

Assistive Contents for Hearing-Impaired People

**Ariffin Abdul Mutalib, Syarifah Nadia Syed Yahya, Sobihatun Nur Abdul Salam,
Mazida Ahmad, and Massudi Mahmuddin**

Universiti Utara Malaysia (UUM), Malaysia, {am.ariffin, sobihatun, mazida, ady}@uum.edu.my

ABSTRACT

This paper reports an ongoing study on designing a learning content for hearing-impaired people. Since teaching hearing-impaired people orally is too burdening, both the teachers and students, an alternative has to be provided. Hence, the idea of providing contents in electronic means came into consideration. It is useful, because the hearing-impaired students could utilize the contents on their own pace. Understanding their limitations, this study attempts to gather the preferences by the hearing-impaired people. Hence, a series of interviews were conducted, assisted by a sign language interpreter. Based on the findings from the interviews, the contents were storyboarded. It was used for gathering feedback from the users. When the most preferred layout was determined, the content was developed, and tested with the users. It was found that the proposed requirements are able to make hearing-impaired happy to learn with the material, which is called Assistive Content for Hearing-impaired (AC4HI) people.

Keywords: Hearing-impaired, sign language, learning.

I INTRODUCTION

There are more 66 million people in the world suffer hearing-impaired (Hong et al., 2011). For this study, they are special people who deserve to acquire knowledge and perform daily tasks similar to normal people. Hence, their limitations need to be cared wisely. Realizing that situation, this study ventures into discovering factors those could assist hearing-impaired people in their learning process. Part of the initiatives includes determining guidelines for applications for the hearing-impaired people (Ariffin & Faizah, 2010). The guidelines have been adapted and incorporated into applications for the hearing-impaired people as reported in Nurulnadwan, Zatul Amilah, Nur Hazwani, Nurul Ulfa, Afiffin, and Mohd Saifullizam (2011) and Zatul Amilah, Nurulnadwan, Afiffin, and Mohd Saifullizam (2011). Later, the guidelines were further refined for hearing-impaired students of higher learning institutions, which shows not big difference (Ariffin, Sharifah Nadia, & Sobihatun, 2012).

Further, this paper extends those works, by determining whether hearing-impaired students prefer to learn either with courseware or video. It has to be determined because the nature of courseware and video are different. Conceptually, courseware could be designed with high-level complexity, while video just involves low level (Borsook & Higginbotham-Wheat, 1991). In terms of interaction style, users have to click buttons in courseware to operate and get to the content. This is not required in video, in which the users could watch the contents that move on their own. When necessary, they could use the minimal interaction mechanism to jump to certain content (Dix, Finlay, Abowd, & Beale, 2004).

Based on the descriptions in the previous paragraphs, this study aims to determine whether hearing-impaired learners of higher learning institutions prefer to learn with either courseware or video. Additionally, a learning object is developed to demonstrate the guidelines obtained through the works reported in Ariffin, Sharifah Nadia, and Sobihatun (2012).

While this section establishes the background for the work in this paper, the next section explains about the techniques gone through in achieving the aim. It discusses also about the determined results. Further, the design and development of the learning object are elaborated in the next section, before the final section ends the paper by discussing the next actions.

II METHOD

This study carried out a field study involving the real users and their teachers. The field study included interviews, which was helped by a translator. The interviews involved 17 hearing-impaired students of Politeknik Tuanku Syed Sirajuddin (PTSS), Perlis. In Malaysia, only PTSS and another Polytechnique in Johor provide academic programme for hearing-impaired students. When asked about the difference among students between both polytechnique, their teachers mention that they share similar characteristics. Their attitude and behavior are very much influenced by their disability. In short they are homogenous.

Further, 17 hearing-impaired students participating in the interviews were sufficient enough to gather meaningful data. In fact, their feedback were stagnant

already, hence, employing more hearing-impaired students would just incur non-productive cost, energy, time, and focus. This is inline with the suggestion by Mayhew (1999).

