Bijak Jawi: An Interactive Multimedia Reading Tool Using Phonic 'Makhraj' Technique for Preschool Children

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ABSTRACT

Reading 'jawi' script using spelling method is not very effective to capture children's attention as this method lacks interactivity and attractiveness. Without a proper reading tool, preschool children might face difficulties in reading 'jawi' during their primary education level. This study proposes the integration of phonics reading technique for 'jawi' with interactive approach help to attract children's interest. Known as 'Bijak Jawi', it implements phonics 'makhraj' as a 'jawi' reading technique for children aged 5 to 6 years old by manipulating multimedia elements in an interactive learning environment. The content of this application is specifically designed to visualize 'jawi' alphabets, phonics 'makhraj', syllables, sentences, and numbers. The usability test with the teachers and heuristic test with experts revealed that the content of the application is well blended with phonics reading technique, multimedia interactive and multimedia elements. It can be concluded that the application is interesting, user-friendly, enjoyable, valuable and supportive.

1. Introduction

Reading is a skill that requires children to absorb the speech signals in their environment and begin producing the spoken language. In the reading process, they learn to decode letters and understand the meaning of each decoded word [1]. Reading *jawi* script is also a similar process as it requires the ability to recognize the alphabets and their specific pronunciation. The pronunciation requires combinations of vowel and consonant characters which are similar to roman letters' reading style.

In recent years, there are many issues and challenges in maintaining the Malay words, including efforts to restore the *jawi* script system as part of communication and reading materials. The government and non-government organizationas (NGOs) are trying to revive the utilization of *jawi* script through educational system and publications [2], as the new generation, especially the Malays, have lack of interest in reading *jawi* script [3]. It is important to encourage them to learn *jawi* at a

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young age to preserve its authentic value and not be forgotten. Therefore, it is crucial to tackle this issue by introducing a learning medium to attract the young generation (pre-school children) to learn *jawi* in an interactive and attractive way.

In order to support the teaching and learning of *Jawi* in pre-school environment, the use of rich multimedia elements is suitable because texts, images, sounds, animations and videos are utilized [4]. The learning approach will be more enjoyable with the use of the different techniques such as phonic reading to pronounce the *jawi* letters. Phonics technique is proven and recommended by National Reading Panel in the U.S. as one of the important features in reading [5]. At school, teachers use Roman letters (*rumi*) to replace the *jawi* which is not a good teaching method for students to learn reading and writing in *jawi* [6]. As a result, children lack motivation to learn *jawi* which then lead to failure in reading the Quran [7]. These children undergo a common reading process that lacks attractive and interactive activities which affect their attention during the learning process. As a result, their basic foundation of reading *jawi* could be affected, leading to other problems in other Islamic subjects such as *Islamic Studies* and *Arabic*. In fact, the government's aspiration of restoring *jawi* literacy for the future generation will be impossible to achieve.

Therefore, this study focuses on designing and developing a reading tool known as "*Bijak Jawi: Siri Bijak Baca*" to assist children in reading '*jawi*'. The idea is to provide better learning strategies by applying phonics '*makhraj*' reading technique, blended with interactive multimedia elements. These learning strategies are implemented using multimedia technology that is specifically designed for preschool children aged five to six years old. The following section discusses the background of the study.

1.1 Jawi and Phonic 'Makhraj'

'*Jawi*' is a cursive script derived from Arabic alphabets which are believed to have been created in the year 1303 or 702 Hijrah. It plays an important role in the spread of the Malay language as well as Islamic religion in South East Asian [8]. However, the usage of *jawi* was condensed after the invasions of western colonial power and changed to Roman letters. In recent years, many issues and challenges have surfaced in the effort to maintain *jawi* which cause less usage and interest in people to use it in their daily life [3].

In addition, some of *jawi* alphabets have been adapted and reproduced to suit the local speech. This adjustment is intended to facilitate teaching and learning process. Ga (ڬ) is introduced based on the letter Kaf (ك), the letter Jim (ج) and Cha (چ) are based on the sounds of the letters Ta (ت) and Jim (ج). *Jawi* consists of six vowel phonemes (/a, e, é, i, o, u /), three diphthong phonemes just like in Malay (/ai, au, oi/) and 27 consonant phonemes (/b, t, s, j, c, h, kh, d, z, dh, r, sy, sh, k, gh, ng, f, p, q, g, l, m,n, w, v, y, ny/) [9].

The phonics reading is the relationship between a specific letter and its sound. It uses the code which is sound-symbol relationship to recognize the words. It is stated that phonics reading is important in early reading programs [10]. Phonics is similar to *makhraj* which focuses on pressure sound in voice pronunciation point that exists in certain Arabic characters [11]. Pronunciation of 'a' represents 'ا', 'b' represents 'ب', 't' represents 'ت' and so on.

