World Applied Sciences Journal 12 (Special Issue on Computer Applications & Knowledge Management): 59-64, 2011
ISSN 1818-4952


# Malay Sign Language Courseware for Hearing-Impaired Children in Malaysia

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**Abstract:** In Malaysia, deafness is the third highest registered disability. Manually Coded Malay is used as the formal teaching sign language in school, while Malaysian Sign Language is the official sign language for the deaf community in Malaysia. The existed tools are not entirely based on local contents, while others are absence of video capability, 3D images and animatedly rotational view. The objectives of this paper is firstly to develop a Malaysian Sign Language courseware for hearing-impaired children in Malaysia and secondly to evaluate the courseware with selected participants. The courseware was built using Microsoft Visual Basic 2008, Microsoft Access 2007 and 3D Poser 7.0. In comparison, by employing the proposed courseware, it shows higher understanding and performance level of the children, due to interesting usage of colors and design, simple and easy navigation method and inclusion of 3D images with video capability and animated rotational view. The teachers and parents showed high satisfaction level on the performance of the children and the courseware capabilities. The recommended future work is to produce a much comprehensive courseware which focuses on interactivity, visual effects, dual language options, larger databases of words and multiple stages of exercises in granting value-added courseware for the children, teachers, parents and Malaysian deaf community as a whole.

**Key words:** Children · Deaf · Learning Tool · Courseware · Sign Language · Bahasa Isyarat

## INTRODUCTION

Deafness is the complete loss of the ability to hear from one or both ears which can be inherited or caused by (1) conditions during birth (2) infectious diseases (3) medications [1]. According to [2], sign language is a rich language of movement and space of the hands and eyes which communicate abstractly with iconic narration. Early literacy development is important even for deaf children in order for them to develop their cognitive, linguistic, social and personal abilities. Many places nowadays have taken up the bilingual approach to early literacy development whereby deaf children are given a chance to learn sign language as well as the oral language used by the hearing community [3, 4] explain that exercises with a focus on the meaning (semantic knowledge), as represented by pictures, would be most beneficial for learning new words in sign language [4]. Further justify by saying that this method allows children to see the connection between a printed word and its meaning. For deaf children, computer-based learning is a very good prospect to gain knowledge on language. It involves high participation from the child and enables user to cover a large amount of educational material in a short span of time [5]. Each child has different processing capabilities. They are individuals who learn best at their own pace. Using computer-based learning, individualized practice can be repeated almost endlessly [4]. Also, users can get the feedback from these exercises privately and on the spot. Multimedia tools have been shown to enhance the performance of learning systems [6]. Generally, students learn more from animated pictures than from static ones because it allows user to perform more cognitive processing [7, 8] discover that multimedia is able to increase the literacy skills of these children and such courseware is able to minimize problems lack of education media at school as well as an alternative way to supplement teaching by instructors [9].

This is supported by [10] whom explain that information transferred via words and texts can be made more interesting and effective using multiple modes such as multimedia stories, animated pictures, animated sign language and lip reading. The reason is because children with learning disabilities are restricted to print reading,

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Table 1: Comparison between Existing Tools

| | eSign | MSL Guide (VCD) | MSL Guide (CD-ROM) | iKOD | MySlang | Proposed Software |
|---|---|---|---|---|---|---|
| Sign Language | MSL | MSL | MSL | MCM | MSL | MSL |
| Medium of Instruction | Malay | Malay | Malay with English Subs | Malay | English | Malay |
| Operating System | Website | VCD | CD-ROM | Course-ware | Course-ware | Course-ware |
| Alphabets | No | Yes | No | No | Yes | Yes |
| Numbers | No | Yes | No | No | Yes | Yes |
| Words | Yes | Yes | Yes | Yes | Yes | Yes |
| Amount of Words | > 2000 | 500 | 350 | 1647 | 215 | 50 |
| Medium of Sign Display | Video | Video | Video | Video | 3D animation | 3D animation |
| Rotational View | No | No | No | No | No | No |
| Search Engine | Yes | No | No | Yes | Yes | Yes |
| Exercises | No | No | Yes | Yes | No | Yes |
| Audio | No | Yes | Yes | Yes | No | No |
| Animation | No | No | No | No | No | Yes |
| Picture | No | No | No | Yes | No | Yes |

presenting information through multiple representations allows these children to create a deeper understanding of the information [11]. Multimedia helps resolve issues by prolonging the child's attention span by making learning fun and interesting [4]. In Malaysia, two main sign languages are used. They are Manually Coded Malay (MCM) and Malaysian Sign Language (MSL). MCM was developed by the Malaysian Ministry of Education [12]. It is used as the formal teaching language in schools because it has all the grammar syntax of the spoken Malay language. MSL was developed by Malaysian Federation of the Deaf (MFD) [12]. Also, since 2008, MSL is the official sign language for the deaf in Malaysia [13]. Currently, there are 32 special schools for the hearing-impaired people in Malaysia [14].

