A BAHASA MALAYSIA INTERACTIVE BOOK APP AS A SPEECH-LANGUAGE THERAPY TOOL FOR CHILDREN WITH LANGUAGE DELAY

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ABSTRACT

Interactive story books (ISB) mobile application is defined as an app for children to practice their speech, language and literacy skills. Information has shown that ISB can be used to support education and learning for individuals with language delay. In general, visual and auditory artifacts are included in this kind of app which makes the app an incredible aid to facilitate speech and language skills. Considering the situation in Malaysia, many of the developed ISB suffers from a lack of practical experience with children, especially for the children who have language delay. The evidence can be seen from the lack of apps for the children whose first language is Bahasa Malaysia. Malaysian children with language delay and their parents are the subjects in this research. The children and their parents were asked to answer a survey about the ISB requirement. The survey focused on collecting the requirement for the ISB targeted for children with language delay. The survey data were analyzed to get the requirements for the app. Based on the requirements, the ISB can be developed using the Android platform. The main finding of the study is the practical requirements of ISB in Bahasa Malaysia for children with language delay in collaboration with Speech and Language Pathologists (SLPs), parents and children.

Keywords: interactive story books, Bahasa Malaysia, language delay, survey, requirements

INTRODUCTION

Children with language delay often show difficulty in receptive and expressive language skills. Receptive language generally precedes expressive language skills and gradually develops in children. A child is diagnosed with language delay when he or she fails to reach developmental milestones in learning to talk and understanding language. Language delays are part of the broader communication disorders that have adverse effects on the children's abilities to talk, understand, read, and write (Landry et al., 2012).

The study aims at getting the requirements of the ISB for children with language delay whose first language is Bahasa Malaysia. Bahasa Malaysia is national language of Malaysia and written by a Latin alphabet system with specific pronunciation rules. On accounting of the pronunciation rules and writing system, the words in Bahasa Malaysia can be separated into different phonemes (Chye, 2006). A hardcopy book used for speech therapy at Klinik Audiologi dan Sains Pertuturan in Fakulti Sains Kesihatan has been referred during the research. The sentences in the book are simple and consists of 2 to 3 sentences. The words are mostly easy and usually used in daily conversation. This book was developed to meet the receptive and expressive language skills of a typically developing for children aged 4-6 years old.

ISB is used for enabling users to interact with the storyline of the book by sight, sound and touch. Many ISB apps have appeared with complete range of products for children for the past few years. The earliest theory about language development believed that children acquire language by imitation (Bigge & Shermis, 1998). While it has also been shown by research that children who imitate the actions of those around them in their first year of life are generally those who also learn to talk more quickly, some theories supported by people also claim that imitation alone cannot explain how children become talkers (Gleason and Ratner, 2009). Shared book reading has also been successfully used to facilitate receptive and expressive language skills in children, seen from the outcomes of the book sharing researches, the introduction of sensitive and faciliatory book sharing had a profound effect on the development of children's receptive and expressive language skills (Landry et al., 2012).

With the development of Science and Technology, the current technology is using apps installed on the mobile devices so that people can have interactive activities according to the functions offered by the apps. From the beginning, mobile apps are used to get the general productivity and information retrieval, such as email, contacts, calendar, weather information and stock market. However, the availability of developer tools and public demands drove rapid expansion into other categories (Paredes et al., 2013).

ISBs enable children to interact with the storyline from 3 aspects: sight, sound, and touch. Using these aspects makes ISB much more interesting and colorful than the normal books. Concrete and abstract concepts can be shown based on the use of words, images, and objects. ISB is the combination of the development technology of the mobile apps and the language development theory (Donner, 2008).

The methods of helping children with language delay often include auditory supports and the use of visuals, which are cognitive tools to enable learning and the production of language (Edwards, 1991). By using these methods, ISB has been shown to reduce the symptoms related with cognitive, social disabilities and communication. However, ISB developments suffer from a lack of practical experience with children, especially for the children who have language delay (Oliver & Goerke, 2007).

According to the situation above, children with language delay will be involved in a survey to collect the detailed information with the help of those children's parents in this study. After the survey, appropriate analysis will be made to get the best approach to develop the app to meet the requirements of children with Language delay.

Since there is a glaring lack of ISB in Bahasa Malaysia today, there exists an opportunity to help children with language delay especially for those children whose first language is Bahasa Malaysia.