1.2 Interactive Multimedia

Today, Multimedia has a wide influence in people's daily lives due to the fast growth of the internet. It is defined as combination of media that uses multiple forms of information content and information processing such as texts, audios, graphics, animations, and videos. Interactive

multimedia learning offers a wide range of interactivity that can facilitate the learning process [12]. Also called the "rich media", it is a non-linear multimedia that responses to the user's action [13]. It refers to materials like digital and analog, which include software programs, applications (apps), broadcast and streaming media, the Internet, and other forms of content. The digital content is purposely designed to facilitate children's learning and to support social engagement with other children and adults. It is useful and usable in a teaching environment as its interactive and rich elements can attract and entertain children during their learning process [13].

2. Methodology

This section describes the activities involved in producing *Bijak Jawi: Siri Bijak Baca* that implements phonics *makhraj* reading in three phases of production activities. Those phases are suitable for e-content production, which comprises pre-production (analysis and design), production (development), and post-production (evaluation) [14,15].

In pre-production phase, the initial activities are to gather information regarding user requirements and learning material specifications, as well as to prepare a storyboard. It requires an iterative process in order to achieve specific user requirements. Upon completion of this stage, the production process took place by converting the low-fidelity design into a working prototype. It involved designing process of user interface, which contains internal design (theme, *jawi* script, actors, buttons, icons, etc.) and producing external contents (phonic audio and phonic visual video) based on the user requirements and learning materials. The refinements of those processes were conducted iteratively until the final version of *Bijak Jawi: Siri Bijak Baca* was completed. The post production activity has been carried out by conducting a usability test with Jawi, al-Quran, Arabic, Fardu Ain (J-Qaf) teachers of primary schools and a heuristic test with e-learning experts. The results obtained from both tests were compared in order to evaluate the prototype from different perspectives. Figure 1 depicts the phases of the production process and their activities.
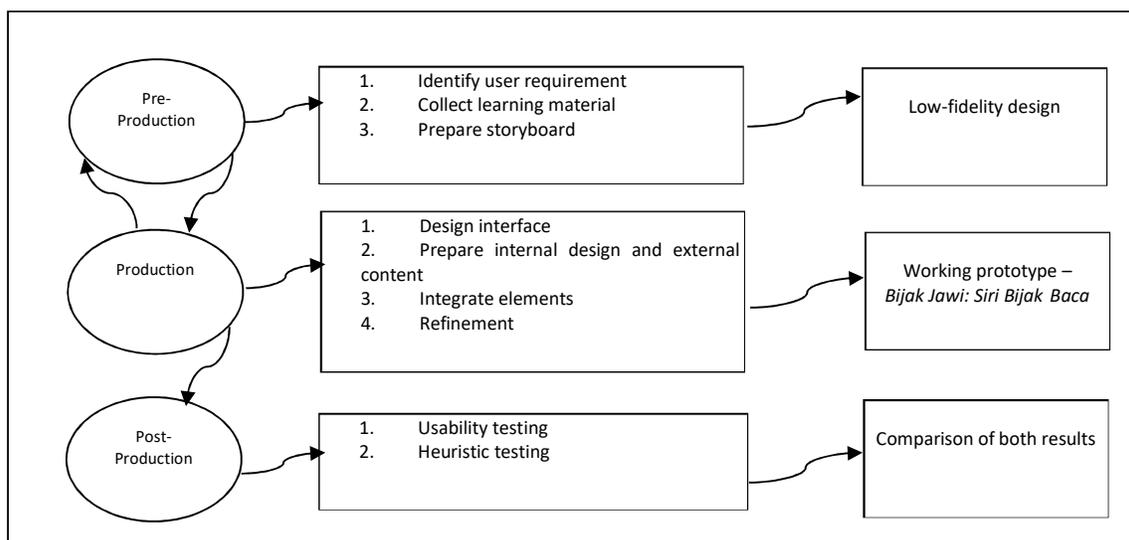
Fig. 1. Production process and activities

3. Phonics Technique and Interactive Multimedia in "Bijak Jawi: Siri Baca Bijak"

This section discusses the implementation of the reading technique and learning approach using interactive multimedia application in *"Bijak Jawi: Siri Bijak Baca".* The main menu consists of two main modules, which are i) "Tutorial" and ii) *"Aktiviti"* (Activity) as depicted in Figure 2.