Based on Table 1, most learning tools that teaches MSL, uses Malay as the medium of instruction. This is appropriate given the fact that majority of the deaf in Malaysia are of the Malay race. It is even suitable for the Chinese and Indian because most are fluent in the Malay language since Malay is Malaysia's national language. Four out of the five learning tools uses video to display the signs and so far, none has animatedly rotational view of the sign.

Looking at its operating platform, only two existing learning tools are in the form of software. Out of these, one teaches MCM and the other teaches MSL. The main drawback of iKOD [15] is that it is not an MSL learning tool, it does not have materials on alphabets and numbers and the signs are displayed in videos with no rotational view. MySlang [16] teaches MSL and the signs are displayed using 3D animation. This software functions solely as a dictionary instead of a learning tool. This means that it provides no exercises for users to use as practice. Another drawback is that the medium of instruction is English.

The objectives of this paper are to develop a Malaysian Sign Language courseware for hearing-impaired children in Malaysia and to evaluate the courseware using white box testing and black box testing.

## MATERIAL AND METHODS

Four methods of study have been selected; literature review, questionnaire, observation and interview. Throughout the literature review, information on deafness, Malaysian deaf community and background on education for the deaf were discovered. Existing learning tools available on the market were analyzed to figure out what functions are important and which are unnecessary. Questionnaire was developed aimed for teachers and family members of deaf children. It is designed to capture three key pieces of information (a) personal profile of respondents (b) background knowledge and experience on sign language (c) desired features in a sign language learning package. In order to truly understand the deaf community and education, an observation of the current teaching method was carried out at a selected center. Since preschoolers are the target group for this product, the observation was conducted during preschool programme classes. Follow up interview was conducted in order to gain more insight on the area of study. Open-ended questions were used to capture the experts experience and opinion. Rapid Application Development (RAD) method [17] was chosen for the development of this project. The RAD approach to software development

has its roots in iterative prototyping and computer-aided software engineering (CASE), both of which is used to speed the development of prototypes.

## RESULTS AND DISCUSSION

An observation was conducted on the 13th of April 2010 during a preschool class. There were 10 students in total during that day ranging from four to six years old. Teaching was conducted by two teachers whom are deaf themselves. Some key points were taken from the observation. Firstly, it is important for the child to know the relation between lines and meaning. This is an advantage of learning in class because there is someone there to show the child this relationship. Secondly, it is good to start with alphabets before going into words. This will be done by having the first module on alphabets and then the second module words. Next, having a picture proved to be a good method of gaining understanding of the word and the sign. All signs in the software will have to be accompanied by a picture for users to grasp the meaning. Also, giving children exercises is vital for them to know the proper usage of the word. Lastly, teaching has to be made interesting and dynamic for these children in order to prolong their attention span. An interview was conducted with the Preschool Programme Coordinator. Some points that were taken are (a) Manually Coded Malay is good for use in the academic area, (b) Malaysian Sign Language is more suitable for the deaf community to communicate with one another because it is more expressive and easier to understand, (c) Deaf children rely heavily on visual materials such as cue cards and pictures.

A total of 35 sets of questionnaires were distributed randomly to parents and teachers of students from two centers. Out of these, only 28 sets were taken into the analysis. The findings of analysis phase described (a) all respondents chose MSL over MCM as the preferred sign language, (b) 96% of respondents agreed courseware would be the best medium to ensure learning for deaf children is more convenient, interesting and interactive, taking into account the limitations of books, databases, portal and video based, (c) top three attributes that respondents think should be included in the software are alphabets, simple words and numbers and (d) the required function of software are exercises followed by search engine, manual, animations and navigational buttons.

During design phase, activity diagram, use case diagram and storyboard were constructed using Microsoft Visio 2007. The software was developed using


Fig. 1: Main Menu of E-BIM

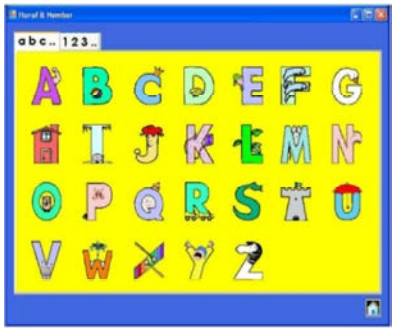


Fig. 2: Alphabets and Numbers module

Microsoft Visual Basic 2008. Three dimensional (3D) animations were selected to represent the signs by using a 3D application known as Poser 7.0. Adobe Photoshop CS3 is used to edit the images as needed. Based on the questionnaire results and literature review, it has been proven that children are able to learn more from animations compared to static images and it is able to prolong a child's attention span. Microsoft Access 2007 is the platform used to develop the database for the software. The database was created to store the records of the signed words. It is important to have this so that users are able to search through the words and for use in the exercise module.

Fig. 1 illustrated is the main menu of the courseware which is known as eBIM. eBIM stands for Electronic Bahasa Isyarat Malaysia.

Each alphabet and number is displayed by using colorful icons, where both alphabets and numbers modules are displayed on the different tab of the same page as indicated in Fig. 2.

