

Evaluation of the Mobile Learning Applications That Can Be Used to Develop English Language Skills Among Students With Blindness in the Inclusive Class

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Abstract

This study aimed to Evaluate the Mobile Applications that can be used in the inclusive classroom to teach and enhance English language skills among students with blindness. Analytical research design was employed in the current study. Using specific key words and criteria a total of 64 Voice Recognition software (VRS), 31 Optical Character Recognition Software (OCR), 34 Text to Speech software (TTS), and 59 e-Dictionaries available in android platform from January to August 2021 were analysed using accessibility and usability checklist prepared by the authors. The tool's validity and consistency were gained through Experts' good judgment and following inter-rater reliability method. The findings of the study revealed that, Google Assistant, Google Translator, SayHi Translator, and Talking Translator were ranked first among the VRS and e-Dictionaries, so they are considered as the best VRS and e-Dictionaries available in android platform that can be used to develop vocabulary and speaking skills among students with blindness. Whereas, Scanner Go, Clear Scanner, vFlat, Documents Scanner, Google Lens and Fast Scan Apps were ranked first among the OCR software. However, T2S, @Voice, Google Lens, and TTS Reader Apps were ranked first among the TTS Apps and considered as the best free TTS Apps available in android platform. Therefore, they are highly recommended to be used by general teachers in the inclusive settings to compensate the lack of special technology, adapt the English subject curriculum for blind students, and enhance the students' self-learning and participation in the English class.

Key words: mobile, applications, English, language, blind, visual impairment.

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Introduction

Mobile learning technologies become alternative way of learning to foster knowledge creation, skills development for learners (Akci, 2018). It promises more equitable access to education, especially to those who have suffered exclusion for any reasons including blind students (Kukulska-Hulme, 2012).

With the presence of inclusive education philosophy, students with blindness get the opportunity to study under the same roof with their sighted peers sharing the same resources and technology. This adds extra responsibility on English teachers who are not aware about the specific needs of such students and their special technology. This scenario requires students with blindness to be able to use equipment designed for the general public!

Many research such as Rukwaro Ndung'u (2011), Josua (2013), Maar (2015), Bilal (2017), Johnson-Jones (2017), Otyola et al. (2017), and Kapur (2018) proved that students with blindness who are enrolled in the inclusive schools experience many challenges in learning language skills such as reading and writing. The study done by Ghafri (2015) revealed that students with blindness face difficulties in all four English language skills including reading, writing, listening and speaking, whereas writing and reading being the most challenging when comparing to their sighted peers. Such difficulties are influenced by number of factors that have interactive negative effects on language development among students with blindness and can be explained as following:

English Braille transcript: English does not have phonological symbols in Braille (Maar, 2015). It confuses students with blindness when it is learnt as a second language (Christidou, 2016). Its word/sentence is not observable as a full form and in association with other word/sentences while reading (Ghafri, 2015; Christidou, 2016).

Shortage in resources/adaptive technology: Aryanti (2014), Kocyigit & Artar (2015) and Zorlufl Ozer & Cavaroglu (2018) revealed that there is a shortage in the resources and adaptive technology in the inclusive English Class, whereas the textbooks have major accessibility problems (Ghafri, 2015; Kocyigit & Artar, 2015; Christidou, 2016). Moreover, Malinovska & Ludikova (2017) ensured that the available technologies are not used, not available beyond the

campus, or not suitable for inclusive settings as it creates lot of noise. Therefore, students with blindness tend to use the same course materials as their classmates. And teachers use sight-based lessons and visual Teaching Learning Materials (TLM) in high level (Christidou, 2016). Despite of that, even audio books are not available at all, and other specialized AT/systems are expensive (Kaur, 2018).

Unqualified teachers and students' poor competency skills which made the teaching of blind students in a regular classroom stand out as a “challenge” (Kocyigit & Artar, 2015; Malinovska & Ludikova, 2017). This situation made the teachers not able to meet the specific needs of blind students or make use of the available AT. Therefore, teachers prevalently use audio-visual aids in high level and depend on traditional grammar-translation technique and/or other rigid strategies which might not be suitable for students with blindness (Aryanti, 2014; Ghafri, 2015; Christidou, 2016; Kaur, 2018; Nasution, 2019).

Therefore, it is summarized that the majority of students with blindness do not use proper literacy medium and have problems in the most demanding skills including reading, writing, speaking, spelling and vocabulary learning.

