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Vowel Screening Application

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Abstract

The present study aims to investigate the index of item objective congruence Vowel Screening Application for children aged between 2 - 3 ½ years old. Theprocedures of the application development are as follows; 1) studying and data collection, 2) selecting words with vowel sounds in Thai language, 3) designing the application, 4) developing and implementing the application, 5) evaluating the index of item objective congruence in terms of techniques and contents and 6) testing face validity The result of the study revealed that the index of item objective congruence of the designed application covered the techniques (IOC) = 0.93 and the contents (IOC) = 0.88. The result of the implementation was used to improve the application usage in the future. The Vowel Screening Application for children aged between 2 - 3 ½ years old was considered to be suitable in screening vowel sounds translation for both normal children and children with cleft lip and cleft palate.

Introduction

Vowel sound is the sound that babies are able to pronounce before consonant sound and intonation markers. When babies pronounce vowel sound, the organ used for pronunciation or which level of tongue is used cannot be identified since the articulator is not closed. According to the problem, Daniel Jones invented the cardinal vowel which is a set of standard reference vowels used by phoneticians in describing the sounds of language. The mentioned sounds consisted of 8 primary cardinal vowel sounds. Pronunciation is mainly produced from tongue and lips. The movement of the tongue depended on each vowel sound (Thaweesak, 1999).The different sound of vowel is caused by the movement, position of tongue, lips and vibration of vocal cords. There are 2 types of vowel as follows; Monophthongs are a single sound that are produced when the tongue and lips are in the same position. There are short vowels, though there are also some long vowels monophthongs as well (Prathanee, Lorwatanapongsa, Anuntapong, Buakanok, 2011a). Diphthongs are a single-syllable vowel sound in which the beginning of the sound glides to another slightly different vowel sound. For this reason, diphthongs are often referred to as "gliding vowels".

Table 1 : Monophthongs vowels (Prathanee, 2014)

Lip Position	Unrounded				Rounded	
Tongue Position	Front		Central		Back	
	Short vowels	Long vowels	Short vowels	Long vowels	Short vowels	Long vowels
High	ɪ	iː	əɪ	əɪː	ʊ	*uː*
Mid	e	eː	ə	ɜː	o	*oː*
Low	æ	æː	ɑ	ɑː	ɔ	*ɔː*

The change of sound producedby a single-syllable vowel, for example ɪɑ, consist of ɪ and ɑ. It is unrounded front high (ɪ) and central low (ɑ). Vowel sounds are produced by every syllable. Thus if there are children with speech impairment, vowel sounds should be first practiced. Children with cleft palate always face problem with their organ of speech and sometimes hearing problems. It affected in the delay of phonological development and compensatory articulation disorders before wording of speech (Prathanee, 2014). The operation of lip and cleft palate is considered to be the first treatment, in order to gain facial appearance which similar to normal children. However, after the operation, the children still have articulation disorders (88.56% 95 % confident interval = 84.47-92.65%) and delayed language development which requires therapy immediately (Prathanee, Thanawiratananit, & Thanawiratananit, 2013). The adoption of information technology in education encourages the learners' motivation and interests. Learners are able to access at any time that they feel comfortable to learn. Information technology may consist of audio visual for example songs, stories, or motion pictures which encourage learners to visualize vivid pictures (Radesky et al., 2016). Audio visual assisted in the correction of speech for children with cleft lip and cleft palate. It is an alternative method for speech therapy because it affects the speech development for a short period of time together with language development. This can be implied that early therapy and development should be considered (Del Carmen Pamplona, Ysunza, & Morales, 2017). According to the aforementioned information, the researcher intends to develop the application in screening vowel sound translation for children with articulation disorders within normal children and compensatory articulation disorders of children with cleft lip and cleft palate or children with special need of speech impairment.

Objectives

The present study aims to investigate the index of item objective congruence of the application in screening vowel sound translation for children aged between 2 - 3 ½ years old.

Sample

Five normal children aged between 2 - 3 ½ years old who had been to Nongkung child development center located in Sila sub-district, Mueang Khonkaen district, Khohkaen province. They were selected by purposive sampling andpossess sound development in all aspects.

Two children with cleft lip and cleft palate aged between 2 - 3 ½ years old who had registered with center of cleft lip and cleft palate at Srinagarind hospital in Khohkaen province. They were selected by purposive sampling.

Procedures

The present study was ensured by the center for ethics in human research, Khon Kaen University, No. HE63117 of 26th May 2020.