BACKGROUND

ISB is a new way of the digital entertainment. ISB is defined as a form of interactive entertainment, in which the player can explore, learn and practice by themselves (Gleason and Ratner, 2009). Those apps are installed in the mobile devices and used anytime and anywhere.

Past research efforts have been done to investigate effectiveness in speech-language therapy (Saz et al., 2006). It reveals from the results that conventional ISB as the speech-language therapy tools are not practical enough for the patients. Some are difficult for a child with language delay to operate, some are expensive and difficult to get. Also, the ISB for children with language delay in Bahasa Malaysia is limited online. The screenshot from the Google Play store is shown below (Figure 1).
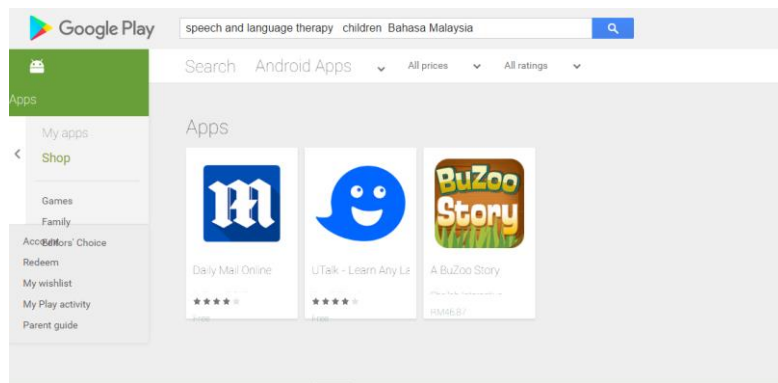
FIGURE1. The screenshot from the google play store

After discussion with SLPs in the Klinik Audiologi dan Sains Pertuturan in Fakulti Sains Kesihatan, the SLPs proposed an app which can satisfy the language development and the speech development (Language development: using different colors to show the different parts of a sentence and record the pronunciation. Separate the sentences into different parts and have the children make the sentences; The speech development: using different colors to show the different parts of the words, record and compare the children's pronunciation. Separate the words into different phonemes and have the children make the words.) and several detailed functions were also asked to deliver for the children with language delay, those functions will be discussed in the "Results and Discussions "part.

According to the introduction above, the research question in this study is: what are parents and children's practical requirements about ISB among the children who have language delay?

METHODS AND MATERIALS

A survey will be carried out to get the requirement of the ISB. The survey will be a questionnaire with some specific questions about the parents' information, the children's information and the requirements of the ISB for the children who have language delay. This questionnaire is designed in 2 phases, phase 1 is the validation of the questionnaire, and phase 2 is the development of the questionnaire.

Explanation of the validity of the questionnaires:
The questionnaire used in this study is adapted from questionnaires by Johnson (2007) and Debaryshe& Binder (1994). The questionnaires which are originally in English will be adapted and changes will be made through consultation with supervisors, SLPs and teachers.

Development of the questionnaire:
Based on the questionnaires above, the questionnaire is developed in 3 sections. The first section requires information about the parents, including the demographic information and their ideas of choosing an ISB. The demographic information will contain some questions about age, highest academic qualification, current occupational status and the daily conversational language to see their qualifications in the survey. Their ideas of choosing an ISB will be some questions such as the crucial criteria of choosing a book for their child, their attitudes towards the children's apps and so on. Some open questions will be included if necessary.

The second section requires information about the children, including the demographic information and their experience of using an ISB. The demographic information will contain some questions about the date of birth, gender and age to see their qualifications for the survey. Their experience of using an ISB will be some questions about if they have used the ISB before, how long in general the children spent on the ISB and so on. Some open questions will be included if necessary.

The third section requires information about the requirements of the app. In this section, the android version of the phone is required, some detailed ideas of the content design and the function design. Besides, open questions will be included if necessary.

