# iMSL: INTERACTIVE MALAY SIGN LANGUAGE COURSEWARE FOR THE DEAF AND HEARING IMPAIRED

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# iMSL: INTERACTIVE MALAY SIGN LANGUAGE COURSEWARE FOR THE DEAF AND HEARING IMPAIRED

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## ABSTRAK (BAHASA MALAYSIA)

*Malay Sign Language* (MSL) atau Bahasa Isyarat Malaysia adalah merupakan salah satu bahasa yang digunakan oleh orang-orang pekak di Malaysia untuk membantu mereka berkomunikasi dengan orang lain. Orang-orang pekak dan cacat pendengaran pergi ke sekolah istimewa bagi mempelajari MSL. Pada era kini, teknologi digunakan untuk tujuan menyediakan kursus MSL untuk orang-orang yang cacat pendengaran dan pemegang mereka. Dengan adanya kursus MSL berasaskan teknologi, pembelajaran MSL bukan sahaja boleh dilakukan di sekolah, malahan di rumah mahupun di mana-mana sahaja. Ini menjadikan aktiviti pembelajaran berleluasa. Berdasarkan hujah ini, kajian ini bertujuan untuk mencadangkan satu model bagi kursus multimedia interaktif yang dinamakan sebagai iMSL. Sehubungan itu, kertas kerja ini akan membincangkan konsep latar belakang untuk keperluan dan reka bentuk iMSL. Objektif kajian ini ialah 1) Untuk menentukan keperluan antara muka untuk iMSL untuk orang-orang yang pekak dan cacat pendengaran, 2) Untuk reka bentuk dan pembangunan iMSL, dan 3) Untuk menilai kebergunaan iMSL melalui ujian pengguna. Dalam menjayakan kajian ini, Metodologi Waterfall telah diadaptasi. Kaedah ini melibatkan tiga fasa iaitu Keperluan Pengguna, Pembangunan Prototaip, dan akhirnya Ujian dan Fasa Penilaian. Model ADDIE juga disesuaikan dalam membangunkan prototaip iMSL. Pendekatan kualitatif seperti pemerhatian dan temu bual telah dijalankan dengan empat orang pelajar darjah 1. Kesimpulan daripada hasil kajian ini menyatakan bahawa teknologi berdasarkan perisian adalah alat yang boleh digunakan sebagai alternatif untuk membantu proses pembelajaran bagi pelajar pekak dan cacat pendengaran. Kaedah ini mudah untuk difahami dan dapat membantu guru untuk mengajar dalam cara yang lebih menarik.

## ABSTRACT (ENGLISH)

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 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 multimedia courseware which is called iMSL. Accordingly, this paper discusses the background concept for the needs and design of the iMSL. The objectives of the study include 1) To determine the interface necessity for the iMSL for the deaf and hearing-impaired, 2) To design and developed the iMSL, and 3) To evaluate the usefulness of iMSL through user testing. In accomplishing this study, Waterfall Methodology was adapted. There are involved three phase which are User Requirements, Prototype Development and finally the Testing and Evaluation phase. ADDIE Model also adapted in developing prototype of iMSL. The qualitative approaches such as observation and interview were conducted with four students in standard 1. The result of this study concluded that the technology based on courseware is an alternative tool that can be used to assist the learning process for the deaf and hearing-impaired students. It is easy to understand and help teacher to teach in interesting way.

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| | |
|---|---|
| OKU | Orang Kurang Upaya |
| MSL | Malay Sign Language |
| iMSL | Interactive Malay Sign Language |
| CD ROMs | Compact Disk Read Only Memories |
| PWD | Persons With Disability |
| AT | Assistive Technology |
| AC | Assistive Courseware |
| dB | Decibel |
| TTY | Text Telephone |
| IT | Information Technology |
| MCM | Manually Coded Malay |
| KTBM | Kod Tangan Bahasa Melayu |
| BIM | Bahasa Isyarat Malaysia |
| MFD | Malaysian Federation of the Deaf |
| ICT | Information and Communication Technology |
| CD | Compact Disk |
| VCD | Video Compact Disk |
| DCT | Dual Coding Theory |
| WMT | Working Memory Theory |
| CLT | Cognitive Load Theory |
| ADDIE | Analysis Design Development Implementation Evaluation |
| LR | Literature Review |

# CHAPTER 1

# INTRODUCTION

## 1.1 Background of Study

The United Nations states that the estimated number of persons with disabilities (PWD) in Malaysia is about 2.8 million (Zulkiple, 2011). These increasing numbers of PWD attracts the researchers to develop various technologies that could assist them in their daily life, which is known as Assistive Technology (AT). The term AT has long been used, referring to technologies developed for PWD. Each PWD uses different AT based on their types of disability. The AT could be founded in terms of hardware and software. In conjunction, this study focuses on designing assistive educational software for deaf and hearing-impaired people, which is known as Assistive Courseware (AC). AC could be used to help hearing-impaired students in their learning process.

