

# Learning Object for the Hearing-Impaired: design and development of Koswer Pendidikan Islam Tunakerna (KOSPIT)

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## ABSTRACT

This paper describes about an initiative in determining requirements for learning objects for the hearing-impaired students. Interviews with the hearing-impaired students were carried out in gathering the requirements. Then, a prototype of a learning object was developed, which is called Koswer Pendidikan Islam Tunakerna (KOSPIT), in which the contents were referred to the syllabus. An initial user testing has been carried out involving the real users, which reveals that the KOSPIT, that incorporates special features for the hearing-impaired helps them in their learning activities.

**Keywords:** Hearing-impaired, learning object, assistive courseware.

## I INTRODUCTION

Hong et al. (2011) report that there are more than 66 million people worldwide suffering from hearing impairment. They are special people who deserve to acquire knowledge similar to the normal people. Hence, their limitations need to be supported wisely.

In response to that, an initial study has been carried out among hearing-impaired students of a polytechnic in Malaysia, and their lecturers. It was found that there are many problems in the teaching and learning implementation. In short, among the problems include that the students have a very low memorizing ability. Most contents are repeated several times. This results in exponential efforts on the lecturers' part. In addition, the level of cognitive among each student is different. Hence, it is very hard for lecturers to entertain them in class equally, in which it also wastes a significant amount of time.

On top of the students' weaknesses, language interpreters are required by the lecturers in their teaching activities. However, in most cases, the interpreters are not enough to cater for the needs of all courses in the polytechnic.

Based on the situations as described in the paragraphs above, this study intends to propose the use of learning objects for the purpose of hearing-impaired students' reference. At the same time, this study understands that the hearing-impaired students have obvious limitations regarding their hearing ability (Hiraga & Kato, 2006). Hence, a study on the requirements of the interaction styles

for them is necessary (Almohimeed, Wald, & Damper, 2011).

In response to that, this study collaborates with a polytechnic for a pilot project. In current stage, the Pendidikan Islam is selected for study because it is taken by all hearing-impaired students, so it helps in gathering data.

Accordingly, this paper aims at (1) gathering the requirements for the KOSPIT, (2) propose a prototype of KOSPIT, and (3) gather the hearing-impaired students' feedback on the KOSPIT.

This section elaborates the background of the initiatives being carried out, including the aims of the paper. Next, the method of study is addressed. Further, this paper discuss about the KOSPIT, which is followed with a long discussion on the users feedback and planning for the future.

## II METHOD

This study involves activities as illustrated in Figure 1. It starts with requirement gathering, design, development, and user experience testing.

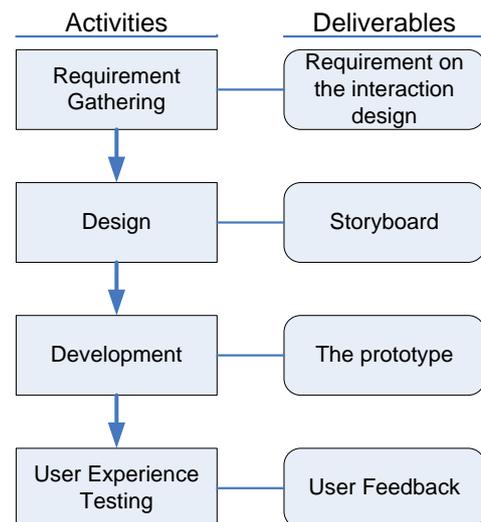


Figure 1. Summary of the activities

The requirements for KOSPIT were gathered through observing the hearing-impaired students' interactions with their lecturers, language interpreters, and among themselves. Besides that, interviews with them and their lecturers with help of the language interpreters were also taking place. Overall, this study spent a month for understanding the requirements for KOSPIT. At the end, the requirements as listed in Table 1 were obtained, which is supported by the findings of Ariffin and Faizah (2010).

