

Teaching the Indigenous Students with Courseware Based on Theory of Multiple Intelligences

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Abstract: Problem statement: This study reports result of a research carried out to determine the possibility of computer technology use among the indigenous children in teaching and learning. **Approach:** In this study, courseware was used in a classroom of a school for the indigenous children, in which their motivation was extremely low. Comparison between normal class and courseware-assisted class was carried out and reports in the methodology. The courseware was tested to meet the requirements of Multiple Intelligences (MI) Theory. **Results:** The findings reveal that the indigenous children were able to accept the newly-introduced courseware-assisted teaching and learning which includes the eight types of intelligences. This could be seen in their attendance record and achievement improvement. **Conclusion/Recommendation:** This study concludes that the courseware could be a usable tool to support the indigenous learning motivation.

Key words: Assistive courseware, edutainment courseware, indigenous students, Multiple Intelligences (MI), National Information Technology Council (NITC), computer technologies

INTRODUCTION

Malaysia puts high importance rate for education at various levels. At the primary level, schools are equipped with computer technologies for teachers and students to utilize. Initiatives are encouraged to let students learn with computer technologies. In fact, schools are provided with courseware, which can be utilized in teaching and learning. Also, students are allowed to borrow the courseware (Mutalib and Shiratuddin, 2008). Another, in current implementation, textbooks are provided with interactive CD, containing extra contents and exercises MOE.

This is in line with the strategies of MyICMS 886 of the National Information Technology Council (NITC) (NITC, 2010). In addition, one of the major initiatives of MyICMS 886 in content development, in which one of the focus areas is for education. In education, many types of digital contents have been developed and proposed for use such as audio and video (Cennamo, 1983), educational TV programme (Block, 2007), eBook (Shiratuddin and Landoni, 2003),

courseware (Faridah and Halimah, 2008) and RLM. Among all these courseware is the most popularly used and the one provided to schools.

In addition, there's an interesting issue to ponder that is the attitudes of the students in accepting the courseware as their method of learning. Jonassen and Grabowski (1993) and Ali and Zaman (2006) have discussed that individual differences play an important role in learning. Individual differs in traits such as skills, aptitudes and preferences for processing information and applying in real world situations. In order to attract the student's behavior, there's a need to study the courseware whether it meets the requirements of Multiple Intelligence (MI) theory. As stated by (Ali and Zaman, 2006), MI is one of the prominent theories regarding individual differences. The theory serves as one of the most effective curricular and instructional frameworks for classroom teachers to use in designing their lesson plan.

The MI theory was proposed by (Gardner, 2006). He viewed "intelligence" as the capacity to solve problems or to fashion products that are valued in one

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or more cultural setting. Gardner (1993) also discussed that the most important contribution of the MI theory to education is that it allows the educators to expand their repertoire of methods, tools and strategies beyond those that are frequently used in the classrooms. In relation with that, the courseware needs to be tested to the indigenous students based on the eight types of intelligences as follow:

- Verbal-linguistic: The ability to understand and use language, both written and spoken; sensitivity to the meaning of words and the different functions of language
- Logical/mathematical: The ability to use inductive and deductive thinking, numbers and abstract patterns. Often referred to as scientific thinking-comparing, contrasting and synthesizing information
- Musical-rhythmic: The ability to discern meaning in or to communicate with tonal patterns, sounds, rhythms and beats
- Bodily/kinesthetic: The ability to use and understand physical movement; a mastery over body movement or the ability to manipulate objects with finesse
- Visual/spatial: The ability to perceive and recreate the visual world accurately, to visualize in one's head and to give some kind of order and meaning to objects in space
- Interpersonal: The ability to make distinctions among other individuals in regard to their moods, motivations and temperaments and to communicate with others
- Intrapersonal: The ability to self-reflect and have an awareness of one's own internal state of being. Ability to define one's own feelings as a mean of understanding and guiding one's behavior
- Naturalistic: The ability to recognize patterns in nature and to classify according to minute detail

Courseware: Coursewares are developed for access through the web, or for use on CD. For instance, (Baloian *et al.*, 2002) use courseware in their computer-integrated classroom as the content repositories. Among the advantages of courseware, in which hypertexts are utilized, is the ability for learners to read in different orders. Every page contains links to a number of different pages which can be read next. Basically in courseware, the 'browse and click' is the main interaction approach. Regan and Sheppard (1996) classify the purposes of courseware as follows:

