

Assistive Courseware for the Visually Impaired based on Theory of Multiple Intelligence

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ABSTRACT

This paper aims to develop an Assistive Courseware (AC) for visually-impaired (VI) learners based on multiples intelligence (MI) theory. In the introduction part the term of knowledge management (KM) is discussed and related with MI theory. Current issues regarding VI students in the context of education scenario in Malaysia is also discussed. It also outlines the objectives of the paper. Next the design and development of AC is outlined. The final part of the paper discusses the MI theory implemented in AC. The findings of this paper highlight the prototype of the AC labeled with eight type of intelligence.

Keywords

Knowledge Management, Multiples Intelligence Theory, Assistive Courseware, Visually Impaired

1.0 INTRODUCTION

Today's world has been representing hectic circumstances of managing intellectual assets into a corporate memory. This would end up by containing value and used by organization as its competitive advantage. Through the process of Knowledge Management (KM), intellectual and knowledge based assets can be generated [Singer & Hurley, 2005] in which the intellectual assets will be derived through collective perspective, insights, ideas, best practices, and lessons learnt.

Meanwhile, knowledge is the key factor for driving growth, creating new value, and providing the basis to remain competitive (Mihalca et al. 2008). Yordanova adds that KM is a method to simplify and improve the process of sharing, distributing,

creating, capturing, and understanding knowledge (2007).

In a nutshell, KM is a discipline originating from management studies, but always going hand in hand with information technologies (Mihalca et al., 2008). In addition, technology-based knowledge is driven by choice and implementation of suitable tools of interactions (Pedroni, 2007). KM technology can be seen it as technological attributes of a tool for online interaction to support KM process.

On the other hand, individual differences determine different styles of learning. It is said that each individual differs in traits such as skills, aptitudes, and preferences for processing information and applying in real world situations (Jonassen & Grabowski, 1993; Bushro & Halimah, 2006) and it is called personal knowledge. In relation, MI is one of the prominent theories regarding individual differences. It allows process of learning and understanding in dynamic and logical ways basing to the individual performance capability. The theory serves as one of the most effective curricular and instructional frameworks for classrooms teachers to use in designing their lesson plan (Bushro & Halimah, 2006).

The theory of MI was proposed by Howard Gardner in 1983. He said that "intelligence" is the ability to solve problems, or to create products, that are valued within one or more cultural setting. Gardner (1993) and Bushro and Halimah (2006) discussed that each individuals has eight types of intelligences, in which each individual may have good skills at different types. The intelligences are as follow:

Verbal-Linguistic Intelligence

This involves sensitivity to spoken and written language, the ability to learn languages, and the capacity to use languages to accomplish certain goals.

Mathematical-Logical Intelligence

This involves the capacity to analyze problems logically, carry out mathematical operations, and investigate issues scientifically.

Visual-Spatial Intelligence

Features the potential to recognize and manipulate patterns of wide space as well as patterns of more confined areas.

Intrapersonal Intelligence

Involves the capacities to understand oneself, to have an effective working of oneself including one's own desire, fears and capacities and to use such information effectively in regulating one's own life.

Bodily-Kinesthetic Intelligence

Entails the potential of using one's whole body or parts of the body to solve problems or fashion products.

Interpersonal

Denotes a person's capacity to understand the intentions, motivations and desires of other people and consequently to work effectively with others.

Naturalist Intelligence

Demonstrate expertise in the recognition and classification of the numerous species the flora and fauna of his or her environment.

Musical-Rhythmic Intelligence

In the intelligence, individuals entail skills in performance, composition and appreciation of musical patterns.

The MI with its eight types of intelligences has been used as the basis for a number of multimedia application developments for teaching and learning. This can be seen in works by Ariffin and Norshuhada (2009), Norshuhada, Landoni, Gibbs, and Shahizan (2003), and Faridah Hanim and Halimah (2008). Multimedia features including text, graphics, animation, audio, and video can cater for all types of intelligences (Chapman & Chapman, 2002).

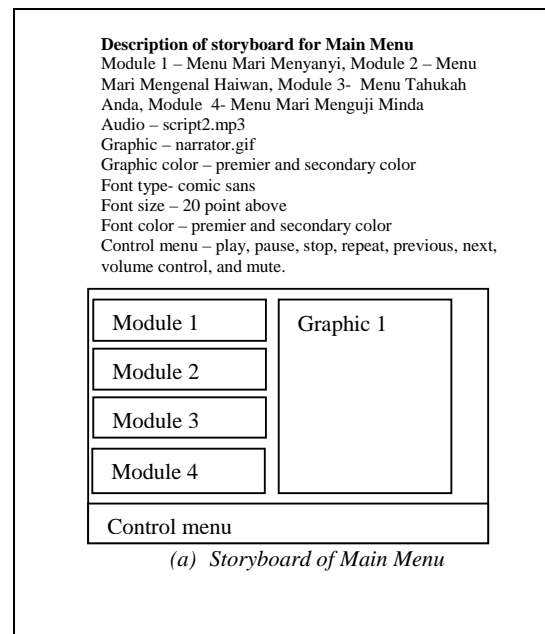
Inline with the above-discussed theory, multimedia has been used tremendously in Malaysian school after the introduction of the Smart School project (Konting et al., 2003). One of the most popular multimedia applications is courseware (Ariffin & Norshuhada, 2008). It is interactive and is one of the multimedia applications that could enhance the student's performance in their learning process (Norhayati, 1999). It also assists teachers in

teaching. However Nurulnadwan, Nur-Hazwani, and Ariffin found that the existing coursewares are not developed for the visually impaired (VI) people (2009) as an assistive courseware (AC).

