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# Preliminary Testing on Interactive Bahasa Melayu Reading Courseware for Dyslexic Children

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[1]**Abstract:**E-Z-Disleksia is a courseware designed to accommodate the needs of dyslexic children with difficulty in reading and learning to read Bahasa Melayu (National language of Malaysia). The design and development of the courseware is based on dyslexic children learning styles. The three dominant learning styles identified are; visual, auditory and kinesthetic. So as to support these learning styles, the courseware was developed with the integration of multimedia elements within a semi user controlled navigation approach. Preliminary evaluation was conducted to gather feedbacks from dyslexic children as well as teachers. This paper presents the preliminary result of the evaluation which indicate that the courseware was well-received by the children with minor modification.

**Keywords**: Dyslexia, Visual, Auditory, Kinesthetics, Courseware

## 1. Introduction

According to Gomez (2000), the operational definition of dyslexia refers to children who have a general level of performance which is similar to or slightly higher as compared to normal children but have significant difficulty in reading and spelling. Gross & Voegeli (2007) had listed common problems faced by dyslexic children: (a) problems in reading and writing (b) difficulties in carrying out instructions (c) directional confusion (d) problems in mathematics (e) problems in arranging the sequence (f) difficulties in organizing workflow and (g) difficulties to stay focus. As a result, they acquire different approach in learning. They need lots of practice which utilize the use of hands, eyes, ears and voices (Dyslexia Assc, ND). Multimedia application is a suitable tool in teaching dyslexics children as it utilizes more than one human senses. Recently, there are varieties of multimedia courseware in the market; proven that it is widely accepted in the educational field.

Multimedia as mentioned by Singleton (2006) has the potential to reduce or even remove most of the problems faced by dyslexic people.Using multimedia, instructions can be represented in a graphical or auditory form that allows dyslexic children to develop links between what a word looks like, sounds and meaning. Furthermore, multimedia application promotes the drill and practice concepts (Lundberg, 1992) that can improve learning process Karsh (1992).

Based on the potential used of multimedia application discussed above, a Bahasa Melayu reading courseware was developed for dyslexic children. This paper is aimed to discuss the design of the prototype courseware as well as the outcomes from the preliminary evaluation of the courseware.

## 2. Learning styles

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In order to ensure the positive effects of the courseware to dyslexic children, it is important to design and developed the courseware that can complement dyslexic children learning styles (Reid, 2006). Learning styles is defined as individual's preferences of acquiring and using information when learning (Herod, 2002; James, 2009).There are three basic types of learning styles that are suitable for children namely visual, auditory, and kinesthetic (Beatrice, 1994). Reid (1987) suggested that when students are taught using techniques consistent with their learning styles, they will learn more easily and efficiently.

With regards to the importance of learning styles, a questionnaire was distributed to 30 dyslexic children in order to identify their learning style. Based on the result, it can be concluded that the dyslexic children's learning styles are the combination of the three learning preferences. This result supported the integration of all the three learning styles into the courseware. In addition to this integration, the extra attention was given to the kinesthetic aspect as it shows the highest preference by dyslexic children. The importance of kinesthetic aspect is comparable to the findings reported by Fleming (2009) that kinesthetic learner tends to develop good reading skills.

## 3. Reading method

Phonic method has been identified as one of the possible method for teaching dyslexic children (Ahmad, 2004; Cecilia, 2004). This method teaches word recognition using letter-sound association (Learning Disabilities Association America, 1998). These method has been chosen for the courseware due to its effectiveness in improving children's reading ability (Ahmad, 2004).

## 4. Courseware description

E-Z-Disleksia is a courseware that introduces dyslexic students to syllables in Bahasa Melayu. This courseware was developed due to the lack of such courseware in the market. Moreover, research on the subject (Bahasa Melayu reading courseware for dyslexic) is also very limited in Malaysia (Lee, 2008; Gomez, 2004). The target users for this courseware is dyslexic children who are in their early stage of learning to read and Bahasa Melayu teacher who can use it as a teaching aid.

