Understanding Patterns of Interactive Courseware Use Within Malaysian Primary Smart Schools

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ABSTRACT

Rapid advancement of multimedia technology plays one of the most important roles in classrooms as interactive courseware has been used in presenting content and information. These initial forms of analysis have helped to establish the extent that the current existing interactive courseware used are present and contribute to users' interaction and learning experience. Moreover, the outcomes has helped to establish the actual needs of the teachers and students as end-users of interactive courseware.

Keywords:

INTRODUCTION

Teaching and learning materials currently used for schools are a combination of traditional learning material such as textbooks with modern materials such as electronic publications (e.g., videotape, CD-ROM and websites). This shows multimedia technology is playing an important role in the classroom in presenting and delivering course materials to students. Therefore, effectiveness of course material is substantially related with the quality of the course material interface design and the level of interaction between learners or end-users.

In the current Malaysian education perspective, rapid advancement of multimedia technology also plays one of the most important roles in classrooms as interactive courseware used in presenting content and information. The majority of the teaching-learning courseware available in the Malaysian market however, now are focusing on Language subjects, Mathematics and Science.

Based on a several existing literature reviews, it was found that students' perception of courseware is high. Many related works show the importance of good presentation through interface design and creativity teaching in courseware for gaining student attention. Most teachers reported that the courseware was useful for their students and facilitated learning. Analysis revealed that most of the teachers involved in the studies agreed that the courseware is useful for teaching and learning. However, certain courseware aspects and components need to be improved (Kamaruddin, 2011). It is essential to note that the courseware needs to be revised as there is room for improvement to fulfil student needs. Thus, we need to understand the current level of usage within existing interactive courseware and how the exisiting courseware interface design contributes to user interaction and learning experience. The objectives of this article focused on two issues,

which are to determine the level of confidence among teachers using the courseware and to understand students' and teachers' engagement with the courseware.

Interactive Courseware: The Malaysian Experience

While various aspects of E-learning have been discussed in the international literature, most of the research has been conducted in first world countries such as the United States, the United Kingdom and countries in Continental Europe. The empirical data and information about E-learning in developing countries such as Malaysia is limited. Nonetheless it is possible to draw on local reports and a small body of literature to establish the current context of E-learning in Malaysia.

Because of a strong belief that computer technology will improve learning outcomes, Malaysia constantly invests in computer technology for education and has implemented an E-learning strategy. In Malaysia, e-learning has been developed under the umbrella of educational technology programs offered by the government through the Malaysian Ministry of Education. E-learning programs actively began with a pilot called the Smart Schools Project in 1998, when teachers in selected Smart Schools were given the opportunity to use interactive courseware to teach Malay language, English, Mathematics and Science subjects in the classroom (Ministry of Education, 2008). In addition, the Malaysian government has provided a laptop to each teacher to ensure that the supplied interactive courseware can be utilized successfully. These initiatives were designed to provide an incentive to the schools to use computer technology in teaching and learning activities.

Since 1998, E-learning has taken shape and gained widespread popularity in Malaysia. Only a small number of studies, however, have been conducted on E-learning effectiveness, its implementation and its outcomes in the local context. This includes work by Azizah et al. (2005); Baharuddin et al. (2006); Hajar (2005); Jowati (2005); Kamariah (2006); Lee (2007); Puteh (2006); Kamaruddin (2010) and Multimedia Development Corporation (2007). These studies have largely focused on the interactive courseware available for the Smart School Project. Most have concluded that the E-learning system in Malaysia does not provide significant impact. Some studies relate this to teachers' and students' attitude and perceptions, and argue that these must be improved for greater effectiveness. However most conclude that the interactive courseware itself presents two major issues. Firstly, not all subjects can be taught effectively using an interactive multimedia approach (Baharuddin et al., 2006; Multimedia Development Corporation, 2007; Ministry of Education, 2008; Muda & Mohamed, 2006). In particular, Kamariah (2006) notes that some subjects – such as Science – need to be presented in the real form because learning through simulations in Science can mislead students and impact negatively on their understanding. A second issue identified is that the current interactive courseware has not been tailored to student needs and abilities (Azizah et al., 2005; Puteh, 2006).

