A Design of Educational Multimedia Software for Disability: A Case Study for Deaf People

Ananthi Krishnasami Masitry, Mazlina Abdul Majid, Tutut Herawan

Faculty of Computer System and Software Engineering
Universiti Malaysia Pahang
Lebuhraya Tun Razak, 26300 Kuantan Pahang, Malaysia

ananthi@shahputra.edu.my, mazlina@ump.edu.my

Abstract. This paper focuses on develop a new multimedia courseware for disabilities students mainly for students who have hearing problem. This application can be used by deaf pupils to learn sign language by watching video and animation pictures to communicate with other deaf people. This system will be providing the student to select the alphabetical and see the picture and the sign language explanation. The student also allows selecting the number and picture to view and with the sign language explanation. With the navigation provide to e-MSL allow the student to access with easily.

Abstract: Education; Multimedia software; Disability; Deaf people.

1. Introduction

The new technology can help to decrease the difficulty that disabilities people faces in daily life to use the information services like normal people [1]. Disable people face difficulties when they want to involve or learn the new technologies in computer. Disabilities people may have several problems with hearing and seeing like a normal people. Sign language is a natural language that evolved from the communication of deaf people and their families, e.g. Sign Language of the Netherlands [2]. Children with learning disabilities often find learning a difficult and painful process. Learning disabilities is describes as a specific kind of learning problem. In the daily life the disabilities children will face difficulty when they going throw the process of reading, writing and listening. Learning disabilities between these children's may not be same problems with other disabilities children; they might have different kinds of learning problems. According to [3], the studies have shown that children with learning disabilities can improve reading comprehension skills. Teaching deaf people to read is a difficult task, in fact the researches prove that phonological process takes a part in the achievement of reading skill [4]. Moreover, written languages contain a big number of phonetic markers which are essential to understand the means of sentences. In 1979, Conrad confirmed that some deaf readers use an orthographies strategy as an alternative to the phonological. Although it appeared that this strategy is less effective than the phonological [5], a study of the reading and writing skills acquisition done by Padden and Ramsey in 1998 on the large sample of deaf and hard-of-hearing children

show that there are a moderate association between the finger-spelling comprehension and reading comprehension [6].

Deaf children still have the read difficulties on reading in the adulthood. Moreover, reading levels of hearing impaired is lower than the reading level of hearing student. In 1996, [7] have confirmed that their learning progress is extremely slow. The reading capability of the adult's deaf people is parallel to the reading likely of 8 to 9 years old hearing child. As a result, the gain of knowledge collected by deaf children in four years is equivalent to the gain of one year for hearing [7]. The promise to give the best educational method to deaf or hard program for deaf of hearing student guidelines for quality standards is created by the California Department of education in 2000 [8].

The usage of ICT can develop the classic educational method by new educational learning methods based on multi-media contents. Current problem is how far the helpfulness of the current education multimedia application can be used suitably and attractive for students' disabilities. It supposed to have an example to introduce elements to assist the disability student to feel more attractive to use this educational multimedia application. Interactive multimedia software can develop the knowledge between disabilities students' with a purpose to support them to learn and feel enjoyable without stress. With Using the manual system in the special schools for disabilities students the teachers can only introduce the word, number, color and other through book. This method may not represent this disabilities student's interest to learn more and they will feel difficult to understand. On the other hand this interactive multimedia application might help these students to capture the words easily and it is interesting to learn.

This paper focuses on develop a new multimedia courseware for disabilities students mainly for students who have hearing problem. It develops a prototype in teaching and learning process by using the multimedia features such as graphics, text, animation and audio. This courseware can be used by deaf pupils to learn sign language by watching video and animation pictures to communicate with other deaf people. The aims of the software are (1) to develop a courseware for deaf pre-school students by using the multimedia features such as pictures, text, video, sound and animation. (2) To improve learning performance amount the deaf students with the colorful text, animation, sounds, video and pictures for long learning concentration. The rest of this paper is organized as follows. Section 2 describes the literature review on multimedia technology for deaf people. Section 3 describes the methodology used to develop this project. Section 4 describes the implementation. Section 5 describes the results and discussion. Finally the conclusion of this work is described in Section 6.

