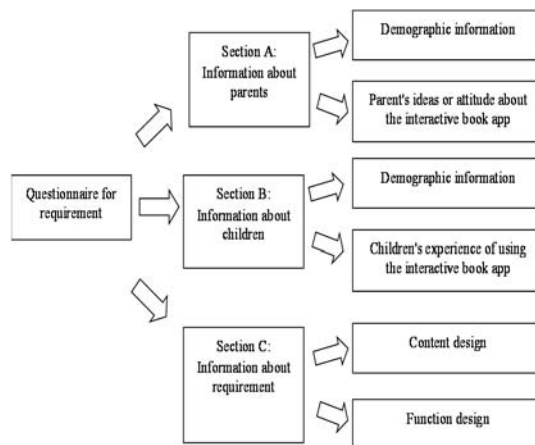


Figure 2: Questionnaire of Requirement of App

Section A requires information about children's parent. This section includes the demographic information about parents and their ideas or attitude about interactive book app. The demographic information about children's parents includes their age, highest academic qualification, current occupational status and main language using in daily conversation with their children.

Section B requires information about children. This section includes the demographic information about children and experience of using the interactive book app. The demographic information about children includes their age and gender. The experience of using interactive book app is whether children have used the interactive book app before.

Section C requires information about the requirement of interactive book app. This section includes the content of interactive book app and the function of interactive book app.

For the content of interactive book app, the questionnaire is designed from four aspects: voice, color, music and quiz.

- Voice or sound: The respondent can choose what kind of voice or sound they prefer. For example: male adult's voice, female adult's voice or child's voice. The respondent can choose the level of voices or pronunciations that are made to app. For example: alphabet level, word level and sentence level.
- Color: The respondent can choose how many colors in one word or one sentence.
- Music: The respondent can choose what kind of background music he prefers. For example: children's song or classic music.
- Quiz: After children finish reading the book, the app will offer a quiz for children to check whether the children understand the story completely. The respondent can choose the level of quiz section, how many questions in quiz section and how many options in one question.

For the function of interactive book app, the questionnaire will include a list of ideas about the function of the app. For example: The app supports extra content or children can record their voice.

### 3.3 Data Collection

The survey is conducted among the children from four to six years old and their parents. The inclusion criteria will be: 1) four to six years old typically developing children; 2) respondents should have a mobile phone with Android OS; 3) The respondents should be interested in interactive book app. The exclusion criteria will be: 1) children with disability 2) respondents do not have one smart phone with Android OS. The questionnaire will be distributed to respondents who satisfy the criteria. The respondent will fill out and send the questionnaire back.

## 4. RESULTS AND DISCUSSIONS

### 4.1 Data Analysis

In this survey, 30 questionnaires were distributed to suitable respondents, and responses were validated for data analysis. The collected data was analyzed by using the Statistical Package for Social Sciences.

*Table 1: Information about Parents  
(At the end of this paper)*

The table 1 shows the results of section A: information about parents. Based on the results, most of parents are aged below 40 years old. All the family use Malay in daily conversation with child and most of family also use English in daily conversation with child. All parents own a smart phone with Android OS and most of parents own a smart phone with Android OS for their children. Based on the data analysis of section A, most of parents agree that quality of text and quality of picture are crucial criteria when choosing a book for their child.

*Table 2: Information about Children  
(At the end of this paper)*

Based on the data analysis of section B, all the children are aged from 4 to 6 years. Most of children have not used an interactive book app before. Most of children spend less than 20 minutes on reading books per day.

*Table 3: Requirement on Content Design  
(At the end of this paper)*

Based on the data analysis of section C, for the requirement of content design, most of respondents prefer picture story book and the form of orientation should be vertical. For the voice or

sound design part, most of respondents prefer female adult's voice and the interactive book app should provide sound for content in word or sentence level. For the color design part, most of respondents want two colors in one sentence or word. For the background music design part, most of respondents want the background music. In the quiz section design, the level of quiz section should be regular level. There should be five questions in the quiz section and each question should have 3 options.

Table 4: Requirement on Function Design  
(At the end of this paper)

These questions are based on a based on a 5-point Likert scale. Likert scale will rate from “Strongly Disagree (1.00)” to “Strongly Agree (5.00)”.