Muda and Mohamed (2006) went further and claimed that much of the interactive courseware in Malaysia fails in terms of instructional design and interface design and explained that the courseware does not accommodate end-users' interests, preferences and needs. They concluded that, for these reasons, teachers have returned to using printed textbooks for teaching and learning. Similarly, Jowati (2005) has argued that the courseware has been used as a forum to showcase advances in computer technology, rather than prioritizing facilitation of content writers, graphic designers and instructional designers in working toward the needs of students and teachers to produce a tool for enhancing teaching and learning.

The main challenge faced in Malaysia is to ensure that teachers and students can use interactive courseware effectively and creatively (Goi & Ng, 2009; Thang, Murugaiah, Hall, & Hazita, 2009). While positive conclusions have been reached in previous research about teachers' willingness to embrace interactive courseware use in classrooms, a general misunderstanding that often occurs is that interactive courseware is simply used to establish topics and present content (Bismillah Khatoon, 2008; Hoon, Chong, & Binti Ngah, 2010; Thang, Murugaiah, Krishnasamy, Azizah, & Hazita, 2009). According to Bismillah Khatoon (2008), teachers commonly project output from interactive courseware onto a big screen located in front of the class and students simply watch it with limited guidance by the teachers. At the other extreme, some teachers have claimed that teaching with the interactive courseware requires more preparation work. Hence, the interactive courseware is likely to remain untouched.

Clearly interactive courseware should not be expected to replace teachers' roles in delivering knowledge but must be seen as a tool for engaging students in curriculum and must do so in an engaging way that involves both teachers and students interacting with the courseware. The literature on the Malaysian experience makes it clear that, in order to ensure successful adoption of interactive courseware in Malaysian classrooms, the most important considerations are the quality of interface and instructional design, as these design factors provide the basis for access and engagement. And, as the broad literature establishes, development of interactive courseware should be based on theoretical understandings of the learning process because the main goal should be to help students gain knowledge; understanding how the process happens effectively is therefore crucial. That is, in Malaysia, as is the case internationally, interactive courseware effectiveness is related to the quality of instructional and interface design.

Therefore, in the following sections, the ecology of interface design and how interface design theory relates to other aspects of interactive courseware such as interaction design, learning processes and learning experiences are discussed in detail. This discussion covers the way in which the interface of an interactive learning product not only affects user interaction but the learning process and learning experiences, and it explains why a lack of attention to interface design in the development process can lead to limited uptake of interactive courseware in the classroom as well as a failure to enhance the student learning experience.

METHODOLOGY

Classroom observations were conducted at two of each of the three different types of primary Smart Schools located in four different states across Malaysia. The Ministry advised that each school is allocated 1 hour and 25 minutes per week for Science subjects and that students have a Science class once a week. Observations were conducted over two weeks at each school, to ensure reliability. They involved one class at each school, consisting of between 37 and 45 students per class.

The method used was non-participant observation. That is, observations were conducted without disturbing the students and teachers in their work environment or making any intervention in the teaching and learning process. As the researcher remained unobtrusive at the back of the class, several limitations were encountered. For example, it was difficult to observe each of the students at the same time. To overcome this inevitable limitation of a single researcher, all observations were videotaped using several video cameras installed on selected computers from different angles. In addition, photographs were also taken to capture the way students and teachers use the interactive courseware in the different settings of available Smart School learning environments.

Detailed notes also were taken during each observation, which described how students interacted with the interface design components; the length and level of students' engagement with the courseware; and any distraction the students and teachers faced in the classroom surroundings. The way teachers delivered instructions in teaching through the courseware, their level of confidence in using it, and how students responded to the learning activities were also observed.