Fig. 2. Main menu of *Bijak Jawi: Siri Bijak Baca*

The content of tutorial contains "*Pengenalan Fonik*" (Introduction to Phonics), "*Pengenalan Sukukata*" (Introduction to Syllables), "*Pengenalan Perkataan*" (Introduction to Words) and "*Pengenalan Nombor*"(Introduction to Numbers). Each tutorial applies multimedia interactive approach for children to interact actively during the learning session. All *jawi* alphabets in "*Pengenalan Fonik*" are supported with video to visualize the pronunciation in phonic *makhraj*, as shown in Figure 3 and Figure 4. The video will be automatically played once a user clicks to a specific *jawi* alphabet. However, user has full control of the video as it can be replayed and paused. In addition to the video, the screen also contains spellings of the alphabets in *jawi* along with their pronunciation that represented in Roman text.

Fig. 3. *Jawi* alphabet in "*Pengenalan Fonik*"

Fig. 4. Video in phonics tutorial for children to pronounce phonics

The next three submenus in the tutorial section of *"Bijak Jawi: Siri Bijak Baca"* enable the children to learn advanced words and sentences by learning the pronunciation of syllables. They are free to choose any of the listed consonant alphabets. Figure 5 shows "*Pengenalan Sukukata*" tutorial where children can learn syllable pronunciation from selected *jawi* alphabet families. This tutorial focuses on hearing correct pronunciation by highlighting the selected syllable. Meanwhile, Figure 6 depicts the tutorial session, where children can learn how to pronounce sentences assisted by audio and

graphics elements. It utilizes the interactive concept, as children are required to click on alphabet 'B' or 'T' to see pictures and a sentence of it in '*Jawi*'. This page provides simple instruction guide using hand pointer to ease the children's learning. A user may click on an icon with letter '*i*', if he/she requires some guidances.
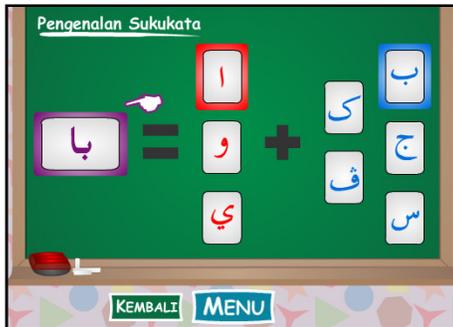
Fig. 5. "*Pengenalan Sukukata*" tutorial

Fig. 6. "*Pengenalan Perkataan*" tutorial using desk theme

This application provides some activities for children to strengthen phonic pronunciation and *jawi* reading. The activity page consists of "*Teka Bunyi*" (Predict the Sound) and "*Baca Ayat*" (Read the Sentence). Those are the interactive activities that recall the content of tutorials that they have learned. The first activity, "*Teka Bunyi*", tests the children with phonic sounds. As an interactive activity, the children are required to click on sound icon to hear the phonics sound produced and respond by clicking the correct answer. The phonic *makhraj* sounds are scripted to be played randomly. Lastly, in "*Baca Ayat*" activity, the children will interactively learn how to read sentences with the aid of graphics, animations and sounds. This activity enables the children to read the sentence based on the picture provided. The picture appears for several seconds before the sentence's words appear in sequence. They can check the answer by clicking on the speaker icon. Similar to the previous activity, the picture will be randomly displayed.

4. Results and Discussion

The evaluation of *"Bijak Jawi: Siri Bijak Baca"* involves teachers, lecturers and experts. The participants are all adults as this study requires some insights before it can proceed with further evaluation process with the targeted users (children). This study undergoes two tests, which are usability test and heuristic test. The usability test was conducted with seven lecturers from Academy of Islamic Studies (ACIS) UiTM Perlis and five J-Qaf teachers from primary schools in Perlis. Their task is to look into the adaptation of phonic *makhraj* technique and multimedia content in *"Bijak Jawi: Siri Bijak Baca"*. They were given a set of questionnaires that consist of i) content, ii) interaction and navigation, iii) interface design, iv) sound and v) general feedback about the application.

Another evaluation, which heuristic test, was conducted to evaluate the interface design and usability aspects of the application. Heuristic test was conducted on five experts in Human Computer Interaction (HCI), who are lecturers from Faculty of Computer and Mathematical Sciences. The tasks in heuristic test are similar as in usability test that conducted with the ACIS lecturers and J-Qaf teachers. Table 1 lists the Likert scales used in the questionnaires.