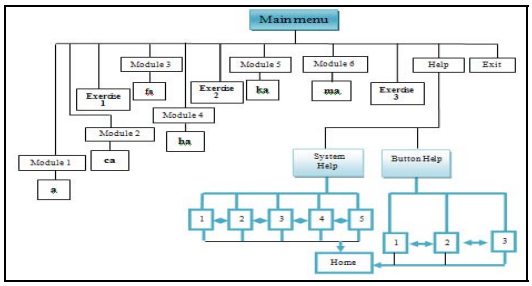


Figure 2: Navigational flow of the courseware


Figure 3: Main menu of the courseware

The courseware covers six main modules which comprises of twelve sub modules. Each of these sub modules contains introduction to syllable together with the pronunciation of the syllable, examples of pictures associated with the syllable and hands on exercises by stages. Figure 2 shows the navigational structure of the courseware. The navigational flow of the modules is indicated by numbering each module starting from one until six. The modules are arranged in a sequence as illustrated in Figure 3. After completing two modules, user can engaged in the hands on activities that covers all the syllables in both modules by clicking the '*Latihan*' button. Apart from that, the user can also access the *Help* page that contains System Help and Buttons Help.

Besides the hands on activities that cover two modules, user can also do the hands on exercisers within each sub-module. These hands on exercises are delivered by stages, for example after completing two pages of learning module, user can do the writing exercise and when he/she finished another two pages, another activities (ie; drag and drop and choose the correct answer) is provided. These activities were structured into stages in order to retain dyslexic children attention and also to test their understanding.

The courseware provides flexibility for user in exploring the content but at the same time imposed certain constraint on the navigation flow. User has to wait until the whole contents of each page are

presented before he/she could navigate to other pages to ensure that the user finishes the module. Figure 4 illustrates the content page of the courseware. Each module contains combination of two sub modules (for example combination of sub module 'a' and 'ba'). All sub-modules have the same layout design.


Figure 4: Content page of the courseware


Figure 5: Writing activities

In addition, the left marker is presented using the hand image which is located at the upper left corner of the page. The use of the left marker is to assist dyslexic children on identifying the left side of the page as they always confused between left and right and sometimes ends up reading from the right (Gross & Voegeli, 2007). The researcher also applied another method to overcome the directional confusion. The method was implemented by showing the syllables one by one from left on the screen. The process will continue on each new page. This will indirectly help dyslexic children to read from left.

The courseware also offers a background color customization feature (refers to Figure 4) that offers flexibility for the dyslexic children to choose the background color that best suits them. The choices of colors are represented with palette on the top left corner of the courseware . The main intention of this feature was to reduce the Scotopic sensitivity or Meares-Irlen syndrome (unpleasant visual symptoms when reading for example see words juggle in a paragraph or rivers of white space).

Figure 5 shows the screen shot of the writing activity page. The animation on how to correctly write a letter is provided. User can use their hands to follow or trace the animation. Tracing the syllable is one way of applying the tactile element into the courseware. Tracing method actually helps dyslexic children to write the letter and remember how the letter looks like (Lim et al., 2009). Following the writing activity, user has to complete another two pages before they could engage in the next activities.

The subsequent section will discuss about the preliminary evaluation. The result from testing and evaluation will be used as the basis to further improve this courseware.

## 5. Preliminary evaluation

The researcher has conducted few testing that involved dyslexic children ($n$=30) and 5 teachers in the state of Selangor. The complete flowchart for the preliminary evaluation sessions is as in Figure 6.

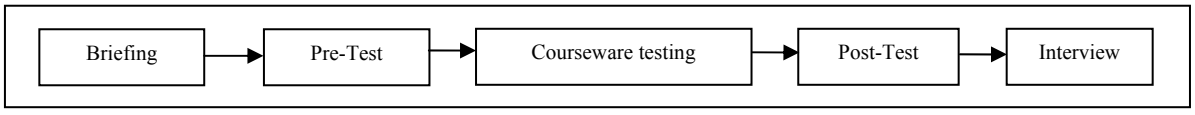


Figure 6: The experimental design

The evaluation started with the explanations about the testing procedure as well as the description of the courseware from researcher. Then, the courseware hands on experience sessions were conducted in the computer labs where the children were required to complete two modules ('a/ba' and 'ca/da'). The observation was conducted during the courseware hands-on session to identify students' acceptance towards the courseware. During the observation, students' expression and body language were observed and video were also recorded to ensure that the researcher did not miss out any important information.

Following that, children were given two sets of questions covered the two modules that they have explored. The same set of questions was given before and after they had finished using the courseware to maintain the consistency and reliable comparative result of students' performance. In the end, the interview

was conducted with children and teachers. The questions were divided into 3 categories that are: ease of use, motivation and interface.