A. The Interview

The interview was aimed at deciding on the preferred interaction style for learning application for the hearing-impaired people. Besides, the basic requirement for their learning contents was within the interest. The 17 hearing-impaired students were interviewed openly face-to-face. Figure 1 visualizes the interview session involving a group of hearing-impaired respondents. It was very lively because the hearing-impaired students were very participative. It was because they appreciate the initiative to assist their learning experience. The language interpreter was doing his job very dedicatedly, entertaining to all reactions by the hearing-impaired students. It is followed with an interview with their teacher, which is shown in Figure 2. It was to understand teachers' challenges in facing the hearing-impaired students. The outcome of the interview is discussed in the discussion section. Then, the hearing-impaired students were interviewed individually. In Figure 3, the language interpreter is captured, assisting the interview session.



Figure 1. Interviewing In A Group

It was found that the hearing-impaired students are able to interact with computer applications. They have good experience with computers. However, when asked for their preference on the interaction style, they prefer something that does not conquer their physical actions. They addressed that they are tired of controlling mouse in computer applications. So, something that goes continuously without requiring them to click the mouse continuously for traversing the content is more preferred. This agrees with the findings by Karat, Pinhanez, Karat, Arora, and Vergo, (2001) and Ariffin and Nurshuhada (2008).



Figure 2. Interviewing The Teacher



Figure 3. The Interpreter Mediated The Interview

Thus, this study decides that video is suitable for them. Consequently, the idea of performing learning contents in a video form was expressed to them. As a result, they altogether agreed that video is their choice rather than highly interactive courseware. Hence, this study adheres to their decision.

In terms of the basic requirements, this study gathers the details as shown in Figure 4.

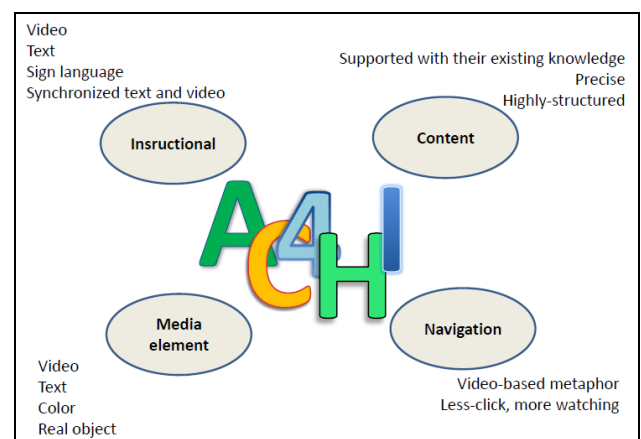


Figure 4. Basic Requirement For AC4HI.

Figure 4 explains that the *instructional* strategy for the hearing-impaired people should incorporate text and

video. The text should be minimized, so that they can focus on the visual element, which is also complemented with sign language. In fact, the sign language is a must for the hearing-impaired people. Also, the text should be synchronized with the video and sign language. In terms of *content*, it has to be highly structured. As the hearing-impaired people are slow in grasping contents, the content must be precise, and supported with their existing knowledge.

Meanwhile, the *contents* must be presented with supports of various media elements, such as text and video. In case real objects could be incorporated easily, they should be incorporated together. However, less variety of colors is more preferred by the hearing-impaired people. Among all, green should dominate the space because the color could harmonize their attention and cognition. To support user task, *navigation* should be designed efficiently. For hearing-impaired people, they prefer to click less and watch more. Hence, the video metaphor is utilized.

III DESIGN AND DEVELOPMENT

Having decided that video is the most appropriate learning content for the hearing-impaired people, this study started designing the video. It was first drafted in a storyboard (as sampled in Figure 5). The idea was put on the storyboard, discussed with the users (hearing-impaired students). When they agree, the development started.

