iMSL: Malay Sign Language for the Deaf and Hearing-impaired

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ABSTRACT

Malay Sign Language (MSL) or Bahasa Isyarat Malaysia is a language that has been used by the deaf people in Malaysia. The deaf and hearing-impaired people go to special schools to learn the MSL. In current age, technology could be utilized for the purpose of providing MSL course for the hearing-impaired people and their stakeholders. With the provision of the technology-based MSL course, learning MSL not only happen in schools, but also at home, or anywhere. This makes the learning activity pervasive. Based on that argument, this study aims at proposing a model for an interactive MSL (iMSL). Accordingly, this paper discusses the background concept for the needs and design of the iMSL. It contains the problem that lead for the iMSL, and activities and techniques to involve.

Keywords: Hearing-impaired, sign language, learning.

I. INTRODUCTION

The term Assistive Technology (AT) has long been used. It refers to technologies developed for people with disabilities. There are a number of disabilities including hearing-impairment or deaf. Murniwati (2007) identified that hearing impairment can occur in the outer, middle, or inner ear along the pathway to the brain. Table 1 lists and classifies the degrees of hearing loss in dB (Decibel). This study considers all hearing loss types.

Table 1: Hearing loss according to dB range

Degree of hearing loss	dB range
Normal Hearing	0-20dB
Mild Hearing Loss	20-40 dB
Moderate Hearing Loss	40-65 dB
Severe Hearing Loss	65-90dB
Profound Hearing Loss	95 and up dB

The trend of registered hearing-impaired and deaf in Malaysia shows an increase from year to year. In conjunction, Table 2 shows the figures, which compares also the hearing-impaired cases with other types of disabilities. It is obvious that the hearing-impaired is one of the most common disabilities. The increment in each year was more than a thousand until 2007. This study believes that the number keeps increasing. Hence, studies in disabilities and technology could be bridged in assisting the community take appropriate roles in facing the needs of the hearing-impaired and deaf people.

Table 2. Registered disabled people according to types of disability, 2002-2007

Types of Disability	Year					
	2002	2003	2004	2005	2006	2007
Visual Impairment	14,738	14,154	15,364	16,211	18,258	20,039
Hearing Impairment	**21,981**	**22,728**	**24,712**	**26,470**	**29,522**	**31,715**
Physical Impairment	41,311	45,356	51,090	58,371	66,250	73,559
Mental*	43,042	49,340				
Learning Problem			57,483	66,906	76,619	85,812
Cerebral Palsy			34	623	887	1,787
Other	1,017	1,077	1,934	4,335	5,983	7,338
TOTAL	122,089	132,655	50,617	172,916	97,519	220,250

* Mental Impairment terminated, separated into 2 categories: Learning Problem Disability or Cerebral Palsy

The deaf and hearing-impaired people have the same abilities, interests, and aspirations as anyone else, but they face social barriers such as discrimination and communication difficulties (Jacks, Marsh & Massey, 2000). The awareness of society to the deaf people's needs is highly expected to overcome all barriers whether in technical or human support. In Malaysia, it is still hard to find technology-enhanced MSL for hearing-impaired people.

The main problem faced by the hearing-impaired people is to communicate with other people (Norziha, Halimah & Azlina, 2010b) because they do not have access to verbal and written language and especially if children are not exposed to sign language yet (Siti-Zaharah & Nor-Azan, 2010). This

problem becomes worst when normal people also do not understand the sign language and normally most of them do not learn or know the language (Paulraj, Sazali, Hazry & Wan-Mohd-Ridzuan, 2009). Consequently, the hearing-impaired and deaf people usually have limited cognitive ability in understanding as the basis remembering (Norziha, Halimah & Azlina, 2010b) and also slow progress in learning as compared to normal children (Siti-Zaharah & Nor-Azan, 2010). This affects them because they do not have the hearing organs just like normal children. So, this would affect their memory process.

Therefore, to enable them to communicate with other people, they have to be taught using certain proper ways. Norziha, Halimah, and Azlina (2010a) found that the deaf and hearing-impaired people are good in visualizing text. They could not understand the complex words or long sentences but they can visualize simple words and short sentences such as through the sign language besides text and picture. This is agreed by Settachai, Surachai and Ratchadawan (2010), who found that they can remember in a short time, so teachers need to review the previous lessons first before starting the new ones. This makes teachers feel bored and also it wastes time for both of teachers and the children.

The old techniques of teaching sign language include using text books and do manual exercises. There are other more effective ways in teaching them in this digital era in line with the advancements in the technology landscape. Hence, an iMSL is expected to be effective in teaching and learning the hearing-impaired and deaf children. It ensures that learning can not only happen in schools, but also at home. In addition, in this pervasive environment, with iMSL, not only the hearing-impaired and deaf children can learn, but also their stakeholders including care givers, parents, and family members.