AC can be defined as a courseware that is designed for VI people to learn and enjoy lesson like normal people, applying special instructional approach, and provides special elements for VI people. This differentiates them from other coursewares that are available in the market. In our previous findings we discussed on how VI people can make full use of the AC (Nurulnadwan, Nur-Hazwani, Ariffin, 2009). This paper aims to discuss the prototype of AC which is designed incorporating the MI theory. The design and development of the AC for VI people is discussed next.

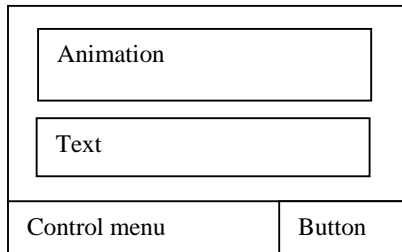
2.0 DESIGN AND DEVELOPMENT

In this study, an AC for learning about animal was developed. Designing and developing the AC includes outlining the storyboard. The storyboard has been designed in detail to make sure the prototype of AC meet the eight types of intelligence in MI theory. Figure 1 illustrates the storyboard. The AC consists of four main modules: Figure 1(a) – Main Menu; Figure 1(b) – Module 1; Figure 1(c) – Module 2, Figure 1(d) – Module 3; and Figure 1(e) – Module 4. The Main Menu is provided with buttons linking to all modules, together with the clear narrative instructions. Each module is provided with control functions so that the users can play, pause, stop, go to the next and previous scene, mute the audio and control the volume on their own. Also, each page is provided with a button linking to the main menu. Audio are in .mp3 format, and all graphics and animations are in .gif format.



Description of storyboard for Module 1

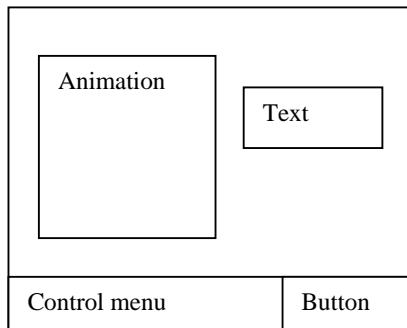
Animation – 1. duck.gif 2. bird.gif
Text – 1. Lyrics “anak itik tok wi”
2. Lyrics “burung kenek-kenek”
Audio – 1.anak itik tokwi.mp3
2. burung kakak tua.mp3
Font type- comic sans
Font size – 20 point above
Font color – premier and secondary color
Button- main menu
Control menu – play, pause, stop, repeat, previous,
next, volume control, and mute.



(b) Storyboard of Module 1

Description of storyboard for Module 2

Animation – 1.cow.gif, 2.sheep.gif, 3.duck.gif,
4.cat.gif, 5.rooster.gif, 6. bird.gif, 7. tiger.gif,
8.eleplant.gif, 9.bear.gif
Text – description of animals
Audio-1.cow.mp3, 2.sheep.mp3, 3.duck.mp3,
4.cat.mp3, 5.rooster.mp3, 6.bird.mp3, 7.tiger.mp3,
8.eleplant.mp3, 9.bear.mp3
Font type- comic sans
Font size – 20 point above
Font color – premier and secondary color
Button- main menu
Control menu – play, pause, stop, repeat, previous,
next, volume control, and mute.



(c) Storyboard of Module 2

Description of storyboard for Module 3

Animation – animal.gif
Text – story about animal
Font type- comic sans
Font size – 20 point above
Font color – premier and secondary color
Button- main menu
Control menu – play, pause, stop, repeat, previous,
next, volume control, and mute.

(c) Storyboard of Module 3

Description of storyboard for Module 4

Animation – 1. tiger.gif 2. elephant.gif
Text - 1. Exercise 1 – multiple choice, 2. Exercise
2 – Fill in the blank
Font type- comic sans
Font size – 20 point above
Font color – premier and secondary color
Button- main menu
Control menu - play, pause, stop, repeat, previous,
next, volume control, and mute.

(d) Storyboard of Module 4

Figure 1: Storyboard

Having designed the storyboard, the AC was developed. Adobe Flash was used to develop the AC. The next section discusses on how the principles of MI is incorporated in the AC.