THE OUTCOMES

In essence, the data are presented in relation to two themes: The overall level of confidence among teachers using the courseware and the students' and teachers' engagement with the courseware in relation to them.

Confidence in use among teachers

With regard to the confidence level among teachers in using the courseware, it was observed that five out of six teachers participating in this research project appeared very confident in using the interactive courseware as a teaching tool in the classroom. Only one teacher appeared to be somewhat unsure (she was

new to the subject with only 6 months of teaching experience). Confidence level did appear to be highly influenced by the level of experience in using the courseware. In fact, both teachers who have been teaching for 8 years (one at a new Smart School and one at a state Smart School) were very confident. This might also be related to experience of use, since both use the courseware as daily practice. Nevertheless, two teachers (one at a remote Smart School and one at a state Smart School) demonstrated that they had to arrange additional activities to facilitate student engagement with the interactive courseware because students could only simply watch the output via a projection screen in class.

Students' and teachers' engagement with the courseware

With regard to the level of student engagement with the courseware and its interfaces, various students' reactions were recorded during the courseware use in class, based on facial expressions, body language and other responses. This is summarized in Table 1.

Table 1 Level of Student's Engagement Through Body Language While Using the Courseware

Facial expressions	Body posture	Other Responses	
Engaged	Smiling Watching Concentration	Writing notes Asking questions Discussing content amongst themselves	
Disengaged	Sleepy appearance (e.g., Eyes drooping) Bored expressions Looking around	Heads on the table Slumped in their chair. Playing with hair.	Talking to others about unrelated topics. Not looking at the screen. Staring into space

As summarized in Table 1, the observations found signs of disengagement among the students when using the courseware independently. Large numbers of students started talking when courseware usage began. Although a few students were very excited with the animations presented in the main sections, these students were largely unable to work independently with the courseware in the following sections. In particular, the observations indicated that some students did not know where to start and had difficulty moving from one screen to another. During the observations of independent use, students frequently had sleepy and bored facial expressions, were talking to their peers, and looking around. Indeed, it seemed that students were much more responsive to the directions and instruction given by the teacher than the courseware.

It was also evident that all students only appeared to respond attentively to some of the media components such as animation, videos and graphic images and smiled and remained engaged when these particular components were presented in the courseware. It was also observed that these particular components were by far the most likely to trigger responses, such as writing down notes and asking questions and they often served as a starting point for discussions. This suggests that students were trying to interpret the courseware content through these components. In terms of specific levels of effectiveness of the five interface design components (audio, video, text, animation and graphic images) in engaging students with the interactive courseware, this was measured through a Likert-scale range from low to high, in which the most effective component is rated in the high numerical range, while the least effective is rated in the low range. The summary shown in Table 2 notes the frequency of students engaged pleasurably with each component across all types of Smart School.

Table 2 Student Engagement with Various Media Component Types

Classroom	Media component type and engagement														
	Audio			Video			Text			Animation			Graphic		
	Low	*Mid*	*High*	*Low*	*Mid*	*High*	*Low*	*Mid*	*High*	*Low*	*Mid*	*High*	*Low*	*Mid*	*High*
New *Smart School 1:* Classroom 1		*				*	*					*		*	
New *Smart School* 2: Classroom 2	*					*	*					*		*	
State *Smart School* 1: Classroom 3		*				*	*					*	*		
State *Smart School* 2: Classroom 4	*					*	*					*		*	
Remote *Smart School* 1: Classroom 5	*				*		*					*		*	
Remote *Smart School* 2: Classroom 6	*					*	*					*			*

In six different observation settings, only two media component types, namely animation and video, received consistent positive responses from students; while graphic images captured moderately positive response from students, text and audio components elicited consistently low responses.