- To illustrate some design, development and/or failure of devices/structures/systems and to show relationships among design issues and devices
- To contain exercises aimed at helping learners to better understand concepts through visual thinking.
- To serves as a guide, stepping learners through the various aspects (e.g., theory, physical setting) of performing physical experiments
- As resources and references to complete assignment homework

Interactive multimedia: Other advantages of courseware can be seen in its interactivity. The philosophy of interactive multimedia is to help in creating knowledge, besides, it should be able to act as a tool for cognitive, collaborative and communicative by providing surrounding that fosters teaching and learning; in which it supports, guides and widens the locus for thinking (Aziz *et al.*, 2011). With the ability to allow learners to click-and-browse; view animations, simulations and real videos; inquiry-and-feedback; self-determined order of navigation, the interactive multimedia applications are reported by (Mukti, 2000) as able to increase learners rate of understanding. The comparison or learning methods in terms of the level they affect understanding rates is tabulated in Table 1 (Mukti, 2000).

From the data in Table 1, it is observable that activities involving interactivities such a making live performances, simulating real situations, interactive multimedia and realizing real projects give sufficient effects to the rate of understanding (at least 90%). It can be concluded that interactivity is important to create environment that fosters learning and understanding. Interactive multimedia combines two words; multimedia and interactivity. Defining these two words could help understanding the word interactive multimedia which is part of the courseware.

Table 1: Relationship of learning methods and their rates of understanding

Learning methods	Rate of understanding (%)
Realizing real projects	100
Learning through interactive multimedia	90
Simulating the real situations	90
Making live performances	90
Delivering messages through speeches	70
Learning by involving in active discussions	70
Learning from live performances	50
Learning from exhibitions	50
Learning from films	50
Learning from pictures	30
Reading	20
Listening	10

Table 2: Levels of interactivity

	Level of interactivity	Description
	Low (navigation)	Focuses on navigating through the application. User needs to do minimum talks to retriever the intended information.
Mukti	Intermediate (functionality) High (adaptive)	There are certain goals to achieve and user are required to control the application. User are allowed to control the application creatively. They could tailor the application to meet their preferences.
Rhodes and Azbell	Reactive Coactive Proactive	User have little control over the application and the feedback from application are Direct. User can determine sequences, style and steps to perform Allows user to control application's content and structure.

Oblinger defines multimedia as a combination of two or more communication media such as texts, graphics, images, animations, video and audio with special characteristics to come out with a presentation. This definition is agreed by many other definitions (Kellerman, 1996; Peck, 1997; Hillman, 1998; Elsom-Cook, 2001) SCALA. In short, by referring to their definitions, multimedia is a combination of media elements that convey information and knowledge to learners efficiently.

Meanwhile, (Wehmeier, 2000) advanced learner's dictionary defines interactivity as allowing the transfer of knowledge in two directions continuously between human and computer. Hillman (1998) support this definition, which can then be concluded that, interactivity is a characteristic of a program that allows users to do something for supporting computer system's understanding and provision of feedbacks.

Interactivity could be designed at various levels. Mukti (2000) classifies interactivity into three levels; low, intermediate and high. Similarly, (Rhodes and Azbell, 1985) also classify the interactivity into three levels; reactive, coactive and proactive, but they term the levels differently. Table 2 includes the levels by (Mandinach and Cline, 1994).

In addition, interactivity has its own characteristics. As a consequence, (Borsook and Higginbotham-Wheat, 1991) identify the common characteristics of interactivity. The characteristics are listed below:

- Instant and quick feedback-feedback could be retrieved with a single mouse-click, or a press on a button. Users are also expecting for ways to overcome error if it happens
- Non-sequence information retrieval-users could access information as they desire
- Adaptable preferences-applications need to be customizable to support user's preferences
- Options-users feel honored to choose from provided options; so application needs to provide options

- User control-users need to control the application, such as navigation, so avoiding application making control over the users is important
- Appropriate grain-size-the duration required for application to be disturbed. Users do not like to wait for many minutes, so the grain-size needs to be short

Indigenous children: In current literatures, studies relating the indigenous children are still not in favor. However, (Zaman *et al.*, 2005) have discussed about this issue and proposed a model for the next generation of eLearning at schools. In fact, there are studies in rural areas such as eBario show that technology can be accepted by the indigenous people, not only in learning activities but also in performing daily transaction.