For the content design in the requirement part, some detailed requirement questions about the design of the voice that will be pronounced in the app, the colors that will be displayed in the app, the music that will be played in the app and the quiz that will be given in the app will be mentioned, the detailed requirements are as follows:

i. Voice design: The respondents can choose the kind of pronunciation they prefer, such as the male adult's voice, the female adult's voice and the children's voice. The respondents can choose the level of the pronunciation that is made, such as the alphabet level, the word level and the sentence level.

ii. Colors design: The respondents can choose how many colors or what colors they want in one word or in one sentence.

iii. Music design: The respondents can choose what kind of music they want in the app, such as the instrumental music, the children's song and so on.

iv. Quiz design: The respondents can choose what level they want in the app: easy level (easy level), regular level (sentence level), difficult level (paragraph level) and so on. And some questions like how many questions they want in the quiz part, how many options they want in one question and so on.

For the function design in the requirement part, several function design ideas will be used in the app. Especially for the children who have language delay, the experts have come up with some ideas to add the detailed functions which will be helpful for the therapy work, these functions mainly lie in attention, comprehending and the brightness of the pictures. Three functions will be designed as follows after the discussion with the experts:

i. The picture will vibrate a little when we touch the pictures. This question mainly satisfies the requirement for the attention.

ii. The sound should not be too loud or noisy. This question mainly satisfies the requirement for the comprehending.

iii. The picture should not be too bright. This question mainly satisfies the requirement for the brightness of the picture.

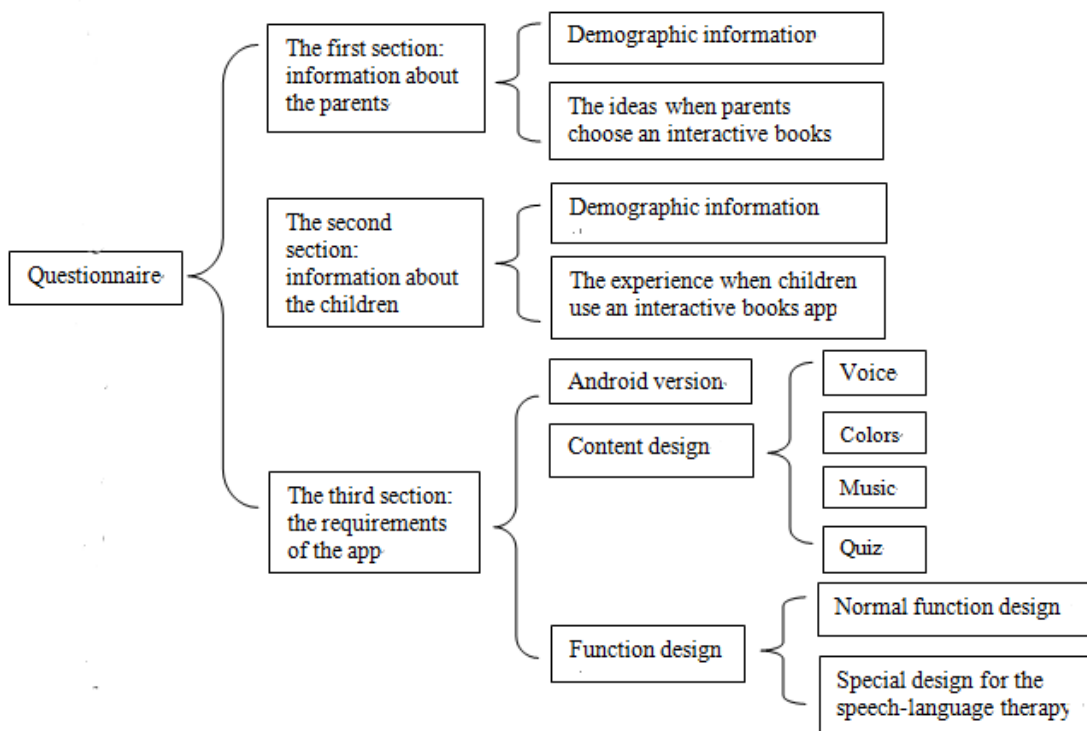The structure of the questionnaire is shown as follows (Figure 2):

FIGURE 2. The structure of the questionnaire

Regarding questionnaire design (Figure 2). Initially, the respondents (the parents and children) are asked to browse a simple ISB during the survey. The parents and the children with language delay will cooperate with each other together. The questions in the questionnaire have to be answered by the parents, or for the children's part, the children have to ask for help from their parents to finish the questionnaire. The parents finished the questionnaire by their own experience, the children's response and their interaction with the children.