The observation data show that most of the students from all types of Smart School tended to be more focused on the courseware when animation or video was running. This was particularly evident when students worked with the animation and video in the Tutorial pages of the courseware when they were smiling and interacting cheerfully. However, it should be noted that the effectiveness of these two components in promoting student interaction and engagement in the learning experience was influenced by the quality of video and animation. In the literature, it is stated that images can increase the motivation of end-users to participate in concept formation. Furthermore, when still graphic images are combined with other components, they help users understand the courseware content. However, in terms of engagement with graphic images, as shown in Table 2, it is important to note that they received a moderate response from the students overall. In particular, most of the students at remote Smart Schools had bored expressions and some looked around rather than focusing on the interactive courseware when graphical images were on the large projector screen.

However, although the overall student responses were neutral, by contrast students from new and state Smart School seemed to somewhat enjoy the graphic images, especially those used for familiar human and animal characters. Thus, again it seems that students who can simply watch the courseware and cannot interact with it themselves due to the school type and facilities, appeared less engaged. The text components were the most ineffective tools in terms of engaging student attention. This was particularly evident in relation to the body text in the Introduction page and Tutorial page sections. However, students had a more positive response when the composition and organization of the body text was more eye-catching. The text pages were the most problematic for students at state and remote Smart Schools where limited facilities mean that students cannot go at their own pace, or drive the navigation themselves, but simply watch images on the big screen projected by the teacher. Students at these schools appeared quite unmotivated to read small text or large quantities of text and tended to chat with their peers instead of reading text.

The observations suggest that sound is a minor component within courseware in which it is usually simply used in the form of a key clicking sound (for emphasis and for feedback on navigation). In some lessons, no voice instruction or text is provided, so the teacher's full assistance is needed to provide a script and instructions. Where sound is included, teachers had to actively encourage students to play and listen to the audio through the "click to listen to the sound" prompts. Therefore, most students tended to be neutral about the sounds accompanying graphic images and they tended to respond little to the feedback sounds when interacting with the software. However students at both remote Smart Schools, who may not have heard the responsive clicks to the teacher's interactions, were unsure whether the page had been visited before by looking at the changed colours of the link text alone. This suggests that feedback sounds may be taken for granted, but are nonetheless important for orientation within activities.

In summary, different user responses were observed according to the different school facilities and how the courseware is used in the classroom. Where students were able to directly interact with the courseware, their responses indicated that their engagement in some components was higher than among those who could simply watch it being used. Focus group discussions clarified this conclusion further. From the observations alone, it can be concluded that the classroom environment appears to be an important factor influencing student engagement with the courseware. Supporting these varying modes of use should therefore be considered in future courseware design and development.

However, it can also be stated at this stage that not all the interface design components used in the existing interactive courseware engaged students in learning, promoted student interaction, and motivated them to use the courseware to the same degree, and that while the animation and video attracted attention to a high degree, the courseware designers were not entirely successful in providing an effective interface design in relation to the use of text, images and audio components. Students therefore tended to deduce the key learning objectives primarily from the animation and video components and the teachers.

The learning process requires student engagement with the subject matter, and it is through this engagement that learning occurs. In the case of interactive courseware, this user engagement with the learning materials depends on effective facilitation by the courseware interaction capability and interface design which provides access to, and engagement with, the content. As Bates (2005) has argued, high quality software that has been designed specifically for education tends to be embraced by students and educators. However, while it has the potential to enhance learning outcomes and provide users with a great deal of convenience, accessibility is important to make the tools effective. Accurate and abundant content is crucial; and appropriate design that ensures suitability for the teaching context is necessary. Moreover, students' and teachers' expectations and concerns must be taken into consideration to ensure the uptake of the courseware in schools.

CONCLUSION

In short, the responses gathered from fieldwork show that some of the participants enjoyed the courseware in general but encountered several barriers in the interface design performance. In fact, students observed using the courseware in the classroom showed some frustration with aspects of the interface design. It is important to note however that courseware effectiveness has to be understood within the context of the Malaysian education system. For example, the lack of facilities and infrastructure within a school, such as limited number of available computers and computer labs in each school, as well as aging and slow hardware in some instances could be a primary factor affecting students' experiences.

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