3.0 FINDINGS

This section highlights the MI theory that has been implemented in the AC. Figures 2, 3, and 4 illustrate the samples of snapshots labeled with types of intelligence. Modules and activities that include in the design of AC content that meet the eight types of intelligence are discussed as follow:

Verbal-Linguistic Intelligence

Module 2 and Module 3 provided in the AC enables the VI learners to learn several types of animals in different environments. Module 2 focuses on learning wild animals, domestic animals, and pets. The animals are segregate into category to help learners in term of understanding and differentiating the animals. This knowledge involves the verbal-linguistic intelligence. The knowledge comes

through the spelling and description for each animal displayed on a screen. Narrations are supplied in each scene parallel with the lines of words and character by character. These elements can help VI learners in understanding the knowledge better. Mother tongue language was decided as the most appropriate medium when the previous research shows that VI learners facing difficulties in understanding English (Yi-Chun & Pi-Ching, 2009; Nurulnadwan, Nur-Hazwani, & Ariffin, 2009).

Logical-Mathematical Intelligence

This initial version of AC only focuses on logical characteristic. Module 4 contains IQ Test to examine students' knowledge level after learning with the AC. This module is divided into two parts. Part A offers Multiple Choice Question. Students have to match the sound with correct animal. Part B requires students to fill in the blanks. Based on the descriptions along with the audio, students need to type the correct answer. Both parts require students to think logically based on their understanding throughout the learning process.

Visual-Spatial Intelligence

Students learn best when they are seeing. This type of intelligence is focused on the VI learners who have low vision and color blindness problems. Large-scale pictures and simple animated elements are provided in the AC. VI learners grasp the knowledge through object, shapes, and patterns designed in the AC. Other than that the font face, font size, and font color are also within considerations. The most preferred font face is sans serif types, readable font size is at least 20-point, and font colour must contrast with the background colour (Nurulnadwan, Nur-Hazwani, & Ariffin, 2009; textmatters, 2009).

Intrapersonal Intelligence

The whole parts contained in the AC represent the intrapersonal intelligence. Module 1 offers VI learners to learn through songs. Hearing and singing songs at the beginning of the AC is a strategy to attract VI learners with the learning process. Modules 2 and 3 develop the knowledge of VI learners. Module 4 aids them in testing their knowledge. The activities throughout the learning process indirectly affect the VI learners. Knowledge and information provided by the AC enables the VI learners to face the real world setting.

Bodily-Kinesthetic Intelligence

After experiencing the learning process, students can test their knowledge by answering quizzes offered by Module 4. VI learners need to insert the answer by using keyboard. This process represents the bodily-kinesthetic intelligence. This fosters the concept of active learning (Bonwell & Eison, 1991), in which the VI learners' engagement within the learning environment is required.

Interpersonal Intelligence

The AC is proposed to be utilized in either classroom or at home. VI students usually learn and work together. They communicate with each other and with their instructor. This could enhance their interpersonal skill. This also promotes the VI learners to learn on their own pace (Mateik, 2000); on their own time, at their preferred place, in their own convenience.

Naturalist Intelligence

Numerous animal pictures together with flora and fauna environment are the main key elements in the AC. Other than that, with the help of animal sounds, VI learners can feel and imagine the real nature environment.

Musical-Rhythmic Intelligence

Music is one of the important medium in teaching and learning process (Yi-Chun & Pi-Ching, 2009). Module 1 enables the VI students to learn various types of animals by listening to the songs provided. At the same time, they enjoy the learning process. Module 4 is equipped with the sound effect. In this module students are needed to enter a correct answer for each of the question given. Different sound effects are used to distinguish between correct and wrong answer. Other than that, all modules in this courseware are supplied with the audio – narrations.

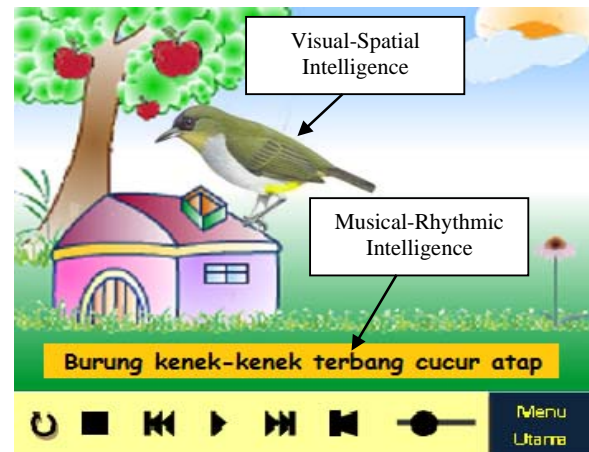


Figure 2: Snapshot of Module 1



Figure 3: Snapshot of Module 2



Figure 4: Snapshot of Module 4

4.0 CONCLUSION

The main discussion of this paper is on the incorporation of the eight types of intelligence in MI theory in the AC for VI learners. The whole part of the AC represents the eight types of intelligence in MI theory. The AC has been proposed for the VI learners, and observed on their reactions. Overall, the VI learners were vary positive upon the AC, and was excited to learn with the AC. This study has no intention to discuss about the findings from the observation.

Next step of the study is not only to report on the findings of the observation, but also to experiment the prototype with VI learners in terms of cognitive implications using empirical data.

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