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 1.1 lists and classifies the degrees of hearing loss in dB (Decibel). Referring to the table, this study considers all types of hearing loss.

The contents of the thesis is for internal user only

## REFERENCES


Ahlers, K., & Vila, J. (1992, February 1-5). Read-My-Lips: A Multimedia Project for the Hearing Impaired. In *Proceedings of the Johns Hopkins National Search for Computing Applications to Assist Persons with Disabilities*, Laurel, MD, 7-9.

Ali Ab. Ghani, Sofian Azmi Tajul Arus, & Hajar Mohd Nor. (2009, November 15-17). ICT Literacy (ICTL) Programme: The Malaysian Experience. In *Proceedings of 13th UNESCO-APEID International Conference World Bank-KERIS High Level Seminar on ICT in Education: ICT Transforming Educatio,* Hangzhou, China.

Baddeley, A. (1992). Working Memory. *Science, 255*, 556-559.

Barry, C., & Lang, M. (2001). A Survey of Multimedia and Web Development Techniques and Methodology Usage. *Journal of Multimedia, IEEE, 8*(2), 52-60.

Brinkman, W.P., Haakma, R., & Bouwhuis, D.G. (2008). *Component-Specific Usability Testing.*

Bushro Ali & Halimah Badioze Zaman. (2006, June 13-15). Framework for Adaptive Multimedia Mathematics Courseware. In *Proceedings of the 2nd IMT-GT Regional Conference in Mathematics, Statistics, and Application*, Penang, Malaysia.

Chandler, P., & Sweller, J. (1991). Cognitive Load Theory and the Format of Instruction. *Cognition and Instruction, 8*(4), 293-332.

Cooper, R.A. (1995). *Rehabilitation Engineering Applied to Mobility and Manipulation*. Bristol, U.K.: Institute of Physics Publishing.

Faizah Maarof. (2009). *Guidelines of Assistive Courseware (AC) for Hearing Impaired Students*. Unpublished master's thesis, Universiti Utara Malaysia, Kedah, Malaysia.

Giam, K.H. (2007). Gaya Pembelajaran dan Penggunaan Multimedia dalam Pengajaran dan Pembelajaran. *Jurnal Pendidikan TigaENF 1999/2000, 2*(3), 57-63.

Grutnerz, I., Weibelzahl, S., & Waterson, P. (2004, March 14-17). Improving Courseware Quality through Life-Cycle encompassing Quality Assurance. In *Proceedings of 2004 ACM Symposium on Applied Computing*, Nicosia, Cyprus.

Jacks, M., Marsh, D., & Massey, C. (2000, April). Welcome to the Silent Zone Multimedia Courseware on Sign Language. *ACM SIGBIO Newsletter, 20*(1), 17-19.

Jamalludin Harun, Baharuddin Aris, & Zaidatun Tasir. (2003). *Pembangunan Perisian Multimedia Satu Pendekatan Sistematik*. Kuala Lumpur, Malaysia: Venton Publishing.

Jayaratna, N. (1994). *Understanding and evaluating methodologies*. McGraw-Hills.

Juozenas, A., Kasparaitis, P., Ratkevicius, K., Rundinskas, D., Rudzionis, A., Rudzionis, V., & Sidaras, S. *DfA Implementations for People with Vision and Hearing Dissabilities: Application and Development for Information Society,* C. Stephanidis (Ed.): Universal Access in HCI, Part I, HCII 2007, Springer-Verlag Berlin Heidelberg 2007, pp.686-695.

Klironomos, I., Antona, M., Basdekis, I., Stephanidis, C. (2005). EDeAN secretariat for 2005 White Paper: Promoting Design for All and e-Accessibility in Europe Universal Access in the Information Society. *International Journal, 5* (1).

Laurel, B.K. (1986). "*Interface as mimesis", User Centered System Design*. London. Flagg, B. N. (1990). Formative Evaluation for Educational Technologies. Hillsdale, NJ: Lawrence Erlbaum Associates.

Malaysian Federation of the Deaf. (2007). Retrieved on January 10, 2011, from http://www.mfd.org.my/public/index.asp

*Malaysian Sign Language Guide*. (2003). [VCD]. Malaysia: Persekutuan Orang Pekak Malaysia.

Mayer, R.E. (2001). *Multimedia learning*. Cambridge, UK: Cambridge University Press.

Maznah Abu Bakar dan Siti Zaharah Ishak. (2011). *Buku Teks Bahasa Isyarat Komunikasi: Masalah Pendengaran Tahun 1*. Kuala Lumpur, Malaysia: Dewan Bahasa dan Pustaka.