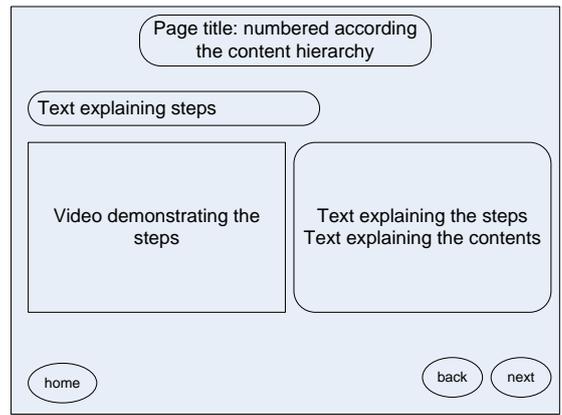
**Table 1. Requirement for KOSPIT**

Feature	Description
Content	Enough to include contents they learn in their syllabus.
Audio	Not necessary, but could be incorporated.
Video	Necessary – the hearing-impaired students rely strongly on visual contents.
Animation	Not necessary – the hearing-impaired students are confused by the animation. Additionally, the animations distract their attention.
Text	Necessary – hearing-impaired students could read. However, it should be straight-forward, because their memorizing ability is low
Navigation	Minimal and simple – hearing-impaired students prefer consistent navigation style.
Layout	Standard and simple – hearing-impaired students tend to get confused easily with the screen layout. Hence, maintaining the layout in a standard form is necessary.
Structure	Simple and standard – most hearing-impaired students have low cognitive ability. Hence, helping them with a standardized structure is sufficient
<b>Special feature</b>	<b>The contents are delivered through supports of sign language</b>

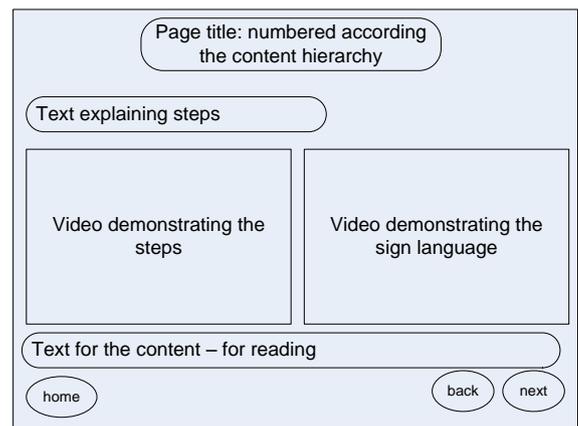
The requirements as determined in Table 1 were used to design and develop the KOSPIT, which is described next.

### A. Design

The KOSPIT was first designed in a form of a storyboard. It was used to visualize the layout and structure. In addition, the navigation buttons, specification of text, video, and content are also possible for discussion upon mutual understanding between the hearing-impaired students and this study. At the end, having proposed a number of storyboards, the storyboard in which the samples are visualized in Figures 2 and 3 were agreed for development. They contain very simple structure and layout.



**Figure 2. Storyboard - page with demonstration**



**Figure 3. Storyboard - page with demonstration and sign language**

### B. Development

Based on the storyboard, the KOSPIT was developed. The development followed the storyboard which has been agreed between the study and the users. This section visualizes the KOSPIT in Figures 4, 5, 6, and 7.



**Figure 4. KOSPIT – the montage**

Figure 4 shows the montage page of KOSPIT. It is very simple, and welcomes the hearing-impaired students with a sign language, to interest them. When users get into the KOSPIT, a laptop metaphor is displayed. This

invokes the users' interest in learning with the learning object.

Meanwhile, Figure 5 visualizes a page in KOSPIT that contains a video demonstrating *wuduk*. This element is very important, which supports learning through observation (van Lent & Laird, 2001). For the *wuduk*, extra explanation is not required; hence the video comes alone without any text explaining the task. However, some of other activities contain explanations.