The reason why the parents is chosen as the main respondents of this questionnaire is the parents also have rich practical experience in speech-language therapy because of the daily communication with their children. The parents can be regarded as a SLP at home. Besides, they also have rich experience in how to make the ISB easier and simpler to use based on their experience of using ISB with their children before. In fact, the parents have much clear and accurate ideas about the ISB. So, getting the parents' requirement is important and necessary.

About most of the questions in the questionnaire, after discussion with the teachers and therapists, the requirement of ISB for the children with language delay can be requirement of a normal ISB with some special design for language therapy work, such as the 3 questions listed in the function design part. Those functions and characters will be delivered so that the parents and SLPs can use this app as a speech-language therapy tool.

EXPERIMENT DESIGN

The questionnaires will be sent to 60 parents and children who have language delay in Klinik Audiologi dan Sains Pertuturan. A survey will be carried out with these parents and children.

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After collecting the data from the survey, the data and the answers from the survey will be analyzed to get the requirement of the interactive story book app. the survey is conducted in 2 phases, phase 1 is the inclusion and exclusion criteria of participants, and phase 2 is the data collection.

The inclusion and exclusion criteria of participants:
   The parents and the children with language delay will take part in the survey. The inclusion criteria will be:
   i. The children and their parents whom SLP recommended taking part in the survey in the clinic.
   ii. The children and their parents who registered in Klinik Audiologi dan Sains Pertuturan.
   The exclusion criteria will be:
   i. The children who have the hearing and vision difficulties.
   ii. The parents who don't have the basic knowledge for words.
   iii. Parents who don't own a Smartphone or tablet or other mobile devices with Android OS.
   iv. Parents who don't agree to take part in the survey.

Data collection:
   The parents will be provided with information sheet and written consent form before the distribution of the questionnaires. The parents will be given one day to answer the questionnaires after being informed about the research. In this research, the 60 questionnaires are distributed equally to respondents. In the questionnaire survey, the respondents are asked to browse a simple ISB and answer the questionnaire based on the app. A researcher can be present to provide guidance to the respondents along the survey sessions if necessary.
   The Statistical Package for Social Sciences (SPSS, version 22.0) will be used to analyze the collected data. Descriptive statistics will be used to analyze demographic information for all the sections. The basic information and open questions will be recorded for the possible usage. Frequencies and percentages of the single choices will be recorded based on the number of respondents. Frequencies and percentages of the multiple choices will be recorded based on the number of answers. For the question based on a 5-point Likert scale, Likert scale that rates from "Strongly Disagree (1.00)" to "Strongly Agree (5.00)" has been developed to get the opinion of the ISB development. The frequencies and percentages will be recorded based on the number of respondents. The average evaluation will be calculated to determine which components of the app development methods are accepted by the respondents.

RESULTS AND DISCUSSIONS

The questionnaire aims at getting the requirement of the ISB. Sixty questionnaires were distributed equally to respondents by operating a survey in the research. A total of 30 responses from the 60 questionnaires were returned. Likert scale that rates from "Strongly Disagree (5.00)" to "Strongly Agree (1.00)" has been developed to get parents and their children's perception towards some specific designing ideas. The questionnaire consists of 3 sections which are the parents' information, the children's information and requirement of the app.

The results and discussions is evaluated as follows. Table 1 contains the parents' information.

TABLE 1. Parents' information

Options	Frequencies	Percentages
Age		
20-30years old	5	16.67
31-40years old	23	76.67
41-50years old	2	6.67
Above 50years old	0	0
Highest academic qualification		
Primary education	0	0
Secondary education (STPM, Matriculation, Foundation)	2	6.67
Tertiary education (Diploma, Degree)	24	80.00
Post-degree qualification (Master, PHD)	4	13.33
Others	0	0
Current occupational status		
Unemployed /housewife	3	10.00
Full time: Government	8	26.67
Full time: Private	16	53.33
Full time: Working from home	1	3.33
Part time: Government	0	0
Part time: Private	1	3.33
Part time: Working from home	1	3.33
What is the main language you use in DAILY CONVERSATION with your child? (multiple choice)		
Malay	25	60.98
English	12	29.27
Mandarin	4	9.76
Dialect/Others	0	0
Do you own an Android smart phone for your child?		
Yes	11	36.67
No	0	0
I am definitely planning to purchase one.	18	60.00
I am considering purchasing one	0	0
Others	1	3.33
Which criteria are crucial for you when choosing a book for your child? (multiple choice)		
Quality of the texts	16	27.12
Quality of the pictures	23	38.93
Design of the app	9	15.25
Recognizable characters	11	18.64
Others	0	0
Which words would better describe your attitude towards children's apps? (multiple choice)		
Encourage reading	17	26.15
Distracting	3	4.62
Addictive	6	9.23
Entertaining	15	23.08
Educating	24	36.92
Others	0	0