In Malaysia, the indigenous children comprise at least nineteen culturally and linguistically distinct groups. The largest are the Semai, Temiar, Jakun (Orang Hulu) and Temuan. Children of the indigenous children attend pre-schools and primary schools in their settlement in jungle areas and are thereby physically excluded from the mainstream (Pawanchik *et al.*, 2010). The indigenous children are drawn into the mainstream to receive secondary and higher education (Endicott and Dentan, 2004).

Thousands of indigenous children stopped schooling after the primary level. According to the Department of Indigenous People Affair JHEOA, the dropout rate in the 1980s was extremely high, especially for the low achievers. On average 25% of the children who started primary school, mostly in JHEOA schools, dropped out after only one year and about 70% of all students dropped out by the end of grade five MOE. According to, about two third of the indigenous children in 1994 (47,141 out of 70,845) between the ages of five and eighteen did not go to school at all. Another study found that the dropout rate among indigenous children was still extremely high at the end of 1990s (Hancock and Betts, 2002). In fact, in 2003 there were 23,607 indigenous children entered primary schools but only 6,675 went to secondary schools. While in 2004, it was recorded that from

25,354 indigenous children entered primary schools only 7,559 went to secondary level JHEOA.

Overall, the number of indigenous children in standard one was always high. Educators need to capture their interest in many ways to make them feel happy to be in school and learn, especially because age and academic achievement as a significant correlation (Redzuan *et al.*, 2010). This factor is important to motivate them intrinsically, so that they continue their study on their own will. One of the possible efforts to motivate the indigenous children is the use of courseware in teaching and learning. Many studies have shown that multimedia applications can benefit learners in many senses, as discussed in the next paragraph.

Advantages of multimedia applications: Multimedia applications were found motivating (Mandinach and Cline, 1994; Beichner, 1994; Kafai *et al.*, 1997), engaging attention (Hancock and Betts, 2002) and entertaining students (Jonassen, 2004). This means that when working with multimedia materials students are concentrating on learning assignments and contents and their task-orientation is preserved. The other side of the coin is superficial engagement and surface-level processing if students are just focusing on the 'entertaining' features of multimedia (e.g., sounds and visual effects). Also, multimedia applications can be used effectively in addressing instruction (Carroll, 2000). In fact multimedia applications are tools that support multiple intelligences (Lazear, 2000) that can enhance diversification which can lead to improved achievement (Cradler *et al.*, 2002).

Based on the above discussions, this study attempts to find out whether the indigenous children can accept the multimedia application, specifically courseware. The objectives include: (1) to determine whether the indigenous children are attracted to the courseware, (2) to compare their reactions between traditional teaching style and teaching-with-courseware. (3) to determine whether the courseware is aligned with the concept of self-directed, self pace and self access which can cater multiple styles of learning. To achieve that, the methods as discussed next were followed.

MATERIALS AND METHODS

This study was scoped to a school for the indigenous children in Selangor named Sekolah Kebangsaan Bukit Cheding (Asli) (Fig. 1). Students were identified based on the skills in 3R (i.e., Reading, Writing and Arithmetic). In a scenario, the indigenous children follow a special program called Special

Treatment Class. In this programme, they were given more attention and closer guidance in terms of discipline, skills, creativity and flexibility. They studied on basic 3R such as recognizing alphabets, basic reading, writing and arithmetic. In the program, only a special teacher is dedicated for these students. Traditional learning tools were used for all activities. Students who show any improvement will be promoted for higher level class. However, it was found that, most of the students remain in the same class for a couple of years. There are 20 out of 140 students of Year 1-5 who followed the programme. From the group, about 10 students from Year 1 until Year 3 have been recognized and selected to involve in this study. They were selected based on the following criteria:

- Low motivation-they were not interested in education and very seldom completed their school works
- Low IQ skills-they always score lowest test marks
- Lack of discipline-they absent from school very frequently

Two courseware's were utilized in this study, Bahasa Melayu and Mathematics. The teacher used a notebook to run the courseware which was projected to the wall using an LCD projector. In addition, the learning activities were focused on: (i) recognizing, saying and writing the basic alphabets (A-Z), (ii) reading and writing short words, (iii) Recognizing, saying and writing the basics numbers to 100 and (iv) counting a group of objects to 100. Having selected the subject of study, the indigenous children were introduced with courseware. Their teaching and learning scheduled was also accommodated with different modes, two days a week utilizing normal style, while three days utilizing courseware. A three-month period was spent to let the indigenous children experience the two teaching styles. Tests were given to them to measure scores between different teaching styles.



Fig. 1: Indigenous children in their classroom

RESULTS

Findings:

Courseware motivates student: This study compared the indigenous children’s attendance to classes with normal style and courseware assisted. Data on the attendance are visualized in Fig. 2.