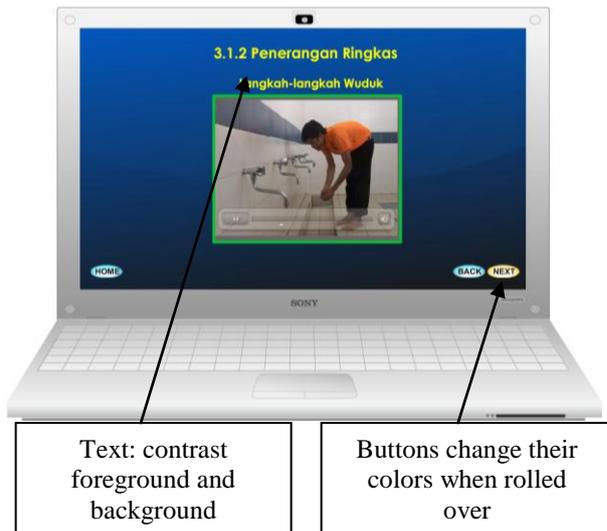


Figure 5. KOSPIT – video of demonstration

In addition, all texts in KOSPIT use a contrast color combination between the foreground and background. Besides, all texts are straight forward and simple. On the other hand, the buttons change their color when the mouse rolls over. This is a kind of visual cue, which is important in supporting the users' cognitive load (Hoffmann, Baudisch, & Weld, 2008; Preece, Rogers, & Sharp, 2007).

The page in Figure 6 contains a video of demonstration and its explanation. The video demonstrates the steps in prayers. The explanation is provided next to the video, which is ergonomic for the eyes (Ali-Hasan, Harrington, & Richman, 2008).

The approach in pages as in Figure 7 is very important for supporting the hearing-impaired students' learning needs. The contents are presented in a video format. The recitation for each step is written in local language, and is presented in a sign language. So, the users could at the same time utilize various senses in digesting the contents.