Research instrument

The research instrument of this study is / was the application in screening vowel sound translation. There were procedures of development quality

assessment as follows; Studying and data collection, Selecting words with vowel sounds and designing the manual, Designing the application, Developing and implementing the application, Evaluating the index of item objective congruence in terms of techniques and contents, Testing of face validity.

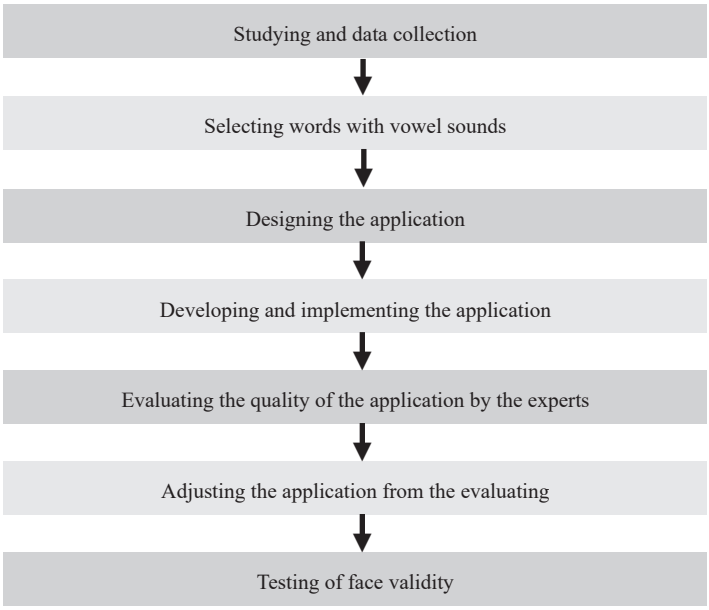

Figure 1: Procedures of research instrument development

Study Design:
The development application in screening vowel sound translation was intended for children with cleft lip and cleft palate after the operation who aged between 2 - 3 ½ years old. The researcher studied the document and studies related to the screening vowel sound translation for children with cleft lip and cleft palate in order to develop the application (Thaweesak, 1999; Prathanee, 2011b; Prathanee et at., 2011b; Prathanee et al., 2013; Prathanee, 2014).

Table 2 : Monophthongs vowels (Prathanee, 2014)

Vowel sounds		
ɑ:	ɜ:	ɪu
i:	iɑ	ʊ: i
əɪ:	uɪɑ	ui
u:	uɑ	o: i
e:	e: u	ↄi:
æ:	ɜ: u	iɑu
o:	a: i	uɪɑi
ɔ:	a:u	uɑi

Selecting words

After the process of studying and data collection, frequently used words in daily life that were seen in the books and word lists for kindergarten and primary students were selected (Ministry of Education, 2001), (Whanset, 2009), (Prathanee et al., 2011a). The words were selected to be drawn into pictures in accordance with the vowel sounds, as shown in table 3.

Table 3 : Word lists with vowel sounds

Vowel sounds	Word	Vowel sounds	Word
ɑ:	Ta	e: u	Aeo
i:	Whi	ɜ: u	Maeo
əɪ:	Mu	a: i	Yai
u:	Hu	a:u	Khao
e:	Ped	ɪu	Niu
æ:	Kae	ʊ: i	Ngoei
o:	So	ui	Khui
ɔ:	Kho	o: i	Aoi
ɜ:	Doen	Ɔi:	Hoi
iɑ	Lia	iɑu	Khieo
uɪɑ	Sua	uɪɑi	Luai
uɑ	Wua	uɑi	Kluai

Designing the application

In accordance with the selected information in creating the application, Adobe Photoshop was adopted to design the application.

Developing and implementing the application

Android Studio, Java and xml were used to develop the application in screening vowel sounds translation for children aged between 2 - 3 ½ years old on Android operating system. After the development process, the researcher tested the application, in terms of objectives and content, which covered 24 words exercise. Then, the application was evaluated by the experts.

Evaluating the index of item objective congruence

There were 3 experts who evaluated the application. Each expert specialized in related fields of study, consisting of special education, language and speech, technology and information. The experts assessed the quality and the index of item objective congruence with the criteria as follows.

Congruent + 1
Questionable 0
Incongruent - 1

Face validity testing

The test was distributed to the normal children by teacher and to the children with cleft lip and cleft palate by the parents. The procedures of the test were as follows;

First, the children were asked “What is this picture?”, if they are able to answer and pronounce the word clearly, put (✓) in the “correct” space of “told by themselves”. If children pronounce the word unclearly, put (**X**) in the “correct” space of “told by themselves”.

If the children are unable to answer, wait for 5 minutes and then give them a clue (follow the manual). If the children are able to answer and pronounce the word clearly, put (✓) in the “correct” space of “told by themselves”. If children are able to answer but pronounce the word unclearly, put (**X**) in the “correct” space of “told by themselves”.