From Table 1, all parents are more than 20 years old and majority of them are 31-40 years old, all of them have the secondary education or above so they have the basic knowledge about the words used in the app. Most of them have a job, most of them use Bahasa Malaysia as their main conversational language and also have the Android phone as a tool to install the app for their children, and they have the suitable qualifications (age, highest academic qualification and current occupational status) to take part in the survey.

According to the result of the several questions about the idea of parents choosing an ISB, most of the parents lay emphasis on the quality of the pictures and the texts in the books, and then when the app is designed, more attention will be paid to the design of the picture and the texts. At last, the parents think the book app should be educating and encouraging. More ways to realize the educating methods will be thought about. And when the story of the books is chosen, it should be encouraging. Table 2 contains the children's information.

TABLE 2. Children's information

Options	Frequencies	Percentages
Gender		
Male	19	63.33
Female	11	36.67
Age		
2	2	6.67
3	2	6.67
4	5	16.67
5	13	43.33
6	2	6.67
7	3	10.00
8	1	3.33
9	2	6.67
Has your child ever used an interactive story book app?		
YES	12	40.00
NO	18	60.00
Do you remember any interactive story book app your child likes? (Based on the respondents who answered "YES" to question" Has your child ever used an interactive story book app?")		
YES	6	50.00
NO	6	50.00
How much time does your child spend on reading books per day? (Based on the respondents who answered "YES" to question" Has your child ever used an interactive story book app? ")		
Less than 20 minutes	5	41.67
20 minutes to 1 hour	5	41.67
1hour to 2 hours	2	16.67
More than 2 hours	0	0
What factor(s) do you think has prevented your child from using interactive story book app? (Based on the respondents who answered "NO" to question" Has your child ever used an interactive story book app?", multiple choice)		
My child is too young.	5	21.73
My child is not interested in interactive story book app.	7	30.43
My child is too dependent on me.	3	13.04
Others	8	34.78

Table 2 contains the children's basic information such as gender, date of birth and age. The respondents are confirmed by observing those children. Besides, according to the results, they are at the suitable age for the survey, all of the children are suitable to take part in the survey.

Forty percent of the children have used an ISB. The respondents have been asked to write down the name of the books so that when the app is designed those can be used as references. The following are the feedback (all the feedback is listed according to the original handwriting):
    i.   PINK FONG
    ii. Disney

 iii. ANGGOTA BADAN SAYA (card plate)

 iv. the three pigs

 v. Clyde and Friends

 vi. off to the beach.

 From the results, most of the children use apps for less than 1 hour, so the app should not be too complex or too long. For the 60% of the children who have never used an ISB before, the parents think their children are not interested in the book app or they are too young. This indicates that app has to be made simple, colorful and attractive for the children. And for the rest 34.78% of the respondents offered some other reasons and the reasons are recorded as the references as follows (all the reasons are recorded by using the original handwriting):

 i. Difficult to discipline

 ii. He can't acquire the skills to use a story book app, a slow learner.

 iii. My child can't focus.

 iv. Most of the apps are too complex for my child.

 v. didn't find a suitable app for the language delay

 vi. I don't have so much time with my child, he is not so familiar with the rules

 vii. I can't find a suitable and easy one.

 viii. My child doesn't know how to use.

 From the answers to the open questions most of the respondents require that the app should be interesting, attractive, simple, and easy and so on. Those can be delivered by using the colorful pictures, simple words and enjoyable music according to these suggestions. The following Table 3 records the requirement of the app.