From Fig. 2, it is seen that the indigenous children turned up for courseware-assisted class more than the normal class. This gives an understanding that the students enjoy learning in the environment, with supports of computer technologies. During the observation, they were clearly seen enjoyed more studying in the courseware-assisted class.

Multimedia can enhance student engagement: In addition to the attendance, this study also compared their attitudes in different environments. From the observations with the assistance of the teachers, the students were found easily got bored and most of them never complete their works on time. Their attitudes were different in the courseware-assisted class where most of them tend to complete their works as early as they can. This situation needs urgent answers. One possible reason may be because the nature of courseware that is attractive and ‘entertaining’ with its color, audio and visual elements.

Courseware and achievement improvement: This study conducted separate tests, which has the similar contents and activities as in the courseware. The results revealed that there is only a slight different on the achievement for both Bahasa Melayu (Fig. 3) and Mathematics (Fig. 4). The results for both tests were almost at par and at average level. This shows that use of courseware somehow improves the indigenous children’s achievement. However, the improvements were not significant. This is another finding that needs urgent further research. In this study, the indigenous children were found attracted to the courseware-assisted and learning only, to motivate them attending classes, but not to improve their achievement.

Besides, based on the verbal and writing test, there is significant improvement on their 3R skills. This study considered this achievement as a contribution to the school to reduce the number of illiterate student. Thus, courseware-assisted learning was found as an alternative approach in educating indigenous student in the future.

Courseware caters multiple styles of learning: This part highlights the MI theory that has been implemented in the courseware. Figure 5-10 illustrate the samples of snapshots of a courseware labeled with types of intelligences. Modules and activities that have been tested to the students are discussed as follow.

Verbal-linguistic: This courseware consists of six modules or skills. These modules enable the students to learn alphabet, spell the words, match the picture with the exact words and test their IQ through crossword puzzle and activities. The knowledge involves the verbal-linguistic intelligence where the students need to spell out the objects given. In addition, narrations are supplied for each scene with the lines of words. These elements can assist the students to understand and memories better. Bahasa Melayu as a mother tongue language has been decided as the most appropriate medium to teach the indigenous students year 1 until 3.