Based on the results, 90% of respondents agree or strongly agree that pictures come with sound. 96.7% of respondents agree or strongly agree that the app supports extra content from online. 100% of respondents agree or strongly agree that sound for the apps are recorded from the doctors in the clinic since they are professional. 76.7% of respondents agree or strongly agree that parents or children can record audio when they read the book. 53.3% of respondents agree or strongly agree that the interactive book consists of turning pages. 36.7% of respondents agree or strongly agree that not so much interaction, focus on the reading. 13.3% of respondents agree or strongly agree that the picture will vibrate a little when we touch the pictures. 16.6% of respondents agree or strongly agree that the sound is recorded from the same people so the children can get used to the sound. 100% of respondents agree or strongly agree that the sound should not be too loud or noisy. 93.3% of respondents agree or strongly agree that the pictures should not be too bright.

At the end of questionnaire, it has some open questions to ask the respondent to give some suggestions about the content, design and function of interactive book app. The suggestions are recorded as follows: more pictures; funny sound; words are clear and easy to recognize; include some animations; pictures should be colorful and attractive; the story is not too long to read; easy to operate; user friendly interface; the button should be obvious enough for the children to recognize; more interactive factors; the speed of voice or sound is not too fast so that the children can follow with; background music should be clear and quiet.

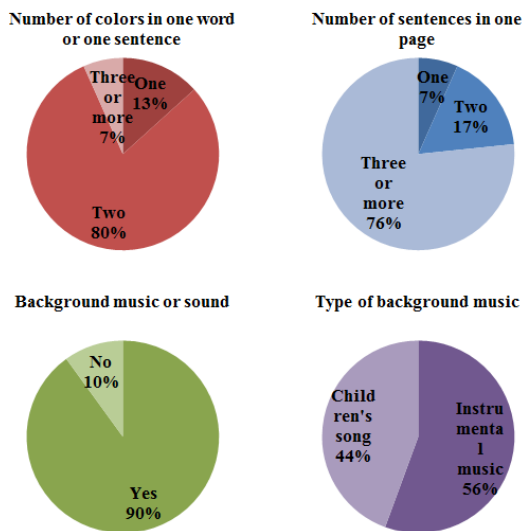


Figure 3: Requirement on color and sound

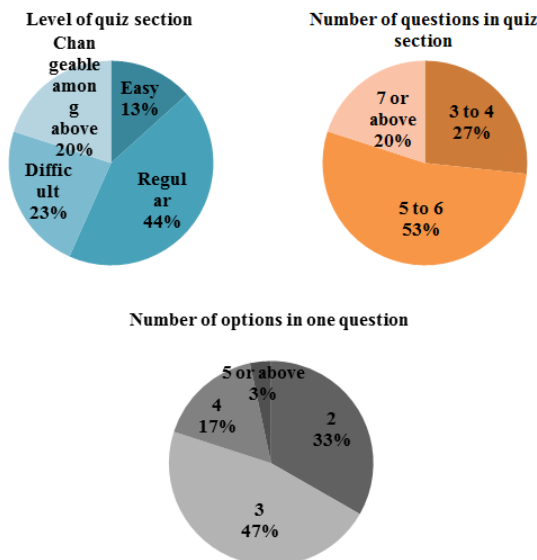


Figure 4: Requirement on quiz section

## 4.2 Interactive Book App Design

According to data analysis result of requirement of interactive book app, the app will be designed from four aspects: content design, function design, structure design and interface design.

### 4.2.1 Content design

The children story book is chosen by the language expert and speech therapist from UKM



clinic. This book is suitable for children aged from 4 to 6 years. There are 8 paragraphs in this book and there are two or three sentences in one paragraph. This book has already been proven that it can help children in language development and speech therapy activities. Table 5 shows the speech therapy elements in original children story book.