TABLE 3. Requirement of the app

Options	Frequencies	Percentages
What types of books does your child prefer?		
Simple story books	12	40.00
Picture story books	18	60.00
Others	0	0
What kinds of voice or pronunciation do you want? (multiple choice)		
Male Adult	9	20.93
Female Adult	14	32.56
Children	20	46.51
The app could provide sound for the content, which level do you want the app to make a sound for it? (multiple choice)		
Alphabet	12	26.09
Word	21	45.65
Sentence	13	28.26
How many colors do you want in one word or in one sentence?		
None(black)	0	0
One	4	13.33
Two	13	43.33
Three or more	13	43.33
How many sentences do you want in one page?		
One	9	30.00
Two	12	40.00
Three or more	9	30.00
Do you want background music or sound while the child is reading the story?		
Yes	17	56.67
No	3	30.00
Can switch on and off	10	33.33

What kinds of background music or sound do you want in app? (Based on the respondents who answered "Yes" and "Can switch on and off" to question "Do you want background music or sound while the child is reading the story?")		
Instrument	11	40.74
Children's song	15	55.56
Others	1	3.70
What difficulty level do you prefer in quiz section for your children? (multiple choice)		
Easy (Word Level)	15	37.50
Regular (Sentence Level)	14	35.00
Difficult (Paragraph Level)	1	2.50
Changeable among above.	10	25.00
How many questions do you like in the quiz section?		
3-5	21	70.00
5-7	7	23.33
7-9	0	0
More than 9	2	6.67
How many options do you like in one question?		
2	13	43.33
3	12	40.00
4	4	13.33
More than 4	1	3.33
Pictures come with sound		
Strongly disagree	0	0
Disagree	0	0
Neither agree nor disagree	3	10.00
Agree	19	63.33
Strongly agree	8	26.67
Sound for the apps is recorded from the doctors in the clinic since they are professional.		
Strongly disagree	2	6.67
Disagree	2	6.67
Neither agree nor disagree	13	43.33
Agree	10	3.33
Strongly agree	3	10.00
Parents or children can record audio when they read the book.		
Strongly disagree	0	0
Disagree	0	0
Neither agree nor disagree	3	10.00
Agree	22	73.33
Strongly agree	5	16.67
Not so much interaction, focus on the reading.		
Strongly disagree	0	0
Disagree	11	36.67
Neither agree nor disagree	11	36.67
Agree	6	20.00
Strongly agree	2	6.67
The picture will vibrate a little when we touch the pictures.		
Strongly disagree	0	0
Disagree	2	6.67
Neither agree nor disagree	9	30.00
Agree	14	46.67
Strongly agree	5	16.67
The sound should not be too loud or noisy.		
Strongly disagree	0	0
Disagree	1	3.33
Neither agree nor disagree	4	13.33
Agree	15	50.00
Strongly agree	10	33.33
The pictures should not be too bright.		

Strongly disagree	0	0
Disagree	1	3.33
Neither agree nor disagree	3	10.00
Agree	19	63.33
Strongly agree	7	23.33

In the requirement part, firstly, the app should at least suit the Android version 4.2.2 from the result.

The second is the content design requirements of the ISB, most of the respondents require the ISB as a picture story book with two sentences in one page. For the voice requirement part, the app should be at word level with female adult or children's voice, for the color requirement part, two or more colors should be designed in one word, for the music requirement part, the switchable children's song should be used as the background music and for the quiz part in the app, the quiz should be easy with 3-5 questions and 2 or 3 options in every question.

The last is the part of some functions of designing the app which is a question based on a 5-point Likert scale. According to the average evaluation on the options the respondents agree that pictures come with sound (4.17). The respondents agree that sound for the app is recorded from the doctors in the clinic since they are professional (3.33).The respondents agree that parents or children can record audio when they read the book. (4.07). The respondents disagree that not so much interaction, focus on the reading (2.97). The respondents agree most of the ideas.

Especially for the questions designed for the speech-language therapy work, the respondents agree that the picture will vibrate a little when we touch the pictures (3.73). The respondents agree that the sound should not be too loud or noisy (4.13). The respondents agree that the pictures should not be too bright (4.06). These results mean that the pictures should vibrate a little when we touch the pictures so that the app satisfy the requirement for the attention. The sound is not too loud or noisy so that the app satisfies the requirement for the comprehending and the picture should not be too bright so that the app satisfy the requirement for the brightness of the pictures. According to the result, the parents and children have accepted all the ideas of design for the speech-language therapy.