Table 1
Rank of answer

Rank	Value
Strongly Agree	5
Agree	4
Neutral	3
Disagree	2
Strongly Disagree	1

Results in Figure 7 reveal the mean score (μ) for content (C), interaction and navigation (IN), interface design (ID) and sound (S) obtained from two series of testing. For both content and interaction and navigation aspects, the mean score is a bit higher for usability test ($\mu C=4.87$, $\mu IN=4.56$) compared to heuristic test ($\mu C=4.37$, $\mu IN=4.46$). The mean score for interface design evaluated by ACIS lecturers and J-Qaf teachers is slightly lower ($\mu ID=4.73$) than the heuristic team ($\mu ID=4.77$). Interestingly, both groups agreed ($\mu S=4.3$) that the sounds embedded in the application are clear and helpful for the learning process. The results revealed the agreement between the two groups of evaluators, as all the mean scores are almost equivalent.
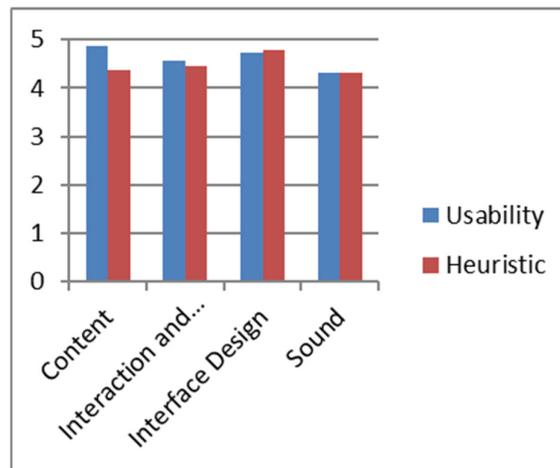
Fig. 7. Comparison between usability and heuristic tests
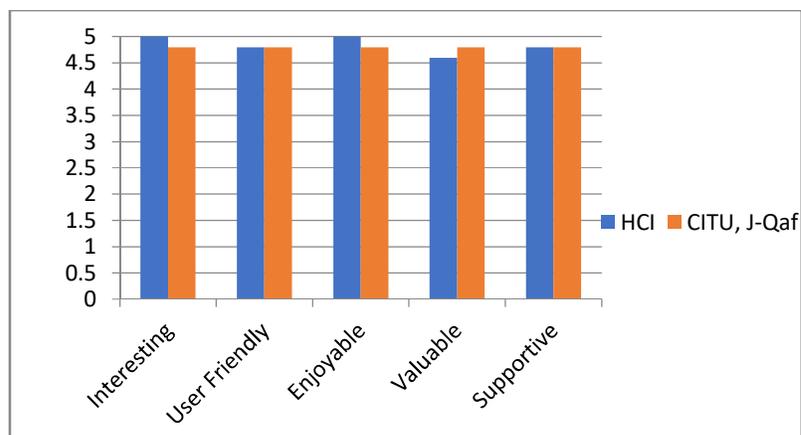
Fig. 8. Comparison on General Feedback

Figure 8 illustrates the results of general feedback obtained from both HCI experts, and experts of '*Jawi*' about the application. Both groups agreed that *"Bijak Jawi: Siri Bijak Baca"* is interesting (µHCI = 5; µAJ=4.8), user friendly (µHCI=4.8; µAJ=4.8), enjoyable (µHCI=5; µAJ=4.8), valuable (µHCI=4.6; µAJ=4.8), and supportive(µHCI =4.8; µAJ=4.8). The positive feedbacks from both groups of evaluators show that the implementation of phonic *makhraj* technique blended with interactive multimedia in *"Bijak Jawi: Siri Bijak Baca"* is appropriate and significant.

5. Conclusion

"*Bijak Jawi: Siri Bijak Baca*" is an interactive multimedia application that blends phonics '*makhraj'* technique in reading 'Jawi' and multimedia elements to attract children to learn to read '*jawi*'. In general, results show that the application is interesting, user friendly, enjoyable, valuable and supportive. "*Bijak Jawi: Bijak Membaca*" can be an additional reading tool for children to improve their reading skill with the help of phonics *makhraj* technique. Based on the results from usability and heuristic evaluation, evaluators found that the application is interesting for children. They agreed that the application is user friendly because of the buttons and navigations could help the children to interact easily. They also found that the application is enjoyable with the inclusion of the phonics technique and the concept of interactivity that have been utilized using useful multimedia elements such as graphics, video and audio. In addition, this study found that the evaluators agreed that the application is valuable in terms of its teaching method, in which the children can visualize the pronunciation of the alphabets in very clear and straightforward. Above all, the evaluators agreed that the application is supportive for preschool children to learn *jawi* and beneficial for teachers and parents to teach *jawi*. However, the use of the application was only limited to children aged five to six and it can only be used in platform that supports flash player like Windows. Further evaluation from the perspective of targeted users (pre-school children) will be carried out as a future work. This study also recommends some enhancements on the activity by adding additional exercises in the application to boost their reading skills.

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