2. Multimedia Technology for Deaf People

The growth of the multimedia technology and network technology, multimedia network education has become an expected development [9]. Multimedia is a good communication tools education society with its own characteristics [10]. Multimedia authoring tools were originally developed more than 20 years ago to help non-programmers develop multimedia presentation, especially in the area of education [11]. According to [12], multimedia technology can involve the computer presentation of multiple media format (e.g. text, pictures, sounds, video etc). Deafness is the

2

complete loss to hear from one or both ears which can be inborn or happens by (1) condition during birth (2) infectious diseases (3) medications.

According to [13], sign language happens by movement and space of the hands and eyes which communicate conceptually with iconic narration. With the establishment of the Federation School for the deaf (FSD) in Penang in 1954, education was first introduced to the Deaf [14]. The results indicated many deaf and hard hearing individuals have difficulty with reading [5,15]. According to [16] speech plays a role in the short-term process to serve understanding of grammar and text comprehension. Speech plays a role in the short-term memory processes that serve understanding of grammar and text comprehension [16].

3. A Design of Educational Multimedia Software for Disability: A Case Study for Deaf People

This section described a screen shoot of educational multimedia software design for deaf people.

Figure 1: Illustrate the Home Screen of the courseware which is known as e-MSL. E-MSL stands for Electronic Malaysian Sign Language. User has to click "Enter" into Main Menu.
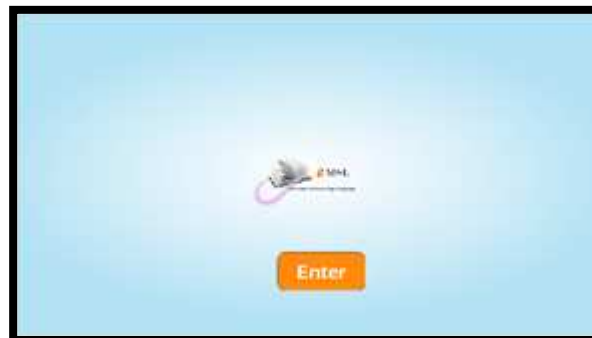

Figure 2: shows the four module of Electronic Malaysian Sign Language (e-MSL). Four Modules at this screen are Alphabets, Numbers, Words and Quiz. User can select any of the modules to enter into.

Figure 3: shows the user interface design of the Alphabets interface. User can select A to Z. When user chooses the Alphabets, it will display the colorful alphabets, MSL sign, picture and the video clips. User can click "home" button to enter into Main Menu interface and click "exit" button to into Home Page.

Figure 4: shows the user interface design of the Numbers interface. User can select 1 to 10. When user chooses the Number we can see the MSL sign of the numbers and picture. User can click "home" button to enter into Main Menu and click "exit" button to into Home Page.

Figure 5: shows the user interface design of the Words interface. User can use the arrow to right to view the next screen. User can click "home" button to enter into Home interface and click "exit" button to into Home Page.

Figure 6: shows the user interface design of the Quiz interface. User can click at "Play Now" to start the quiz. User can click "home" button to enter into Home interface and click "exit" button to into Home Page.

Figure 7: shows the user interface design of the Quiz interface. When user select the "Play Now" button it allow the user enter into this screen. User has to select the correct answer to enter into next question. User can click "home" button to enter into Home interface and click "exit" button to into Home Page.