Finally, in the last two open questions, the respondents have given so many suggestions about the content, design and the functionality. They are listed here as the references as follows (all the contents are recorded according to the handwriting):

The opinion of the app they have used before in terms of:

Content (for example, the pictures. sound and words):

i. Content should focus on children's age; quality picture should be used.

ii. Pronunciation is not too quick, pictures are very interesting.

iii. Interactive picture with sound.

iv. the quality of the sound is good and clear.

v. Parents can select the content for children by the pre-introduction.

vi. the content should be more colorful and display in a unique way, such as the alphabet "a" is made up from a worm with eyes.

vii. Good pictures. Fancy sound and words.

viii. Simple and easy to use.

ix. Attractive and interactive pictures.

Design (for example, the button should be obvious enough for the children to recognize)

i. The app should be recognizable and suitable for child.

ii. The most important items are shown at first.

iii. The contents are not too crowded.

iv. Color of the button should be brighter.

v. Buttons can be made with smiley.

vi. More interactive games.

Functionality (for example, the way to have the children focus or to remember easily)

i. Pronunciation should be much clearer.

ii. Simple pictures and sentences.

iii. Interesting graphic images.

iv. not too long sentences

v. Easy to understand.

vi. Include video. Have various cartoon choices.

vii. The size of the letters can be changed.

Others

i. Make the app for children to make painting or some art.

Recommendations to make this app more appealing:

i. Colorful pictures, moving pictures.

ii. Teach young kids to sing songs.

iii. Font of the texts needs to be improved.

iv. with popular cartoon characters, nowadays

v. The background music can be more enjoyable.

vi. More interactive.

vii. The picture can make sounds when touch, for example, the cat make sound" meow" before catching the fish.

Based on the results and discussions from table 1, table 2 and table 3, the requirements of the ISB as a speech-language therapy tool are got for the children who have language delay by using the questionnaire as follow in Figure 3:

Android version: The app at least suits the Android version 4.2.2.

Content design

Voice:
i. Female adults or children's voice
ii. Slow and clear voice

Colors:
i. Two or more colors in one word
ii. Attractive colors
iii. Bright colors for the buttons

Music:
i. Children's song as the background music
ii. Switchable background music
iii. Enjoyable music

Quiz:
i. 3-5 questions in the quiz
ii. 2 or 3 options in every question
iii. Easy questions

Function design

Normal function design:
i. The pictures come with sounds.
ii. The sound for the app is recorded from the clinic since they are professional.
iii. The parents and the children can record audio when they read the book.
iv. The app should be interactive.