Table 5: *Speech Therapy Elements In Original Book*

Speech theory	Original children book
Language intervention activities	Interact with child using pictures
	Interact with child using books

According to the analysis result of requirement of interactive book app, each paragraph will be presented in one page of the interactive book app and each page will be designed as follows: One paragraph in one page; Two or three sentences in one page; Two or three colors in one word or in one sentence; Background music; Provide sound for content from word level to sentence level; Pictures with sound; Children or parents can record audio while reading the story book; Voices or pronunciations come from female or children.

According to the analysis result of requirement of interactive book app, the quiz section will be designed as follows: there are five questions in quiz section; there are three options in one question; the level of question in quiz section is regular or suitable, not too much difficult and not too much easy.

The interactive book app will include two types of background music: instrumental music and children song. Two instrumental songs and two children songs are chosen. The interactive book app will include two types of colors in one word or one sentence. The red color and black color will be chosen. The interactive book app will include two types of voices for children to choose. After discussion with experts or speech therapists from the UKM clinic, female adult voice will be chosen.

#### 4.2.2 Function design

Based on speech therapy theory, the function design will be mainly considered from four aspects.

- Language development: use different colors to show the different words and

record each word pronunciation in one sentence; separate one sentence into different parts and let the children develop the sentences.

- Speech development: use different colors to show different phonemes and record each phoneme pronunciation; separate one word into different phonemes and let the children make one word; record the children's pronunciation and compare with standard pronunciation.
- Literacy development: develop quizzes to help parents and children check whether they have completely understood the main idea of the story book or not.
- Specific function from questionnaire: pictures come with sound; parents or children can record audio when they use the interactive book app; voice or sound should be clear; pictures should not be too bright.

Table 6: *Speech Therapy Elements In Interactive Book App*

Speech theory	Interactive book app
Language intervention activities	Interact with child using pictures
	Interact with child using books
	Interact with child using songs or music
	Interact with child using animations
Articulation therapy	Correct vocabulary and grammar
	Use repetition exercise
	Use quiz section
Articulation therapy	Sound pronunciation
Oral-motor therapy	Record and repeat

Table 6 shows the speech therapy elements in original children story book.

#### 4.2.3 Structure design

The structure of interactive book app is shown in Figure 5.

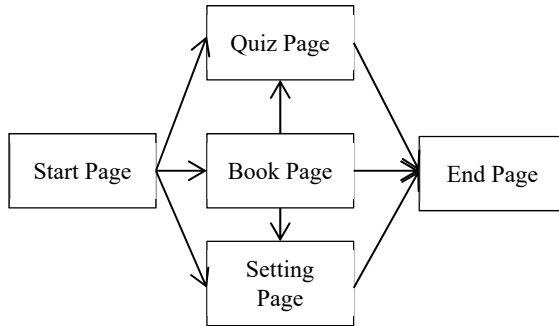


Figure 5: Structure of Interactive Book App

The structure of interactive book app includes five parts. The detailed information is as follows:

- Start page is the first page of the interactive book app. It will be shown when children open the app. Start page will introduce the name of children story book and lead children to read the story book.
- Book page is the main page of interactive book app. It is the most important part of the interactive book app. These book pages contain the whole story book and multimedia elements such as pictures, sounds, voices, background music and animations.
- Quiz page also plays an important role in the interactive book app. When children finish reading the story book, they can start to answer some questions related to the story book. These pages include some basic questions about the story book. These questions are designed by the speech therapist in the UKM clinic to help the children to understand the story more easily and quickly.
- Setting page: children can make some basic settings for the interactive book app such as turn on/off the background music, and change the background music and so on.
- End page is the last page of the interactive book app. In end page, children can close the app or turn back

to start page so that they can read the story book again.

#### 4.2.4 Interface design

Based on the structure of the interactive book app (Figure 5), the interface design will be divided into 5 parts: start page; book page; quiz page; setting page; end page.

Figure 6 shows the interface of book page.

Figure 7 shows the interface of quiz page.

#### 4.3 Development of Interactive Book App

According to analysis result of the requirements of the interactive book app, based on speech therapy theory, the app is designed from 4 aspects: content design, function design, structure design and interface design. In content design, we design the quiz section, background music, color and voice. In function design, the function of the app is designed based on three kinds of speech therapy strategies, including: Language intervention activities(Interact with child using pictures, books and sounds, Use repetition exercise, Use quiz), Articulation therapy(Sound pronunciation) and Oral-motor therapy(Record and repeat). In structure design, the app has five kinds of pages. In interface design, the prototype of the app is designed. After the design of the app, using Java language and android studio as development kit, the interactive book is developed.