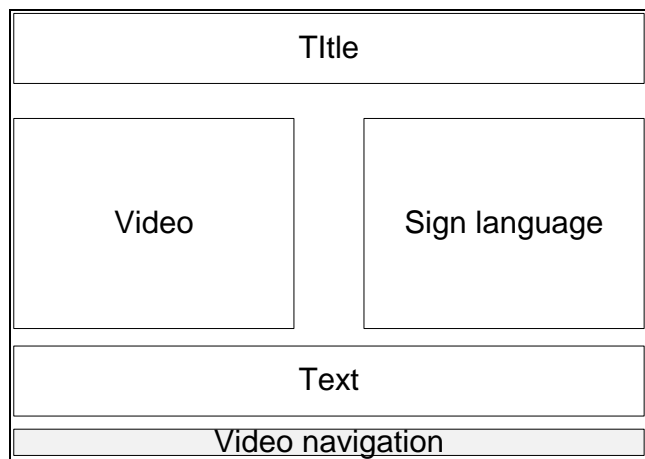


Figure 5. The Storyboard

Having decided that the layout in Figure 5 was the most preferred by the users, the development was started.

The shooting was done in PTSS, with help of their teachers, technicians, and administrative staff. The contents were on Malaysian recipe, from a course the students take in their study programme. It was decided so that the students and their teachers could

get some benefits out of the project. Figure 6 visualizes the title part in the video.

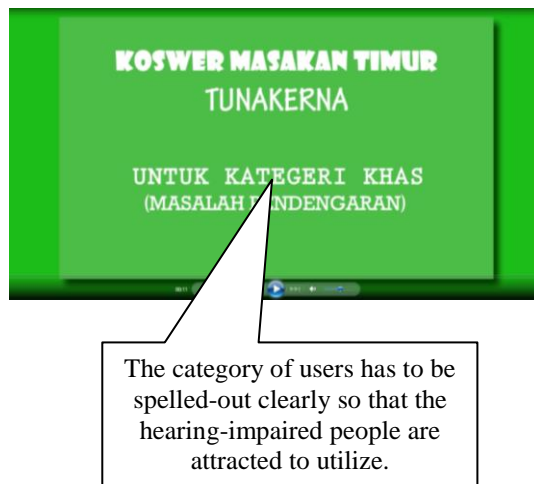


Figure 6. Title Page

Then, the introduction part is visualized in Figure 7. The text appears word by word, synchronized with the sign language and audio. There must not be any decorative element, because hearing-impaired people grab the content through visual. So, messy appearance with non-content elements make them feel tired.



Figure 7. Introduction Page

When there are video and sign language, the layout is adapted into that in Figure 8 and Figure 9. They are side-by-side, with text at the bottom. It has to always be side-by-side, because it helps the hearing-impaired people to see easily. In this form, the text must be minimized, to avoid them feel confused and tired. This is because (as stated the the previous paragraph) they rely very strongly on visual elements.

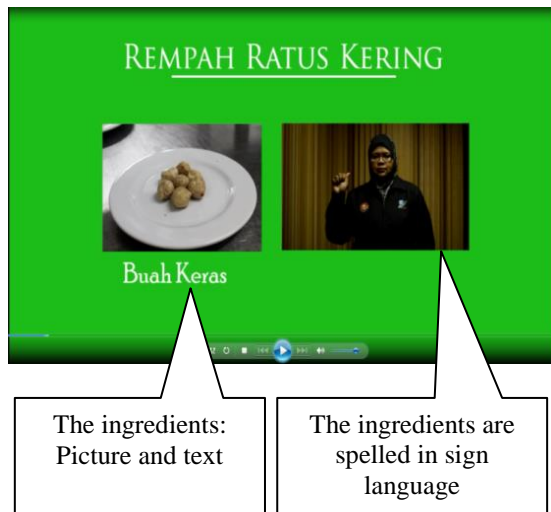


Figure 8. Video And Sign Language - Ingredients.

Throughout the video, the contents are precise, straight to the point, and highly structured. The video and the sign language are ensured synchronized. It is very important, so that the hearing-impaired could connect the sign language and the contents.

IV DISCUSSION

From the interviews, this study discovers that dealing with hearing-impaired people is very challenging. According to the teachers, they have to be very strong, cool, and passion. The hearing-impaired people really need special attention. They grab contents very slowly, and sometimes similar things need to be repeated many times. This is especially obvious in those related to reading or memorizing. In contrast, they are quite good in doing physical activities. Even though they are not as normal people, but it is far better than their performance in reading and memorizing.