Based on the discussion in the previous paragraphs, this study attempts to answer the following questions:

  i.   How to design the iMSL that supports the needs of the hearing-impaired and deaf children?
  ii. Do the hearing-impaired and deaf children accept the idea of iMySL well?

In accordance, the main objective of the study has been to propose a design model of the iMySL for the deaf and hearing-impaired students in learning MySL. To achieve that, the followings have to be accomplished:

  i.   To determine the interface necessity for the iMySL for the deaf and hearing-impaired children.
  ii. To design and developed the iMySL.
  iii. To evaluate the usefulness of iMySL through user test.

For the purpose of this study, which aims at proofing the concept, involvement of teachers and children of a school is sufficient. Hence, the development of iMSL will be engaged by teachers and children (whose age range 8-10 years old – intermediate level) of Sekolah Kebangsaan Pendidikan Khas (Pendengaran) Kuala Terengganu. The contents in iMSL will teach users the basic sign language from finger spelling (ABC), numbers, and some basic things in daily life.

II.   DEFINITIONS, CONCEPTS, AND RELATED WORKS

This section includes the review study of the deaf and hearing impaired people, Malay Sign Language, and multimedia courseware.

A. Deaf and Hearing Impaired People

Someone has damage to any part of ears and hearing loss is referred to as a deaf or hearing-impaired person (Siti-Zaharah & Nor-Azan, 2010). There are many leading causes of deafness. Some people are born deaf due to hereditary condition, or had congenital problems such as those associated with rubella. Others may become deaf as a result of injury, illness, or exposure to excessive noise. The main problem faced by the deaf people is that they are not able communicate verbally with other people. They are very dependent on interpreters, who help them in the communication because not everyone is able to use sign language, especially children (Siti-Zaharah & Nor-Azan, 2010). On the other hand, hearing-impaired students have poor self-motivation. Because of that, teachers need a special learning approach to teach them. It is very important to encourage them to learn proactively by arousing their sense of independence (Nurulnadwan, Zatul-Amilah, Nur-Hazwani, Nurul-Ulfa, Ariffin, & Mohd-Saifullizam, 2011).

B. Malay Sign Language

Sign language is a language that involves the combinations of hand and body movements together with the facial expressions to communicate without sound (Sutton-Spence & Woll, 1999). It is commonly used for the deaf people who are hard to hear and speak. Normal people also can use the sign language as an intermediate language to interact and communicate with all the hearing-impaired or deaf people.

In Malaysia, the sign language that is most commonly used is Bahasa Isyarat Malaysia (BIM) (Norziha, Halimah, & Azlina 2010a). In current practice, there is no standardization for the sign language (Siti-Zaharah & Nor-Azan, 2010).

C. Multimedia Courseware

With the technology advances, computer becomes a popular teaching tool to assist the learning process for the hearing-impaired and deaf children (Ahlers & Vila, 1992). Simultaneously, the use of multimedia grows rapidly and becomes a new medium that provides interactivity on new media. It affects the way learning, working, and playing take place, resulting in the deployment of various websites, multimedia software, and appliances (Hudetz & Friedewald, 2002). This technology has been used in many domains such as commercial, promotional, education, and training applications.

Now, multimedia is widely used in Malaysian education and school after the Smart School project has been launched (Bushro & Halimah, 2006; Nur-Hazwani, Nurulnadzwan & Ariffin, 2010). One of multimedia application that can be used to attract the student's involvement in their learning process is a courseware. In fact, courseware can be designed for used by any one. A special courseware designed for the deaf people is referred to as Assistive Courseware (Nur-Hazwani, Nurulnadzwan, & Ariffin, 2010).

Generally, multimedia involves computer presentation of multiple media such as text, graphics, animation, sound and video (Norfarhana, Wan-Fatimah & Emelia-Akashah, 2010). Based on Bushro and Halimah (2006) courseware is a stand-alone, self-learning unit, and content of various multimedia elements. So, the multimedia courseware usually refers to the courseware that incorporates various media elements and can be used as a teaching aid in the learning process. It stimulates recognition and recall easily.

Siti-Zaharah and Nor-Azan (2010) defines that the non-government organizations (NGOs) in Malaysia are doing a lot of efforts to make and publish books, CD, VCD or accessible on-line materials from the internet for the deaf people. This is because the sign language needs the gestures movement and facial expression, so if the signs are only illustrated in books, they cannot show the sequence of the motion.

Additionally, Siti-Zaharah and Nor-Azan (2010) and Ariffin and Faizah (2010) also address that it is very difficult to find special software for the hearing-impaired and deaf people. Mostly, the materials are published in a form of books and CD-ROMs; however they are also in video format with non-interactive presentation. In accordance, Table 3 lists the examples of material that use CD-ROM for teaching and learning purposes suitable for deaf people and their teachers in Malaysia.