McMillan, S.J. & Downes, E.J. (2000). Defining Interactivity: A Qualitative Identification of Key Dimensions. *New Media and Society, 2*(2), 151-179.

Ministry of Education. (2010). *Kurikulum Standard Sekolah Rendah Pendidikan Khas (Masalah Pendengaran): Modul Pengajaran dan Pembelajaran Bahasa Isyarat Komunikasi Tahun Pengukuhan*. Putrajaya, Malaysia: Kementerian Pelajaran Malaysia.

Mohd Feham Md. Ghalib. (2008). Pemanfaaatan Teknologi dalam Pengajaran Bahasa Arab. Retrieved February 28, 2012 from http://staff.iium.edu.my/mfeham/index.php?download=Teknologi_Arab_SEBAKA2008.pdf

Mohd Jimadie. (2008, April). Industri Pendidikan Bahasa Isyarat di Malaysia. *Dewan Bahasa dan Pustaka.*

Muhammad Haziq Lim Abdullah, Syariffanor Hisham, & Shahril Parumo. (2009, September). MyLexics: An Assistive Courseware for Dyslexic Children to Learn Basic Malay Language. *ACM Sigaccess Newsletter, (*95), 3-9.

Murniwati, A. (May 2007). *Wireless Notification for the Hearing Impaired*. Universiti Teknologi Malaysia.

Najjar, L.J. (1996). Multimedia information and learning. *Journal of Educational Multimedia and Hypermedia, 5*(2), 129-150.

Nielsen, J. (2000). *Why You Only Need to Test with 5 users*. Retrieved March 9, 2012 from http://www.useit.com/alertbox/20000319.html

Nielson's, J. (1993). *Usability Engineering*. Morgan Kaufmann Publishers Ins., San Francisco, CA.

Norfarhana Abdollah, Wan Fatimah Wan Ahmad, & Emelia Akashah Patah Akhir. (2010, May 7-10). Design and Development Methodology of 'Komputer Saya': Multimedia Courseware for Slow Learners. In *Proceedings of 2nd International Conference on Computer Research and Development*, Kuala Lumpur, Malaysia.

Normahdiah Sheik Said. (2004). *An Experimental Study to Develop an Engaging Multimedia Design Model for Children*. Universiti Putra Malaysia. Retrieve February 27, 2012 from http://psasir.upm.edu.my/6604/1/TLN_2004_9(1-24).pdf

Norshuhada Shiratuddin &Shahizan Hassan. (2010). *Design Research in Software Development: Constructing and Linking Research Questions, Objectives, Methods and Outcomes*. Kedah, Malaysia: Universiti Utara Malaysia Press.

Norziha Megat Mohd Zainuddin, Halimah Badioze Zaman, & Azlina Ahmad. (2010a, May 7-10). A Participatory Design in Developing Prototype an Augmented Reality Book for Deaf Students. In *Proceedings of the Second International Conference on Computer Research and Development*, Kuala Lumpur, Malaysia.

Norziha Megat Mohd Zainuddin, Halimah Badioze Zaman, & Azlina Ahmad. (2010b, June 15-17). Developing Augmented Reality Book for Deaf in Science: The Determining Factors. In *Proceedings of the International Symposium on Information Technology*, Kuala Lumpur, Malaysia.

Nur Hazwani Mohamad Roseli, Nurulnadwan Aziz, & Ariffin Abdul Mutalib. (2010, June 15-17). The Enhancement of Assistive Courseware for Visually Impaired Learners. *In Proceedings of the International Symposium on Information Technology*, Kuala Lumpur, Malaysia.

Oosterholt, R., Kusano, M., & Vries, G.D. (1996). *Interaction Design and Human Factors support in the Development of Personal Communicator for Children*. Retrieve January 15, 2012 from http://www.waterlander.com/images/p450-oosterholt.pdf

Paivio, A. (1971). *Imagery and verbal processes*. New York: Holt, Rinehart, and Winston. (Reprinted 1979, Hillsdale, NJ: Lawrence Erlbaum Associates).

Paivio, A. (1986). *Mental representations: A dual coding approach*. New York: Oxford University Press.

Paivio, A. (1991). Dual coding theory: Retrospect and current status. *Canadian Journal of Psychology, 45*, 255-287.

Paivio, A. (2006). *Dual Coding Theory and Education*. University of Western Ontario.

Paulraj, M. P., Sazali Yaacob, Hazry Desa, & Wan Mohd Ridzuan Wan Ab Majid. (2009, March 6-8). Gesture Recognition System for Kod Tangan Bahasa Melayu (KTBM) Using Neural Network. In *Proceedings of the 5th International Colloqium on Signal Processing and Its Application*, Kuala Lumpur, Malaysia.