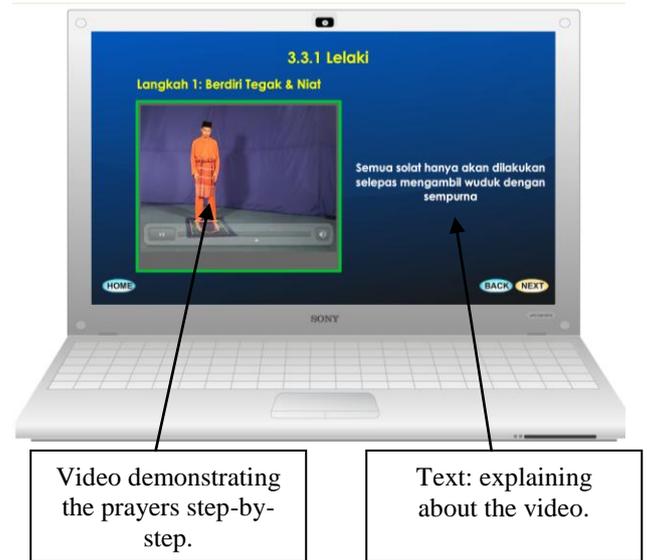


Figure 6. KOSPIT – demonstration and explanation

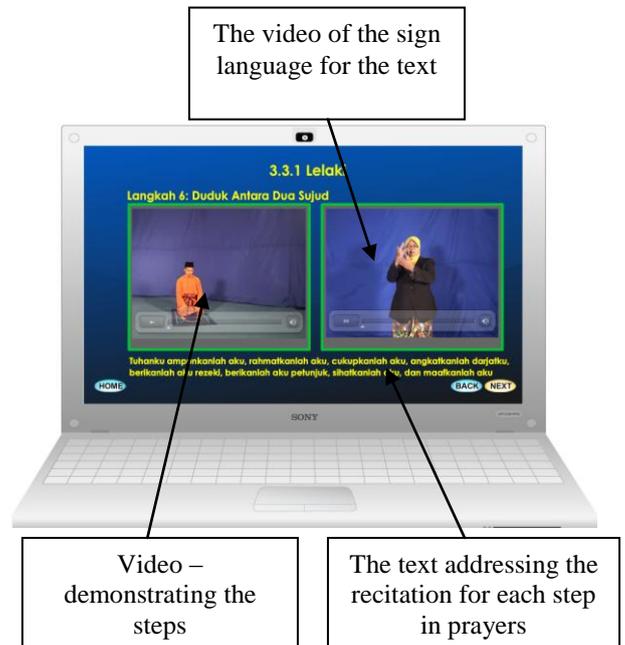


Figure 7. KOSPIT – page with sign language

It is important to note that the hearing-impaired people in Malaysia do not know Arabic. Hence, they recite the meaning of all Arabic phrases in their local language, mostly Malay. As a result, KOSPIT does not include any Arabic or al-Quran sentence.

### III USER EXPERIENCE

KOSPIT has been presented to the users. They are hearing-impaired students of Politeknik Tuanku Syed Sirajuddin, who are currently taking Pendidikan Islam in their study. They were given the KOSPIT to use in their free time, and later they were interviewed in an unstructured manner to gather their feedback, as used by Nurulnadwan et al. (2011). The interviews were assisted by a language interpreter.

Based on the interviews, this study found that the hearing-impaired students are happy with the ideas of KOSPIT. In short, the feedbacks are summarized as in Table 2.

**Table 2. Summary of user feedback**

Feature	Description
Content	The content in the KOSPIT was not asked, because it is mapped fully with the syllabus.
Audio	The hearing-impaired students do not realize the existence of the audio.
Video	The users were very excited with the video elements. They understand the contents well with help of the videos, as opposed to having to read long explanations using text.
Animation	There are some visual cues in KOSPIT, such as the buttons. This kind of animation supports their cognitive development.
Text	The use of minimal text is really positive from the users' view. As mentioned at the early part of this paper, the hearing-impaired students have low memorizing skills; hence the use of minimal text requires them to memorize less. In contrast, memorizing the demonstration in videos is pleasing for them.
Navigation	Only three buttons are used in KOSPIT, and they are standard. This makes the users easy to navigate in the learning object.
Layout and layout	The users' mental state is not like normal computer users. In accordance, the layout in KOSPIT which is very simple and standardized supports the users' attention. They always know where the video is, the sign language is, and the text is. On top of that, the title in each page always let them know where they are in the learning object, because they are labeled with hierarchical numbers.
Special feature	<b>The use of sign language is the most special features in KOSPIT. The users are surprised with the sign language elements, which makes them feel like really interacting with a live person. This motivates them in their learning.</b>

#### IV CONCLUSION

Overall, this study has managed to propose a learning object for hearing-impaired students. The intention of this paper is to discuss on the interaction styles appropriate for the learning object for hearing-impaired students. Generally, it should be assistive (Zatul Amilah, Nurulnadwan, Ariffin, & Mohd Saifullizam, 2011; Hong

et al., 2011) in ensuring the users are able to learn well with the learning object.

Regarding the interaction styles, this study aims at making the learning object for the hearing-impaired is not only functioning, but also usable. In fact, beyond that, the learning object is pleasurable (Tiger, 1992; Jordan, 2002). Accordingly, making the learning object functioning is just the basic requirement.

In response to this, the use of navigational buttons and the inclusion of appropriate contents serve the purpose of making KOSPIT functions. To make it usable, the use of proper layout and structure besides careful considerations on the text, video, animation, and sign language is utilized. Beyond that, the ability of KOSPIT to engage users' cognition with the contents through a proper blending of various media elements and the layout and structure serve the pleasurable aspects.

In future, this study intends to systematically evaluate the effectiveness of KOSPIT in the learning activities among the hearing-impaired students. Besides, the concept of KOSPIT with the determined requirements for the hearing-impaired will be used for developing other learning objects for use in teaching and learning purposes.

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