Adversely, the inclusive mobile Apps facilitate many forms of communication and may create possible solutions for these challenges as they do not require any special training, available everywhere free of cost, and have significant role in curriculum adaptation which enable students with blindness to perform different activities in the English class including reading, writing, speaking and vocabulary learning. Therefore, students with blindness can take advantage of a large number of effective mobile software and their accessories such as Bluetooth/OTG keyboards, voice recognition VRS, screen reading, voice recording, optical character recognition OCR, text to speech and e-dictionaries, which are designed for general users, taking the help of the accessibility features which being added to most of the smartphones that made students with blindness have tools that support their specific needs, of which their teachers might not even be aware.

Rationale of the study

As inclusive mobile Apps that facilitating many forms of communication continue to emerge and constantly evolving, they may create possible solutions for many problems occur in the presence of students with blindness in the inclusive English class and enable them to perform many language activities. But, because these Apps designed with different features, most of them encounter a number of different accessibility and usability issues which made them not suitable for all diverse students (i.e. students with blindness). Therefore, the suitable Apps for such students should be highlighted and used. Thus, assessment of such Apps should be made to identify their accessibility and usability features, design errors, and suggest using the best. Moreover, such evaluation will save the time for both students and teachers, make them more aware about the best available Apps that can be used for English language learning, and will create better access to information in future by making evaluation-based suggestions for developers who make the necessary remedies solutions.

Research Questions

1. What are the best mobile VRS applications available in android platform that help to develop English speaking skills among students with blindness?
2. What are the best OCR applications available in android platform that can help teachers to adapt the English curriculum to students with blindness?
3. What are the best TTS applications available in android platform that help teachers to adapt the English language curriculum and develop speaking, listening and reading comprehension among students with blindness?
4. What are the best mobile Dictionaries available in android platform that can be used to enhance vocabulary learning among students with blindness?

Operational Definitions

- ***Mobile Applications (Apps)***

In this current study, Mobile Apps refer to the Voice Recognition software (VRS), Optical Character Recognition Software (OCR), Text to Speech software (TTS), and electronic Dictionaries available in android platform.

- ***Students with Blindness***

Students with blindness refers to the students who have one of the following conditions (1) total absence of sight; or (2) visual acuity not exceeding 3/60 (Snellen chart) in the better eye with best possible corrections; or (3) limitation of the field of vision subtending an angle of less than 10 degree from the point of fixation (RPwD Act-2016).

Methodology

Research Design

Analytical research design was employed in this study.

Selection Procedures

In order to determine the current available applications and analyse them, an electronic search for the VRS, OCR, TTS and the e-Dictionaries available in android platform (Google play store) of India was conducted between the period from January to August 2021 using the following search terms (i.e. OCR, Character recognition, Scanner, Speake and hear, Voice Translator, Translator, Dictionary, Voice writing, speak and write/translate, Voice commands, TTS, Text to voice, text to speech, text to MP3, Narrator, Text read, VRS, voice recognition). The Apps under inclusive criteria were analysed using a checklist.

Inclusion Criteria:

Application must meet the following criteria to be involved in the analysis:

1. The App should be rated 4 stars or above by the public users.
2. It should be free of cost.
3. App should be under VRS, OCR, TTS or Dictionaries.

Exclusion Criteria:

Trail version Apps are excluded from the analysis.

Tool of the Study:

In order to attain the objective of the present study, accessibility and usability checklist prepared by the researchers was used to evaluate the mobile Apps.

Steps of Constructing the Tool

The items of the checklist were gathered from previous literature and open questions. And, they were judged by nine experts in the field. Then, *Inter-rater reliability* method was used to test the reliability of the checklist. Four Apps were evaluated by two raters, and high level of agreement was gained which was (VRS=89%, OCR=94%, TTS=92% & Dictionaries=97%) and proved the consistency of the checklist across raters.

Data Analysis

Quantitative data analysis was conducted in the study using simple measures.






Results and discussion

I. Analysis and Interpretation of Research Question 1

Q1. What are the best mobile VRS applications available in android platform that help to develop English speaking skill among students with blindness?