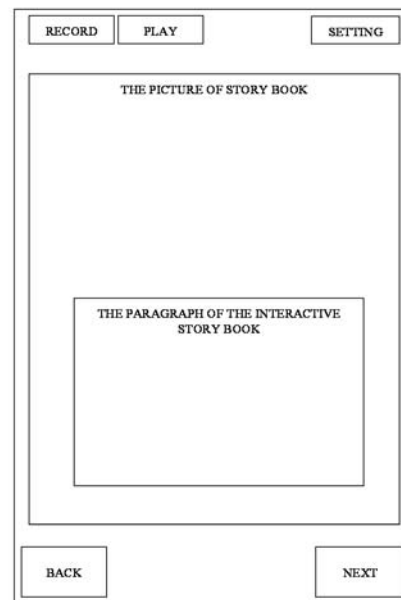


Figure 6: Interface of Book Page

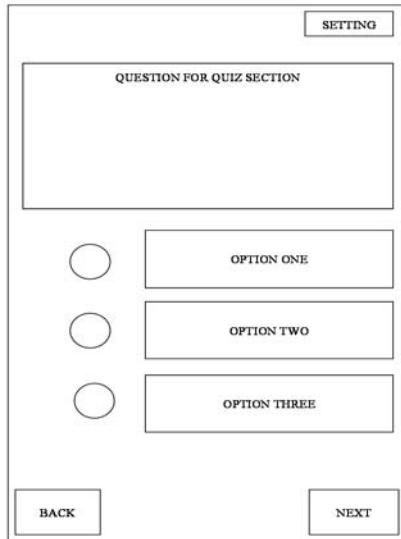


Figure 7: Interface of Quiz Page

Figure 8 shows the book page of the interactive book app



Figure 8: Interactive Book App

#### 4.4 Evaluation on Interactive Book App

After using the interactive book app, another survey will be conducted for evaluation on interactive book app among parents and children. The evaluation will focus on content and usability of interactive book app.

#### 5. CONCLUSION

The contribution of this study is to develop an interactive book app for typically developing children as a speech therapy aid. This is the app, which has been specifically designed and based on speech therapy. The interactive book app uses three kinds of strategies, including: Language intervention activities, Articulation therapy and Oral-motor therapy. The interactive book app in this study is the app that designed for children aged from 4 to 6 years, which used Malay as mother language. The interactive book app has suitable content validated by speech therapy experts, interactive book activities, sounds and images to support learning, intuitive and user-friendly interface with clear instructions. It can help children effectively and efficiently improve their language abilities and skills.

The limitations of the study are as followed: This study only developed one story book to interactive book app. It might be not suitable for all the children aged from 4 to 6 years. This study were conducted in KL and Bangi area and the number of the respondents were not very large, therefore the interactive book app might only satisfy the requirements in the specific area and certain population.

Based on the finding of this study, the following recommendations are made: This study only focused on children aged from 4 to 6 years. Future studies could develop the interactive book app for children of different ages. This study mainly focused on children, which use Malay as mother language. There are so many kinds of languages all over the world. Especially in Malaysia, Malay, English and Mandarin are very common in daily life. Therefore, future studies could focus on different language in different area. This study only focused on normal children. Future studies could develop the interactive book app with special needs.

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Table 1: Information about Parents

Parent's age	Frequency	Percentage %
20-30 years old	10	33.3
31-40 years old	15	50
41-50 years old	4	13.3
Above 50 years old	1	3.33
<b>Main language use in daily conversation with child (multiple choices)</b>		
Malay	30	100
English	25	83.3
Mandarin	12	40
<b>Own an Android smart phone for child</b>		
Yes	24	80
No	2	6.67
Planning to purchase one	4	13.3
<b>Crucial criteria when choosing a book for child (multiple choices)</b>		
Quality of texts	18	60
Quality of pictures	15	50
design of the app	16	53.3
Recognizable characters	13	43.3