4. RESULTS ON THE STUDENT'S STUDY PERFORMANCE

During the observation the researcher identity the objective for developing a courseware for preschool hard hearing students successfully completed. The preschool students involve in this observation understood what was taught by the teachers. Each of the students participate with happy and enjoy with the courseware. By the observation also the researcher find out all the modules provide in the e-MSL really help the student to complete the lesson as what they require. At end of the lesson the students manage to select the module and received the learning objectives correctly. When the teacher teach using the traditional method, the class has to be start

with the previous day lesson to make sure the student recall back the lesson has been teach the previous day. This method was used to make sure the student still remembers the sign language teach before the teacher introduce new sign language. With this courseware the teacher might be finding easy to teach the sign language to the students. Example module alphabetical the entire alphabet display at below and the student can select any alphabet and watch the video or the sign picture that already have on the screen. If the student cannot follow the lesson given by the teacher on the day at classroom, the student still can use this courseware to follow up the lesson with help from their parents and the teacher also. The results showed positively when the researcher do the observation with the students inside the classroom, that the students could recall what was being taught and this proved that the learning objectives were delivered effectively. Interaction with the models as Alphabetical, Numbers, words and quiz give a good direction to the student and make them easy to understand. When the kids select module alphabetical has image and video to make them more interested and enjoy learning.

5. RESULT DISCUSSION

5.1. Advantage using this system

(i) Increase learning performance

By use the courseware, the children able to retain knowledge of the alphabets and the numbers after spending merely one hour on the courseware. This situation is best understood since with inclusion of video, the children are more capable to find the different between the image, sign and meaning of the particular alphabetical. The picture of an item, the children could illustrate the sign of the alphabets, numbers and words correctly. Their attention span and interest to learn the word has increased satisfactorily. According to the children as well the teacher, they like the usage of colors and the design of the alphabets and numbers. The quiz module allow the children answer the sign language on alphabetical. The children felt at ease in navigation the application due to its simplicity and friendliness.

(ii) Extra features compare to other existing sign language

According to [17], mobile-learning is a type of learning which leverages on the mobile device's portability and affordability. Mobile-learning is considered as a form of teaching and learning that occurs through mobile devices such as mobile phones, Personal Digital Assistants (PDA), and others. Mobile-learning allows learners to access computer-based learning anytime, anywhere [18], and mobile-learning overcomes poor internet connectivity, frequent power disruptions and low PC support and availability, especially in remote and rural areas and build up by the power and talent of the mobile phone networks. The extra features compare to other exiting sign language, e-MSL courseware can run on the Mobil application. Currently there is no MSL learning tool on the market that is complete enough to transmit early literacy education for young deaf children on smart phone. This will help the students be able to access on their own progress and used in form of touch screen.

5.2 User exception

The sign embedded in the e-MSL courseware come with pictures and video of the alphabetical, therefore easier for the students to select the alphabet and understand the alphabet with particular picture. By having teaching aids and new information technology to teach the students, this do improve the effectiveness of learning, because only then a fun and interesting satisfying environment can attract students to be interested in studying. The teacher showed high satisfaction level on the performance of the children and the courseware. This has demonstrated a high prospect for the courseware to be utilized at school and home by the children, teacher and parent or even to commercialize for local market. Therefore, this creates a comfortable learning gap for the preschool deaf students to master in the e-MSL application.

6. CONCLUSION

This study has successfully identified existing learning tools based on MSL in Malaysia. MSL is the official sign language for the hearing-impaired students in Malaysia and widely being used among them. Currently there are not many MSL learning tool on the market that are perfect enough to transmit early literacy education for young deaf students. In conclusion, this study has fulfilled the project objectives with the development of e-MSL. It has provided an added courseware for the early literacy development and learning for young hearing-impaired children to achieve MSL language at their own speed. Moreover, with the presence early start as alphabets, numbers and words modules feature have increased satisfactorily the children ability to understand and memorize the alphabets, numbers and words learnt. The add quiz module will help the students to see their progress and the knowledge using this courseware**.**

6.1 FUTURE ENHANCEMENTS AND EXPANSION

The future recommended features to produce a much comprehensive version of e-MSL are by including interactive function of user controlled rotational view and add more languages (Malay and English) options. Also, enlarge the database of words which take into account of dialects or slangs and with multiple stages of exercises. It helps in giving value-added courseware for the children, teachers, parents and Malaysia deaf community as a whole multiple languages to incorporate instructions in other languages such as Malay, Chinese and Tamil. Moreover, add more multi level quiz and exercise and add another module for test bank question. This can make the students to access their own progress. Also, develop a larger database which the children can search a particular sign to know the word, its meaning, image of the words. The fundamental structure that can be used in the future is in form of touch screen. The learning method can be more interesting, fast and easy. This has demonstrated a high vision for e-MSL to be utilized at school and home by the children and teacher and even can be commercialized for local market.