## 5.1. Result from the preliminary evaluation

Figure 7 depicts the result of pre-test and post-test. The graph shows that 86.7% of the children demonstrated an improvement in their score. Justification of significant improvement in students' performance is refined by considering only the increment of scores by four points and above based on the assumption that it reduces the by chance score. With this assumption, it is noted that 19 (63.3%) of the participants managed to demonstrate a good improvements in their performance. Another 6.7% of the students got the same score for both pre-test and post-test. The graph also shows that 6.7% of the students had a slight dropped off in their score. This might be due to carelessness or difficulty to stay focused during the session.

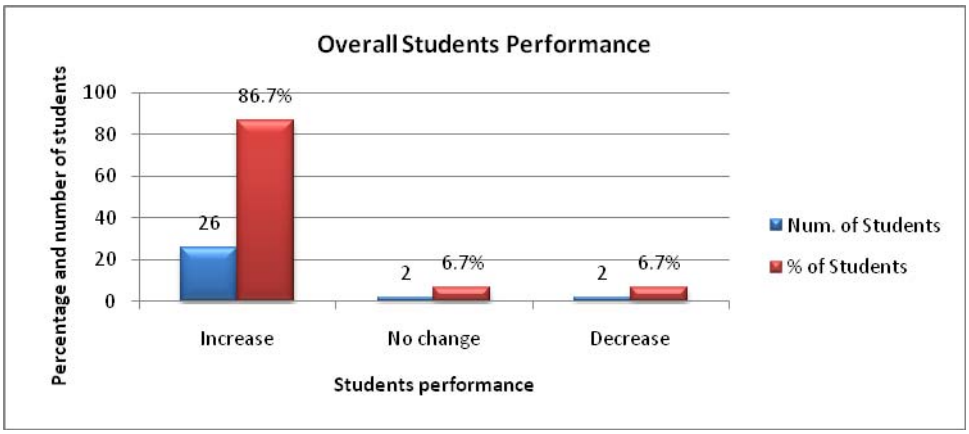


Figure 7: Overall Student's Performance

## 5.2. Interview with students about courseware

Table 2: Summarize Feedbacks Gathered From The Interview

| Interview with students about courseware | |
|---|---|
| a) The courseware in general | • 90% of the respondents agree that the courseware is interesting. |
| b) "Ease of Use" | • Two major improvements to the courseware should be considered based on the "ease of use" category. Those improvements were:<br>- Instructions given should be supplemented with visual or animation.<br>- Help page also should be accessible from any page. |
| c) Motivation | • The feedback recorded showed that 40% of the students think that the courseware still lacked of fun (activities or games). |
| d) User Interface | • The feedback gathered was more positive as most of the students like the design, layout, size of text and color used in the courseware. |

## 5.3. 。Result from observation

Encouraging observations were noted during the experiment where most of the children were eager to explore the courseware and they even tried other modules. The children also showed excitement and actively giving feedback throughout the session. They asked for guidance whenever needed thus showing their interest towards the courseware and also towards learning.

Besides that, some negative responses were also recorded. It is noted that most of the students spent more time on writing exercise and they enjoyed it very much albeit the difficulties that they encounter doing the exercise using the mouse. Most of the children did not even click on the left marker and the help button because they are not sure of the function thus showing the limitation of the courseware especially in providing instruction. There were some children who looked uninterested with the courseware. They clicked everywhere on the page hoping that something will happen thus signified that they would like to engage in

more activities. Other than that, children were not familiar with the flow of the courseware constantly ask for help.

### 5.4. Interview with teachers

The researchers had managed to get feedbacks from five teachers who directly involve with dyslexic children. The feedbacks they gave are: the content of courseware is good and beneficial for students who are in the beginning stage of reading; the design, layout, color and size of text are appropriate for dyslexic children; the instructions given in the courseware should be more detailed and easy to understand; and the courseware should be integrated with more activities in order to grab students' attention.

## 6. Conclusion and future work

Basically the result showed that the dyslexic children who participated in the study had positive attitude towards the use of courseware to learn reading as it accommodate their different learning styles. Further discussion on the result will be discussed in other paper. For future work, more tests will be conducted with dyslexic children in other schools to get more reliable result. With that, it is hope that this courseware can helps dyslexic children to enhance their reading skills.

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