Table 2: Information about Children

Children's age	Frequency	Percentage %
4 years old	12	40
5 years old	10	33,3
6 years old	8	26.7
<b>Children's gender</b>		
Boy	17	56.7
Girl	13	43.3
<b>Has the child used an interactive book app before</b>		
Yes	8	26.7
No	22	73.3
<b>Time spend on interactive book app per day</b>		
Less than 20 minutes	6	75

20 minutes to 1 hour

2

25

Table 3: Requirement on Content Design

Type of book child prefer	Frequency	Percentage %
Simple story book	4	13.3
Picture story book	26	86.7
<b>Forms of orientation of app</b>		
Horizontal	7	23.3
Vertical	13	43.3
Changeable between horizontal and vertical	10	33.3
<b>Voice or pronunciation used in the app (multiple choices)</b>		
Male adult	10	33.3
Female adult	21	70
Children	6	20
<b>Level of sound (multiple choices)</b>		
Alphabet	7	23.3
Word	22	73.3
Sentence	21	70
<b>Number of colors in one word or one sentence</b>		
One	4	13.3
Two	24	80
Three or more	2	6.67
<b>Number of sentences in one page</b>		
One	2	6.67
Two	5	16.7
Three or more	23	76.7
<b>Background music or sound</b>		
Yes	27	90
No	3	10
<b>Type of background music or sound</b>		
Instrument music	15	55.6
Children's song	12	44.4

<b>Level of quiz section</b>		
Easy	4	13.3
Regular	13	43.3
Difficult	7	23.3
Changeable among above	6	20
<b>Number of questions in quiz section</b>		
3 to 4	8	26.7
5 to 6	16	53.3
7 or above	6	20
<b>Number of options in one question</b>		
2	10	33.3
3	14	46.7
4	5	16.7
Above 4	1	3.33

Table 4: Requirement on Function Design

<b>Pictures come with sound</b>	<b>Frequency</b>	<b>Percentage %</b>
Strongly disagree	0	0.0
Disagree	0	0.0
Neither agree or disagree	3	10.0
Agree	20	66.7
Strongly agree	7	23.3
<b>The app supports extra content from online</b>		
Strongly disagree	0	0.0
Disagree	0	0.0
Neither agree or disagree	1	3.33
Agree	25	83.3
Strongly agree	4	13.3
<b>Sound for the apps is recorded from the doctors in the clinic since they are professional</b>		
Strongly disagree	0	0.0
Disagree	0	0.0
Neither agree or disagree	0	0.0
Agree	22	73.3
Strongly agree	8	26.7
<b>Parents or children can record audio when they</b>		

<b>read the book</b>		
Strongly disagree	0	0.0
Disagree	0	0.0
Neither agree or disagree	7	23.3
Agree	21	70.0
Strongly agree	2	6.67
<b>The interactive book consists of turning pages</b>		
Strongly disagree	0	0.0
Disagree	0	0.0
Neither agree or disagree	14	46.7
Agree	12	40.0
Strongly agree	4	13.3
<b>Not so much interaction, focus on the reading</b>		
Strongly disagree	0	0.0
Disagree	2	6.67
Neither agree or disagree	17	56.7
Agree	7	23.3
Strongly agree	4	13.3
<b>The picture will vibrate a little when we touch the pictures</b>		
Strongly disagree	0	0.0
Disagree	7	23.3
Neither agree or disagree	19	63.3
Agree	4	13.3
Strongly agree	0	0.0
<b>The sound is recorded from the same people so the children can get used to the sound</b>		
Strongly disagree	0	0.0
Disagree	3	10.0
Neither agree or disagree	22	73.3
Agree	4	13.3
Strongly agree	1	3.33
<b>The sound should not be too loud or noisy</b>		
Strongly disagree	0	0.0
Disagree	0	0.0
Neither agree or disagree	0	0.0





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Agree	18	60.0
Strongly agree	12	40.0
<b>The pictures should not be too bright</b>		
Strongly disagree	0	0.0
Disagree	0	0.0
Neither agree or disagree	2	6.67
Agree	19	63.3
Strongly agree	9	30.0

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