References

1. World Federation of the Deaf. Position Paper Regarding the United Nations Convention on the Rights of People with Disabilities. Ad Hoc Committee on a Comprehensive and Integral International Convention on the Protection and Promotion of the Rights and Dignity of Persons with Disabilities, 24 June 2003

2. Lichtenauer, J.F., G. A. ten Holt, E. A. Hendriks, M. J. T. Reinders, A. Vanhoutte, I. Kamp, J. Arendsen, A. J. van Doorn, H. de Ridder, E. Wenners, et al. A learning environment for sign language. In the Proceeding of 8th IEEE International Conference on Automatic Face & Gesture Recognition, 2008 (FG '08), 1-2 (2008)

3. Palincsar, A. S. and Brown, D. S. Enhancing instructional time through attention to metacognition. Journal of Learning Disabilities, 20 (2), 66-75, (1987)

4. Juozenas, P., Kasparaitis, K., Ratkevicius, D., Rundinskas, D., Rudzionis, A., Rudzionis, V., and Sidaras, S. DfA Implementations for People with Vision and Hearing Dissabilities: Application and Development for Information Society. In C. Stephanidis (Ed.): Universal Access in HCI, Part I, HCII 2007, Lecture Notes in Computer Science 4554, 686-695 (2007)

5. Conrad R. The deaf school child: Language and cognitive function. Harper&Row, London (1979)

6. Padden C. and Ramsey C. Reading ability in singing deaf children. Topics in Language Disorders, 18, 30-46 (1998)

7. Marschark, M. and Harris M. Success and Failure in Learning to Read: The Special Case of Deaf Children. In C. Cornoldi and J Oakhill (Eds): Reading Comprehension Difficulties: Processes and Intervention, 279-300 (1996)

8. C. Musselman. How Do Children who can't Hear to Read and Alphabetic Script? A Review of the Literature on reading and Deafness. Journal of Deaf Studies and Education 5 (1), 9-31, (2000)

9. L. Qingsong. The Application of Multimedia technology in Web Education. In the Proceeding of International Conference on Medical Physics and Biomedical Engineering, (2012)

10. K. Adistambha, S.J. Devis, C.H. Ritz, L. Burnett. Efficient multimedia query-by-content from mobile devices. Computers & Electrical Engineering, 36(4), 626-642 (2010)

11. T. Arndt and E. Katz. Visual software tools for multimedia authoring. Journal of Visual Languages & Computing, 21(3), 184–191 (2010)

12. Lee. L.W. Development of Multimedia Learning Resources for Children with Learning Disabilities. In an Undergraduates Special Education technology Course Malaysia Education Deans' Council,1, 29-36 (2007)

13. Kyle, J.G. and B. Woll. Sign language; The Study of Deaf People and Their Language. Cambridge University Press (1985)

14. Lim L., Woo S., Chong, A, et al. Understanding deaf culture, Malaysia perspectives. Majudiri Y Foundation for the Deaf Press, Kuala Lumpur (2006)

15. Gallaudet Research Institute. Literacy and deaf students (2003)

16. Lichtenstein, E.H. The relationship between reading processes and English skills of deaf college students. Journal of Deaf Studies and Deaf and Deaf Education, 3(2), 80-134 (1998).

17. Yamaguchi, T., 2005. Vocabulary learning with a mobile phone. Program of the 10th Anniversary Conference of Pan-Pacific Association of Applied Linguistics, Edinburgh, UK.

18. Traxler, J., 2007. Making Good Use of Mobile Phone Capabilities. Retrieved 15 November, 2008 from
http://www.elearningafrica.com/newsportal/english/news70.php

19.