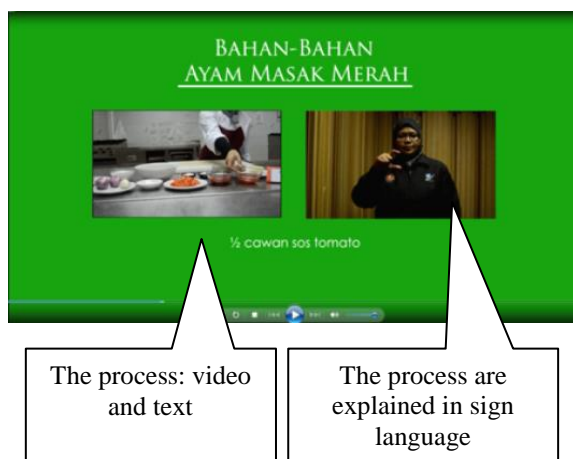


Figure 9. Video And Sign Language – Cooking Steps.

The video developed in this study makes them very happy. It was seen that they were communicating among each other while viewing the video. When they nodded, this study understood that they get the content. When they continue watching, it explains that they are not bored. This has been underlined by many authors such as Preece, Rogers, and Sharp (2007), Mayhew (1999), Schneidermen (1998), Nielsen, Clemmensen, & Yssing (2002), and Jesse (2000). Additionally, they communicates with their teachers that they prefer to have the video in addition to their books.

V CONCLUSION

Although hearing-impaired people are slow at reading and memorizing (than the normal people), they have good talents at physical tasks. So, cooking interests them, and the contents in the video developed in this study engages their attention. Not only the contents, but the instructional and navigation styles really take part in engaging their cognition.

When discussed about hearing-impaired, their characteristics are homogeneous. Hence, their requirements are also homogeneous. So, the requirements gathered in this paper could be used in other works.

REFERENCES

- Ariffin Abdul Mutalib & Norshuhada Shiratuddin. (2009). Conceptual Design Model of Reality Learning Media (RLM). In *Proceedings of eSociety'09*. ISBN: 978-972-8924-78-2. IADIS
- Ariffin Abdul Mutalib & Norshuhada Shiratuddin. (2009). Electronic learning Media (ELM): Reality Learning Media (RLM) Vs Video. In *Proceedings of WCSET'09*. WASET. [Scopus]
- Ariffin Abdul Mutalib & Norshuhada Shiratuddin. (2009). Entertaining and Fun: Experience-focused eLearning Material. In *Proceedings of ICOCI'09*. UUM. [ISI]
- Ariffin, A.M. & Norshuhada, S. (2008). Usable But Not Entertaining eLearning Materials. In *Proceedings of eLearn'08*. AACE
- Borsook, T.K. & Higginbotham-Wheat, N. (1991). Interactivity: What is it and what can it do for computer-based instruction. *Educational Technology*. 31(10). 11-17.
- Dix, A., Finlay, J., Abowd, G. D., & Beale, R. (2004). *Human-computer Interaction 3rd edition*. Pearson Education Limited. England
- Jesse, J. G. (2000). *The elements of user experience. User-centered design for the web*. USA: New Riders.
- Karat, C., Pinhanez, C., Karat, J., Arora, R., & Vergo, J. (2001). Less clicking, more watching: Results of the iterative design and evaluation of entertaining web experiences. In *Proceedings of Interact'2001*, Tokyo, Japan.
- Mayhew, D.J. (1999). *The Usability Engineering Lifecycle*. Morgan Kaufmann, San Francisco.
- Nielsen, J., Clemmensen, T. & Yssing, C. (2002). Getting access to what goes on in people's head?: Reflections on the think-aloud technique. In *Proceedings of the second Nordic conference on human-computer interaction*. ACM Press. 101-110.
- Preece, J., Rogers, Y., & Sharp, H. (2007). *Interaction Design: beyond human-computer interaction 2nd edition*. John Wiley & Sons, Ltd. England.
- Schneiderman, B. (1998). *Designing the user interface. Strategies for effective human-computer interaction. 3rd ed.* Addison-Wesley: Reading, MA.