If the children are unable to answer, the testers will turn on the voice and allow the children to repeat by following the sound. If the children are able to repeat and pronounce the word clearly, put (✓) in the “correct” space of “repeated the sound”. If children

are able to repeat but pronounce the word unclearly, put (**X**) in the "correct" space of "repeated the sound".

Data analysis

The researcher analyzed the data gained from the evaluation by the experts. The index of item objective congruence of application in screening vowel sound translation for children aged between 2 - 3 ½ years old was also analyzed by using the formula as follows (Siljaru, 2017);

$$IOC = \frac{\Sigma R}{N}$$

ΣR = the total of score

N = the number of the experts

The scores from the experts were calculated the index of item objective congruence as shown in the table below;

Table 4: The results of evaluation the application by the experts (Technical aspect)

Items	Experts			IOC	Results
	1	2	3		
Content and processing					
Congruence of contents and objectives	+1	+1	+1	1.0	Congruent
Amount of contents	+1	+1	+1	1.0	Congruent
Motivational contents	+1	+1	0	0.6	Congruent
Figures and Language					
Correctness of figures presented	+1	+1	+1	1.0	Congruent
Size and clearness of figures	+1	+1	+1	1.0	Congruent
Figures illustrated	+1	+1	+1	1.0	Congruent
Language correctness	+1	+1	+1	1.0	Congruent
Alphabet and color					
Format of alphabet used	+1	+1	+1	1.0	Congruent
Size of alphabet used	+1	+1	+1	1.0	Congruent
Background color	+1	+1	+1	1.0	Congruent
Color of figures and graphic	+1	+1	+1	1.0	Congruent
Position and size of Icon and menu	+1	0	+1	0.6	Congruent
Title					
Title presentation	+1	+1	+1	1.0	Congruent
Screen designing	+1	+1	+1	1.0	Congruent
Interest of the title	+1	+1	0	0.6	Congruent
Using on Smart phone					
Friendly use	+1	+1	+1	1.0	Congruent
Appropriateness of media	+1	+1	+1	1.0	Congruent
Encouraging learning	+1	+1	+1	1.0	Congruent
Total				0.93	Congruent

Table 5: The results of evaluation the application by the experts (Content aspect)

Items	Experts			IOC	Results
	1	2	3		
Content and processing					
Correctness of contents	+1	+1	+1	1.0	Congruent
Congruence of contents and objectives	+1	+1	+1	1.0	Congruent
Amount of contents	+1	+1	0	0.6	Congruent
Steps of presentation	+1	+1	+1	1.0	Congruent
Correctness of contents description	+1	0	+1	0.6	Congruent
Interest of contents	+1	+1	0	0.6	Congruent
Appropriateness of contents and level of user	+1	+1	+1	1.0	Congruent
Figures and Language					
Correctness of figures presented	+1	+1	+1	1.0	Congruent
Amount of figures and contents	+1	+1	0	0.6	Congruent
Size of figures	+1	+1	+1	1.0	Congruent
Volume of sound	+1	+1	+1	1.0	Congruent
Clearness of sound	+1	+1	+1	1.0	Congruent
Language correction	+1	+1	+1	1.0	Congruent
Excises					
Appropriateness of excises conclusion	+1	+1	+1	1.0	Congruent
Appropriateness of excises	+1	+1	+1	1.0	Congruent
Using smart phone for excises	+1	+1	0	0.6	Congruent
Total				0.88	Congruent

Table 6: The results of screening vowel sound translation of tryout group

Type of children	Results			
	Age	Score of telling by themselves	Score of repeating the sound	Total
Normal	3 Y/ 4 M	20	4	24
Normal	3 Y/ 5 M	22	2	24
Normal	2 Y/ 6 M	18	6	24
Normal	2 Y/ 0 M	9	15	24
Normal	2 Y/ 6 M	16	8	24
Cleft lip and cleft palate	2 Y/ 11 M	17	7	24
Cleft lip and cleft palate	2 Y/ 8 M	17	7	24