To answer this question, a total of 64 VRS Apps were analysed/evaluated using Accessibility and Useability Checklist. And based on the evaluation, the best accessible and usable VRS Apps are presented under:

Table 1: The Best Mobile VRS Apps Available in Android Platform

N	Item					
		PDF VTT. TTV.	Google Translator	Google Assistant	SayHi Translator	Talking Translator
1	Supports both Indian and British English accents and gives feedback in pleasant voice.	2	2	2	2	2
2	Has very simple shortcuts/or support voice commands that made it easy to be used by blind person.	1	1	2	1	1
3	Has good accuracy level, no missing words.	2	0	2	0	2
4	Gives clear feedback for the blind user.	1	2	2	2	2
5	Detects the spoken language automatically.	0	2	2	0	0
6	Speed of the voice while reading the text can be adjusted.	2	2	2	2	0
7	Gives immediate response.	0	2	2	2	2

8	Can recognize more than one word or a sentence in the same time.	2	2	2	2	2
9	Free from Ads and other distractions.	2	2	2	2	2
Total		12	15	18	13	13
Rank		4	2	1	3	3

*Rating weightage (0, 1 & 2)

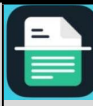



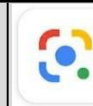
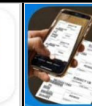
From Table (1), it is noted that the Google Assistant, Google Translator, SayHi Translator, Talking Translator, and PDF Voice to Text Text to Voice have got the highest scores representing the first four ranks among 64 VRS Apps respectively. Therefore, they are considered as the most effective VRS Apps that can be used by students with blindness and their teachers in the inclusive English class to practice and participate in speaking activities and develop speaking skills.

II. Analysis and Interpretation of Research Question 2

Q2. What are the best OCR Apps available in android platform that can help teacher to adapt the English curriculum for Students with Blindness?

To answer this question, a total of (31) OCR Apps were analysed using Accessibility and Useability Checklist. And based on the evaluation the best available Apps are presented under:

Table 2: The Best Mobile OCR Apps Available in Android Platform

N	Items						
		Scanner Go	Clear Scanner	vFlat	Document Scanner	Google lens	Fast Scan
1	Supports English language.	2	2	2	2	2	2
2	All the recognized words in the same original order.	2	2	2	2	2	2
3	Does not miss words or made spelling errors.	2	1	2	2	2	2
4	Links the sentence that is distributed to different lines in the original picture.	0	0	0	0	0	0
5	Can recognize punctuation marks and the letters in their original status.	2	1	2	2	2	2
6	Not complicated.	2	2	2	2	2	2
7	Ads free.	0	2	2	0	2	0
8	High speed of recognizing the text.	2	2	2	2	2	2
9	Can recognize different fonts.	2	2	2	2	2	2
10	Can recognize hand writing.	2	2	2	0	2	0

11	Recognizes text from the camera.	2	2	2	2	2	2
12	Recognizes text from gallery picture/album.	2	2	2	2	2	2
13	Creates text file, allow saving, copying or exporting the text file into readable electronic documents.	2	2	2	2	2	2
14	Can recognize different colors of the fonts.	2	2	2	2	2	2
15	Can enhance the quality of the image before OCR and recognize poor quality photo.	2	2	2	2	0	2
16	Can recognize texts from different backgrounds.	2	2	2	2	2	2
17	Can crop and adjust the edges of the photo.	2	2	2	2	2	2
18	Allow editing the text before saving.	2	2	0	2	0	2
Total		32	32	32	30	30	30
Rank		1	1	1	2	2	2

*Rating weightage (0, 1 & 2)



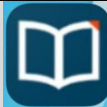


Table (2) shows that Scanner Go, clear scanner, vFlat, Documents Scanner, Google Lens and Fast Scan Apps have got the highest scores representing the first two ranks among (31) Apps respectively. Therefore, they are considered as the most effective OCR software that can be used by teachers to extract the printed material or images and adapt it/ or present it in accessible way for blind students. Such text can be transferred into audio through different Apps or websites (i.e. Text to MP3, TTS, or narrator etc..) which make students with blindness access the English curriculum like their sighted peers of the same school.

III. Analysis and Interpretation of Research Question 3

Q3. What are the best TTS Apps available in android platform that help teacher to adapt the English language curriculum and develop speaking, listening and reading comprehension among students with blindness?