Fig. 3 displayed the alphabet signs, where one image is from a distance and another up close to the hand.

Fig. 4 showed 3D display of a sign for the word chicken or *ayam* using Windows Media Player box where users can stop, pause and play it as many times as they like. On the right is an image of the object and below it, the written form of the word.

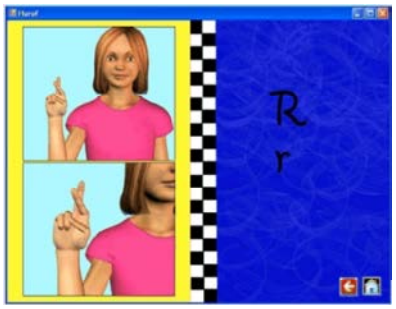


Fig. 3: 3D Display of Alphabet Sign

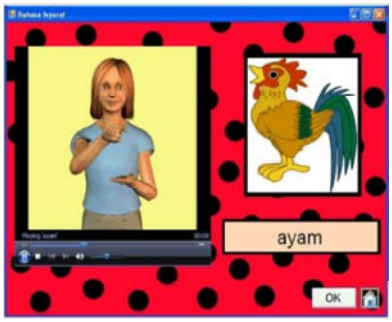


Fig. 4: Animated and rotational view of 3D Display of Word Sign


Fig. 5: Exercise Module


Fig. 6: Search Engine Module

The screenshot of the exercise module is illustrated in Fig. 5, where the instruction is displayed at the top, while the main area of the page will display a video of a signed word. On the right side of the page is a list of possible answers that users can choose from. Once an answer is chosen, the user can click the *OK* button to see if the answer is correct.

Fig. 6 showed the search engine module where the users can enter the word they want in the textbox provided and then click the *cari* (find) button. If the word is found, then 3D sign animation, picture and the written word will be displayed. If not, a popup message will appear to notify user that word is not available in the database.

White box testing was selected to examine the external functionality of the codes in terms of what the product actually does compare to what it was planned to do. Then static testing was performed by two other experiences programmers to detect human errors and to compare the codes against the design specifications to ensure all modules have been developed. Unit testing was conducted to verify that given input produces desired output and all logical decisions and loops execute as they are supposed to.

Black box testing was also conducted with end users to assure all requirements have been addresses in accordance with the users' needs. This is especially important for this software because it is developed for young deaf children who have their own unique needs in learning. The testing was conducted on the 21st October 2010 in a center located in Kuala Lumpur. Five children aged three to six years old were asked to use the software to learn alphabets and a set of words in Malaysian Sign Language. They were then tested using the exercise module in the software and by showing them the item and asking them to sign the word. It was observed that children were very excited while interacting with the software. According to the children as well the teacher, they liked the usage of colors and the design of the alphabets and numbers. The children felt at ease in navigating the software due to its simplicity and friendliness. Still, in the beginning, an adult is required to supervise the child until the child is independent enough to navigate all the modules provided in the software. In terms of processing speed of the animation, a small lagging roughly of 3-7 seconds is occurred due to complexity of certain animations and machine supporting the software.

The most important discovery is that, on average, the children scored 90% of the answers correctly in the exercise module. In addition, when showed the item or the picture of an item, the children could illustrate the sign of the words correctly. According to the teacher, children are taught about five words in each class which they have to memorize until the next class. The classes are held every

Tuesday and Thursday. In comparison, by using the software, on average, children are able to retain knowledge of five words after spending merely an hour on the software. This situation is best understood since with inclusion of 3D animated rotational view, the children are more capable to find the relatedness between the image, animated sign and meaning of the particular word. Their attention span and interest to learn the word has increased satisfactorily. The children are more capable to understand and memorize the word for a longer period of time. The teachers showed high satisfaction level on the performance of the children and the software. This has demonstrated a high prospect for the software to be utilized at school and home by the children, teacher and parent or even to be commercialized for local market.

## CONCLUSION

This study has successfully identified existing learning tools based on MCM and MSL in Malaysia. Although, MCM is the formal teaching language, MSL is the official sign language for the hearing-impaired in Malaysia and widely used among them. Currently there is no MSL learning tool on the market that is comprehensive enough to transmit early literacy education for young deaf children. In conclusion, this study has fulfilled the project objectives with the development of eBIM. eBIM has provided an alternative way of early literacy development and learning for young deaf children to gain MSL language at their own pace. Moreover, with the presence of 3D animation, rotational view, exercise and search engine modules feature have increased satisfactorily the children ability to understand and memorize the alphabets, numbers and words learnt. This has demonstrated a high prospect for eBIM to be utilized at school and home by the children, teacher and parent or even to be commercialized for local market. The future recommended features to produce a much comprehensive version of eBIM are by including interactive function of user controlled rotational view of the 3D animations, with extensive usage of visual effects, dual language (Malay and English) options, larger databases of words which take into account of dialects or slangs and with multiple stages of exercises in giving value-added courseware for the children, teachers, parents and Malaysia deaf community as a whole.

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