*Note:
Y= Years old
M= Months old

Table 7: Percentage of figures which children are able to answer

Words	No. 1 3Y/ 4 M	No.2 3Y/ 5 M	No. 3 3Y/ 6 M	No. 4 2Y/ 0 M	No. 5 2Y/ 6 M	No. 6 (Cleft lip and cleft palate) 2Y/ 11M	No. 7 (Cleft lip and cleft palate) 2Y/ 8 M	Percentage of correct answer	Percentage of correct answer after giving clue	Total	Percentage of correct answer after repeating
Ta	✓	✓	✓	✓	✓	✓	✓	100	0	100	100
Whi	✓	✓	✓	X	X	✓	✓	71	29	100	100
Mu	✓	✓	✓	✓	✓	✓	✓	100	0	100	100
Hu	✓	✓	✓	✓	✓	✓	✓	100	0	100	100
Ped	✓	✓	✓	X	✓	✓	✓	85	15	100	100
Kae	✓	✓	✓	✓	✓	X	✓	85	15	100	100
So	X	✓	✓	X	X	✓	✓	57	43	100	100
Kho	✓	✓	✓	✓	✓	✓	✓	100	0	100	100
Doen	✓	✓	X	X	X	✓	X	42	58	100	100
Lia	X	✓	X	X	X	X	X	14	14	28	100
Sua	✓	✓	✓	✓	✓	✓	✓	100	0	100	100
Wua	✓	✓	✓	X	✓	✓	✓	85	15	100	100
Aeo	✓	✓	X	X	✓	X	X	42	28	70	100
Maeo	✓	✓	✓	X	✓	✓	✓	85	15	100	100
Yai	✓	✓	X	✓	✓	✓	✓	85	15	100	100
Khao	✓	✓	✓	✓	✓	✓	✓	100	0	100	100
Niu	✓	✓	✓	X	X	✓	✓	71	29	100	100
Ngoei	X	✓	X	X	X	X	X	14	14	28	100
Khui	X	X	✓	X	X	X	X	14	14	28	100
Aoi	✓	X	✓	X	✓	X	X	42	28	70	100
Hoi	✓	✓	✓	X	✓	✓	✓	85	15	100	100
Khieo	✓	✓	✓	X	✓	✓	✓	85	15	100	100
Luai	✓	✓	X	X	X	X	X	28	0	28	100
Kluai	✓	✓	✓	✓	✓	✓	✓	100	0	100	100

*Note Y= Years old, M= Months old

Results

The result of the application evaluation by the experts reflected that the index of item objective congruence on technical aspect was 0.93, which indicated that there was the congruence of technical aspect as shown in table 4. The index of item objective congruence on content aspect was 0.88, implying that there was the congruence of content aspect as shown in table 5. The result of screening vowel sound translation of tryout group consisted of 7 children. There was 60 percent of some words in which the children were unable to pronounce.These mentioned words consisted of Lia, Ngoei, Khui and Luai as shown in table 6.

Discussion

The results of the application for Vowel Screening for normal children and children with cleft lip and cleft palate aged between 2 - 3 ½ years old, which was evaluated by 3 experts, revealed that there was the congruence on content aspect at 0.88. The results were in accordance with Surathamjanya (2015) who studied the result of using application for teaching English vocabulary on tablet in English subject for Prathomsuksa 2 students under Ratchaburi Educational service area office 2. The result of the study showed that there was the index of item objective congruence on content aspect at 0.87. The index of item objective congruence on application aspect was 0.93. The result of face validity testing on screening vowel sound translation of tryout group that consisted of 7 children, showed that there were 60 percent of some words which the children were unable to pronounce consisted of Lia, Ngoei, Khui and Luai. These words were considered difficult words for children aged between 2 - 3 ½ years old. The researcher investigated the word lists for kindergarten and primary students (Ministry of Education, 2001), (Ministry of Public Health, 2003), (Whanset, 2009), (Prathanee, et. al., 2011a) and found that the vowel sounds of the problematical words were abstract words. So children faced the difficulty when drawing pictures by following the words. However, when allowing children to listen to the sound and repeat, they were able to pronounce the words correctly. Hence, those words were still kept in the application.

In conclusion, the researcher designed the application in screening vowel sound translation for normal children and children with cleft lip and cleft palate aged between 2 - 3 ½ years old by selecting the vowel sound word lists in Thai language. The application was applicable for parents who intended to practice vowel sound translation for children aged between 2 - 3 ½ years old effectively.

Limitation

The application was designed for screening vowel sound translation for normal children and children with cleft lip and cleft palate, in term of basic words that contained only one word context. Hence, the evaluation of vowel sounds translation could screen only one word context. If the result of the screening shows that children are able to pronounce the words clearly, it means the children are able to pronounce the particular word. On the other hand, if children unable to the particular word unclear, there should be additional consultation among the experts and parents.

Suggestion

There should be the further study of the application for screening vowel sound translation for normal children and children with cleft lip and cleft palate. If the children are unable to pronounce any word unclearly, there should be cooperation of the experts and the speech-language pathologist to assess by using the standard evaluation.

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