To answer this question, a total of (34) TTS Apps were evaluated using a Checklist. And based on the evaluation the best available TTS Apps are presented under:

Table 3: The Best Mobile TTS Apps Available in Android Platform

N	Item					
		TTS Reader	T2S	Reader	@Voice	Google Lens
1	Produce accurate British-Indian English	2	2	2	2	2

	pronunciation.					
2	Maintain the original sequence of the words.	2	2	2	2	2
3	Free from technical errors or missing words.	2	2	2	2	2
4	Aware about the division of the paragraphs, sentences, and punctuations.	2	2	2	2	2
5	Noise/Ads free.	2	2	2	2	2
6	Allows converting large number of words to audio outputs in the same time.	2	2	2	2	2
7	Reflects the proper tone of reading and emotions.	1	2	2	2	2
8	Support different voice types.	2	2	2	2	2
9	Allow saving and sharing the work in audio format.	2	2	2	2	0
10	Easy to be used.	2	2	2	2	2
11	Can convert text from PDF files, Office files or Image to human voice stream.	0	0	2	2	2
12	Allow repeating and skipping sentences or paragraphs while reading.	0	2	2	2	0
13	Allow user to select a specific text from the paragraph and read it.	2	2	2	0	2
Total		21	24	26	24	22
Rank		4	2	1	2	3

Rating weightage (0, 1 & 2)


From Table (3), it is understood that Reader, T2S, @Voice, Google Lens, and TTS Reading Apps have got the highest scores representing the first four ranks among (34) TTS Apps respectively. Therefore, they are considered as the best free TTS Apps available in android platform which can help the general teachers to transfer the texts into audio form accessible for blind students.

IV. Analysis and Interpretation of Research Question 4

Q4. What are the best mobile Dictionaries available in android platform that can be used to enhance vocabulary learning among students with blindness?

To answer this question, a total of (59) e-Dictionaries were analysed using a Checklist. And based on the evaluation the most accessible free Dictionaries are presented under:

Table 4: The Best Mobile Dictionaries Available in Android Platform

N	Item				
		Google Assistant	Google Translator	SayHi Translator	Talking Translator
1	Has very simple shortcuts/or support voice commands that made it easy to be used by blind person.	2	2	1	1
2	Voice search. Looks up any word/knowledge just by saying it in English or regional language and provides answer in audio format.	2	2	2	2
3	Provides audio output for every alphabet in the word that to support learning the word's spelling.	2	0	0	0
4	Supports British accent and gives feedback in pleasant voice.	2	2	2	2
5	Has good accuracy level, no missing words.	2	2	2	2
6	Gives clear feedback for the blind user.	2	2	2	2
7	Detects the spoken language automatically.	2	2	0	0
8	Can translate and read the equitized voice automatically.	2	2	2	2
9	Speed of the voice while reading the text can be adjusted.	2	2	2	0
10	Allows translation to regional language.	2	2	2	2
11	Gives immediate response.	2	2	2	2
12	Free from ads and other distractions.	2	2	2	2
13	Can translate and pronounce more than one word or a sentence in the same time.	2	2	2	2
14	Gives explanation for the concept in English language and regional language.	2	2	2	2
15	Allows repeated listening to the translated or target word for drill and practice.	2	1	1	1
Total		30	27	24	22
Rank		1	2	3	4

*Rating weightage (0, 1 & 2)

As seen in Table (4) the e-dictionaries named: Google Assistant, Google Translator, SayHi Translator, and Talking Translator have got the highest scores representing the first four ranks among the 59 evaluated e-dictionaries respectively. Therefore, they are considered as the best free e-dictionaries available in android platform which can help the blind students to independently learn vocabulary anytime and anywhere through his personal smartphone searching for word meaning, pronunciation and spelling (i.e. Google Assistant).

Recommendations

Based on the data analysis it is recommended that.

- English language teachers should make use of the inclusive and free android Apps to effectively deliver inclusive learning experiences to as many as diverse students specifically those with blindness who feel disadvantaged while using the traditional technology.
- Apps developers should take into consideration the accessibility and usability features and design inclusive Apps to be used by learners with diverse needs.

Conclusion

To conclude, it is expected of this study to help stakeholders and students with blindness recognize the affordable mobile Apps that can be used for curriculum adaptation and develop English language skills among students with blindness in the inclusive schools in order to ensure effective inclusion. Such technology will also help those students to develop self-learning skills, be ICT exploiter, smarter learner, communicate-participate effectively in inclusive settings, take notes, adapt and read the adapted electronic material and succeed in their studies fairly like other sighted peers. Furthermore, the checklist may help teachers to continue assess and compare the upcoming Apps and select the best accessible once, whereas the suggestions given to developers may help develop the same.

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