Table 3: Materials for the Teaching and Learning Aids for the Deaf Community in Malaysia

Title	Content	Publisher
Malaysian Sign Language Book (Book by BIM, 2000)	• This book guides users on how to use the Malay sign language. • Contains 30 BIM chapters.	Malaysian Federation of the Deaf (Persekutuan Orang Pekak Malaysia)
VCD containing Prayer Guidelines in Malaysian Sign Language (VCD by BIM, 2000)	• Contains every steps to doing the prayer • Video record from deaf people as model	Malaysian Federation of the Deaf (Persekutuan Orang Pekak Malaysia)
CD-ROM containing Guidelines to Sign Language (CD-ROM by BIM, 2001)	• Contains more than 350 words Finger spelling and phrases. • A video of Sign Language. • Training to make the learning process more effective.	Asia Pacific Institute of Information Technology (APIIT)
VCD	• 60-minute CD	Malaysian

containing Malaysian Sign Language Guide (VCD by BIM, 2003)	• Contains 24 BIM chapters. • Signs which are easy to be learnt and understood.	Federation of the Deaf (Persekutuan Orang Pekak Malaysia)

III. METHODOLOGY

This study adopts the ADDIE Model (Figure 1) to carry out the whole study as suggested by Jamalludin, Baharuddin, and Zaidatun (2003). He defines that ADDIE model is the best methodology to develop a multimedia application. This is because ADDIE model is a generic, systematic approach to the instructional design process, which provides the instructional designers with a framework in order to make sure that the instructional elements in the prototype are effective and the creative processes are efficient.
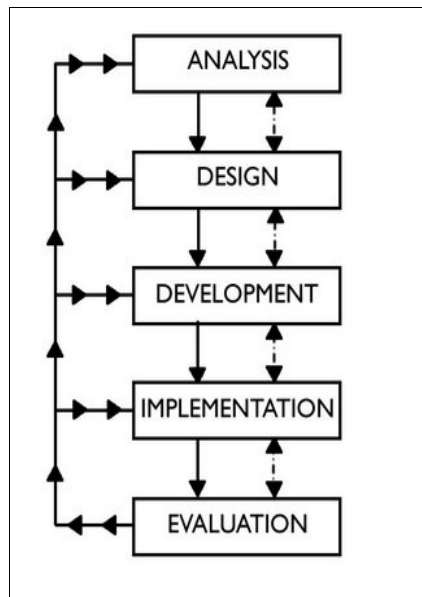

Figure 1. ADDIE Model

3.1 Analysis

During analysis phase, this study identifies the learning problem commonly faced by the hearing-impaired and deaf children, the contents, and the needs and desires of the hearing-impaired and deaf children. The problems are described at the early part of this paper. Besides, this study analyzes also the learning environment, any constraints, and the

delivery options. It is very important to achieve the objective 1.

A brief understanding has been gathered through a series of observation on how the hearing-impaired children carry out their tasks. This study deduces that the interface of the iMySL should be simple, less text, and standardized.

3.2 Design

This study makes use of storyboarding technique to get a consensus on the interface. As a study that involves a special group of target users, the use of storyboarding is appropriate for the users to give their feedback. Additionally, developing multimedia applications that involve less programming is supported well with artifacts like storyboarding and screen sketch. They provide the look and feel of the application to be developed.

3.3 Development

The actual creation (production) of the iMySL and its contents are based on the deliverables in the design phase. This study decides to develop the iMySL using any authoring software with incorporation of any 2D animation software. This ensures that objective 2 is achieved.

3.4 Implementation

As a prototype, the iMySL will be operating on a VCD. Stand-alone technology is the best approach at this step, because this study attempts to proof the concept. Issues regarding networking, social interaction, and others will not be part of the implementation.

3.5 Evaluation

The development of iMySL involves formative and summative evaluation. In detail, each designing artifact is going to be evaluated involving real users. Besides, as a summation, this study will observe users' experience when interacting with the developed iMySL. Analyzing the user experience will also lead to a decision on whether the iMySL is useful for the purpose of assisting the hearing-impaired and deaf children in their learning activity.

IV.   CONCLUSION

This paper proposes an alternative approach in assisting the hearing-impaired and deaf children in their learning activities, which is called iMySL. The problem and context leading to the proposal of the idea is discussed at the beginning, followed with the techniques involved to carry out all tasks. It is expected that the identified users participate well in the designing process. Once the requirements are gathered, they will be compared with the findings in previous studies to analyze whether the requirements contain some additional over the previous findings.

Although studies are being carried out involving hearing-impaired and deaf children, the context affect some aspects in the design on the applications. Hence, this study believes that the richer findings are gathered, the faster the body of knowledge relating to hearing-impaired and deaf children matures.

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