Special design for the speech-language therapy:
i. The pictures will vibrate a little when we touch the pictures.
ii. The sound should not be too loud or noisy.
iii. The pictures should not be too bright.
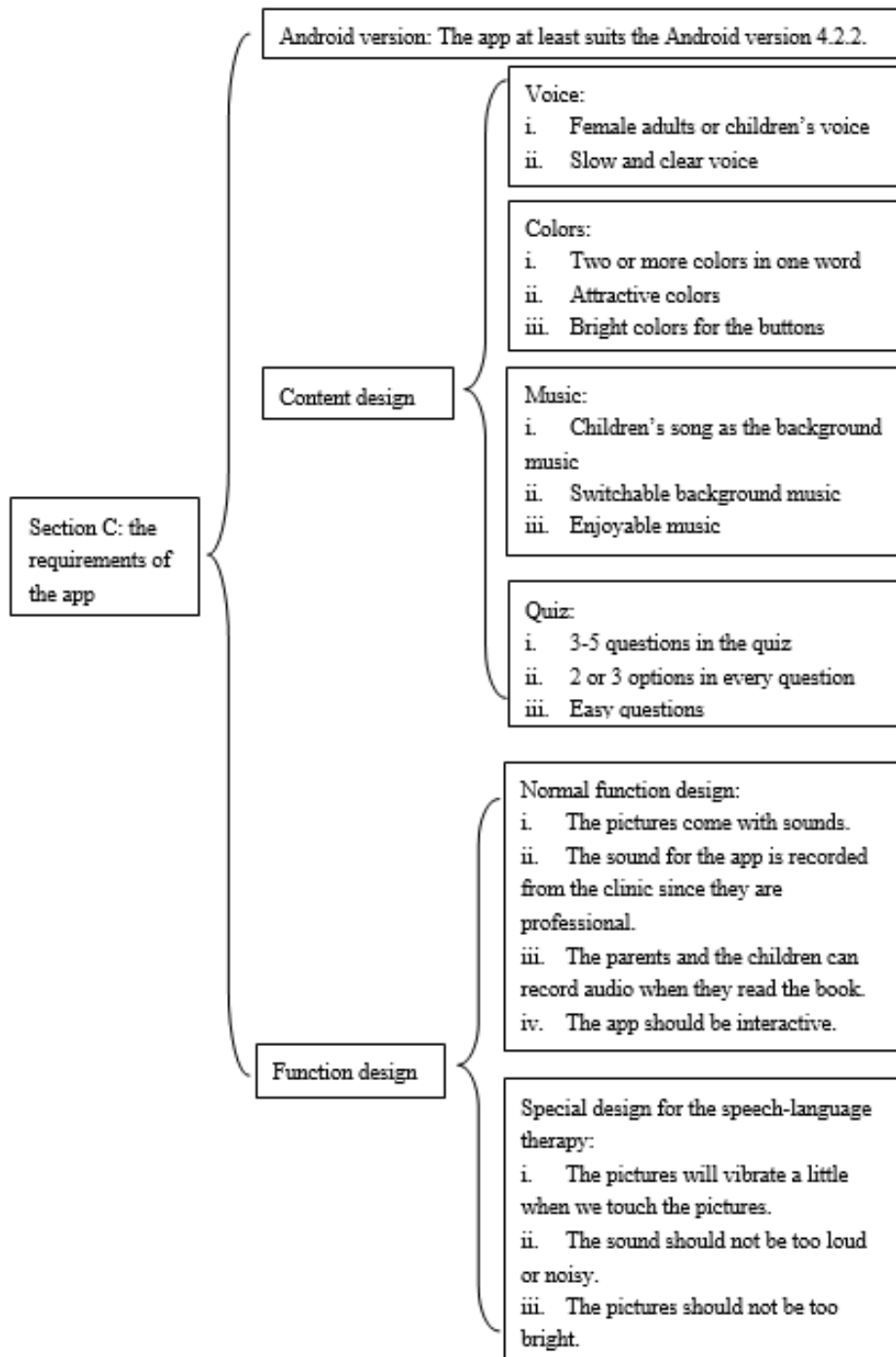
Section C: the requirements of the app

FIGURE 3. The requirements of the app

Seen from the result of the requirement, the app that can suit the Android version 4.2.2. or above will be designed. The structure of the book will be divided mainly into 3 parts: the part of the storybook for the sentences, the part of the quiz and the part of the children's songs. For the requirement of the content, the app will be developed more like a picture story book, so all the words, sentences will be pictures. There will be one or two sentences in one page. For the voice, the female adult or children's voice will be used for the development. For the color, since the words in Bahasa Malaysia can be separated into different phonemes, two or more colors will be used in one word to mark the phonemes. For the music, the switchable children's song will be used as the background music. For the

quiz, the question in the quiz part will be 3 to 5 questions and 2 or 3 options in every question. And the normal functions and the functions designed especially for the speech-language therapy will be delivered so that the app satisfies the requirement for the attention, understanding and the brightness of the pictures. Finally, the suggestions from the open questions which are mainly about the content, design and the functions will be delivered.

Since after getting the practical requirement from above and the development of the ISB based on the requirement for children with language delay in Bahasa Malaysia, the children whose first language is Bahasa Malaysia can be instructed with correct speech-language therapy method at home at any time. It is more practical than the manual speech-language therapy and computer speech-language therapy methods.

CONCLUSION

As the SLPs explained, apps for children with language delay, particularly whose first language is Bahasa Malaysia is limited, and many of the developed ISB suffer from a lack of practical experience with children. The study has listed the requirements of ISB as a speech-language therapy tool for the children who have language delay. A practical ISB can be developed in Bahasa Malaysia combining the practical requirements from the SLPs, patents and children so that the speech therapy work can be conducted at home. In order to further refine the findings of this study, future studies on the requirements of the ISB for the children with language delay can be carried out with the respondents who are chosen to represent the experts and patients in Malaysia. Besides, new technology about AR (augmented reality) and VR (virtual reality) are developing rapidly in computer science and technology, they have been used widely in different area, the combination of AR or VR technology with the educational content creates new type of automated applications and acts to enhance the effectiveness and attractiveness of teaching and learning for students in real life scenarios. Thus, the future study can also try to combine the speech-language therapy methods with the AR or VR technology.

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