Pearson, E. & Koppi, T. (2001). Developing More Effective Access to Higher Education for People With Disabilities: A Case Study in the Design of Accessible Online Courseware. In C. Montgomerie & J. Viteli (Eds.), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2001* (pp. 1470-1472). Chesapeake.

Persekutuan Orang Pekak Malaysia (Malaysian Federation of the Deaf). (2007). *Bahasa Isyarat Malaysia (Malaysian Sign Language)*. Selangor, Malaysia: Persekutuan Orang Pekak Malaysia.

Person With Disabilities Act, 685 Malaysia. (2008).

*Prayer Guidelines in Malaysian Sign Language*. (2000). [VCD]. Malaysia: Persekutuan Orang Pekak Malaysia.

Preece, J., Rogers, Y., & Sharp, H. (2007). Interaction Design: beyond human-computer interaction 2nd edition. John Wiley & Sons, Ltd. England.

Rafaeli, S. (1988). Interactivity: From new media to communication. *Journal of Sage Annual Review of Communication Research: Advancing Communication Science, 16*, 110-134.

Rief, S.F. (1993). *How to reach and teach ADD/ADHD children*. West Nyack, NY: The Center for Applied Research in Education.

Sadoski, M., & Paivio, A. (1994). A dual coding view of imagery and verbal In R. B. Ruddell, M. R. Ruddell, & H. Singer (Eds.), *Theoretical models and processes of reading* (4th ed.) (pp. 582-601). Newark, DE: International Reading Association.

Sadoski, M., & Paivio, A. (2001). *Imagery and text: A dual coding theory of reading and writing.* Mahwah, NJ: Lawrence Erlbaum Associates.

Sadoski, M., & Paivio, A. (2004). A Dual Coding Theoretical Model of Reading.

Savita, K. S., & Nur Athirah, A. P. (2011). Malay Sign Language Courseware for Hearing-Impaired Children in Malaysia. *World Applied Sciences Journal 12*, 59-64.

Shawn, L.H. (2007). *Just Ask: Integrating Accessibility throughout Design*. Retrieved January 20, 2012, from http://uiaccess.com/accessucd/

Siti Zaharah Mohid & Nor Azan Mat Zin. (2010, June 15-17). Courseware Accessibility for Hearing Impaired. In *Proceedings of the International Symposium on Information Technology*, Kuala Lumpur, Malaysia.

Settachai Chaisanit, Surachai Suksakulchai, & Ratchadawan Nimnual. (2010, October 27-30). Interactive Multimedia Courseware of Vowel Training for the Hearing Impaired. In *Proceedings of the International Conference on Control, Automation and Systems*, Kintex, Gyeonggi, Korea.

Shujuan, Z., Wei S., Zheng L., Qibo H. (2010). The Principles of Multimedia Teaching Design Based on Cognitive Load Theory. In *Proceedings of the 2nd International Conference on Education Technology and Computer (ICETC).*

Social Welfare Department. (2008). *Laporan Statistik Orang Kurang Upaya (OKU)*. Retrieved Disember 02, 2011, from http://www.jkm.gov.my/

Social Welfare Department. (2009). *Laporan Statistik Orang Kurang Upaya (OKU)*. Retrieved Disember 02, 2011, from http://www.jkm.gov.my/

Social Welfare Department. (2010). *Laporan Statistik Orang Kurang Upaya (OKU)*. Retrieved Disember 02, 2011, from http://www.jkm.gov.my/

Social Welfare Department. (2012). *Kerajaan Peka Akan Keperluan OKU*. Retrieved April 5, 2012, from http://www.jkm.gov.my/

Sutton-Spence, R., & Woll, B. (1999). *The Linguistics of British Sign Language: An Introduction*. United Kingdom: Cambridge University Press.

Sweller, J. (1988). Cognitive load during problem-solving: Effects on learning. *Cognitive Science, 12*(2), 257-285.

*Utusan Malaysia*. (2011, May 16). Kerajaan Komited Pertingkat Prasarana OKU.

Wilcox. J. (2003). *Developing Professional Skills* [Booklet]. Liverpool: The UK Centre for Materials Education.

Wilkes, D.M., Tugcu, M., Hunter, J.E., & Noelle, D. (2005). Working Memory and Perception. In *Proceedings of IEEE International Workshop on Robots and Human Interactive Communication*.

Zailan Arabee Abdul Salam & Azmi Mansur. (2006). MyGfl: A Lifelong Learning Platform for Malaysia Society. *The Electronic Journal of e-Learning, 4*(1), 7-14.

Zulkiple Ibrahim. (2011, June 2). Most Handicapped People Not Yet Registered With JKM. *Malaysian National News Agency (Bernama.com)*. Retrieved October 2, 2011, from http://www.bernama.com/bernama/