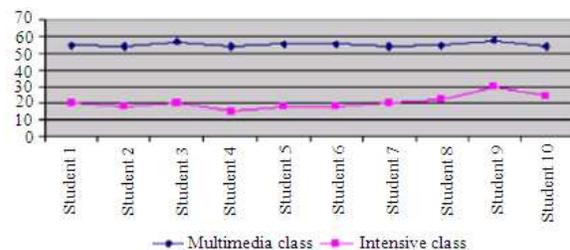


Fig. 2: Comparison of student attendance

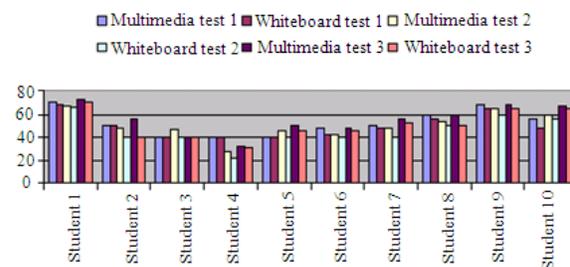


Fig. 3: Comparison of test score-Bahasa Melayu

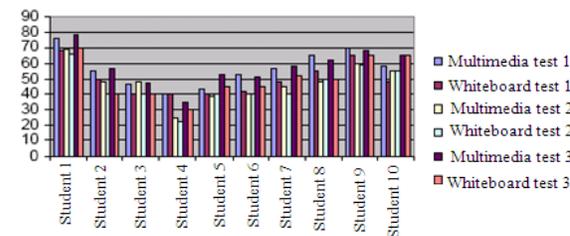


Fig. 4: Comparison of test score-Mathematic



Fig. 5: Snapshot of Module/Skill 3

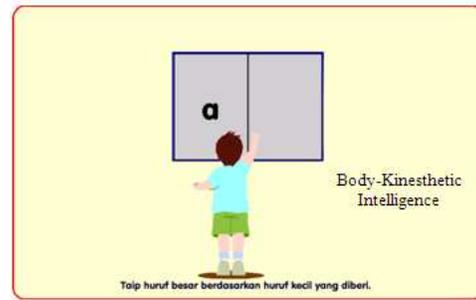


Fig. 8: Snapshot of Module/Skill 1



Fig. 6: Snapshot of Module/Skill 4

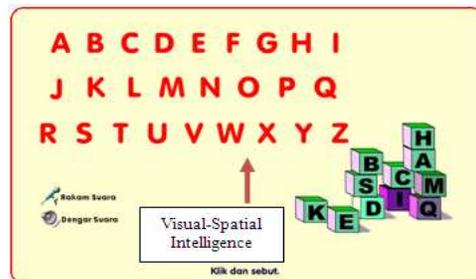


Fig. 9: Snapshot of Module/Skill 1

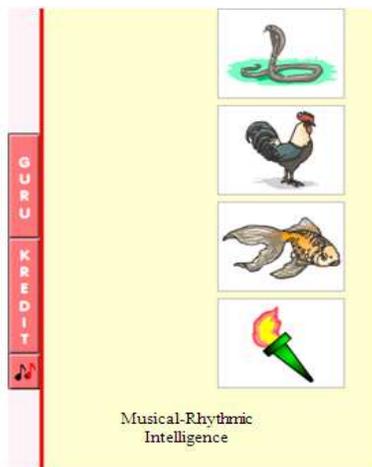


Fig. 7: Snapshot of Module/Skill 2



Fig. 10: Snapshot of Module/Skill 2

Logical/mathematical: Module or Skill 2 until 6 contains IQ tests. These tests were done to the students to examine their knowledge, test their memory and learn to know the environment. In module 2 until 5, students were provided with exercises such as matching question, fill in the blanks and key in the correct answer based on description given. In module 6, the test is quite challenging where the students have been tested through crossword puzzle.

Musical-rhythmic: This courseware is provided with sound starts from the first until the last modules. The students can choose either to play or mute the sound during teaching and learning process. In order to make the learning process more enjoyable, the students have been tested with few exercises which are equipped with sound effect. For the exercises, the student needs to enter the correct answer. Different sound effects have been used to differentiate between correct and incorrect answers. To make learning livelier, narrations are supplied to the exercises given in the modules.

Bodily/kinesthetic: In order to have a two way communications between teachers and students, therefore there are few exercises offered by all modules which need the students to use mouse as a pointer and

keyboard as a medium to type the answers in the space provided. This process represents the bodily-kinesthetic intelligence which fosters the active learning method.

Visual/spatial: Students in year 1 until 3 normally very active and cannot focus on their learning process in a long duration. Therefore, this courseware has been provided to attract the students' attention in class. Each module contains a large-scale pictures and simple animated elements. In addition, the best font size, font color and background color have been considered to ensure the students can read, understand and apply the knowledge smoothly.

Interpersonal: This courseware is proposed to be utilized in classroom for students year 1 until 3. The activities in this courseware have been designed with the purpose of gathering the students to experience the games or activities with their friends. Most of the activities in the modules need the students to communicate with their friends and teachers. They were even singing through the exercise. As a result, the students can develop or enhance their interpersonal skills during and after the learning process.

Intrapersonal: This courseware represents the intrapersonal intelligence throughout the modules. From the modules, the students can learn to sing, recognize alphabet, spell and apply the words where necessary. In the last module, the students were able to test their knowledge with the guidance from their teachers. The activities throughout the learning process indirectly influence and affect the students. Knowledge and information in this courseware can help the indigenous students to face the real world.

Naturalistic: Numerous of natural elements are used in this courseware such as animal, flora and fauna in order to attract the students' attention. All the elements are presented in interesting images and some of the images are presented in animated version. This kind of approach can help the students to adapt the learning process with the real world environment.

DISCUSSION

From the findings, based on the roles and advantages of interactive multimedia, this study argues that courseware and other interactive multimedia can be usable to motivate the indigenous children in teaching and learning so that the gap in digital divide could be minimized (Iskandarani, 2008). Based on the model by (Mukti, 2000), researchers may start proposing the

technologies with those require low or intermediate level of interactivity first. This can be related to the arguments by (Lazear, 2000) who argues that courseware can support multiple intelligences and that the courseware can enhance diversification which can lead to improve achievement (Cradler *et al.*, 2002).

CONCLUSION

From this study, it was found that the indigenous children can accept the nature of courseware-assisted learning to support their learning in ubiquitous environment (Chaudhry *et al.*, 2006). Also, their achievements were found better when using courseware compared to normal way. These findings need further empirical works in future to collect more data for comparison. Qualitative data from observations can be based to state that the indigenous children can adapt themselves with technologies in teaching and learning.

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