Integrating multimedia into the Malaysian classroom:
Engaging students in interactive learning

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Abstract

In recent years, with the infusion of the multimedia technology into the education arena, traditional educational materials can be translated into interactive electronic form through the use of multimedia authoring tools. This has allowed teachers to design and incorporate multimedia elements and choreograph them in an orderly sequence to convey the message in an interactive and multi-sensory learning environment. The focus in education is thus moving away from the conventional "chalk-and-talk" method to one which uses multimedia as the instructional media and a platform in teaching and learning.

This presentation focuses on using the multimedia design process (MDP) to enable educators to re-design their educational curricula into an interactive and media-rich learning environment. This multimedia educational design process will reinforce and strengthen the traditional instructional communication process (ICP) and foster a number of innovative methods to communicate knowledge to the learners. In this context, there is a need to adjust the educator's approach to teaching, preparing content and delivering learning materials. As the present generation becomes more familiar with computers and the Internet, they are going to expect information in the classrooms to be delivered in the same pattern.

Introduction

In the traditional education realm, the role of the teacher is to provide the content and information to the students. The information or content that is presented is based on the teacher's curriculum and other relevant information for the class. In the past few decades, educators have used various types of instructional technologies for delivery of instruction to their students. Radio, film, television and video are the instructional media, which were most often used. However, the use of these media has not made any significant change in the instructional communication strategies and produced the results desired by the educators.

In recent years, the advent of multimedia and the Information and Communication Technology (ICT) have rapidly transformed the scenario in using instructional technologies in the educational institutions particularly in higher education (Roblyer & Edwards, 1998). The fusion of technology and educational content has an important bearing on our instructional methodology. The very same content can be converted into the electronic form by using multimedia authoring tools and presented on the PC. This has enabled the teacher to present his/her educational content in a multimedia format and in an interactive, multi-sensory manner rather than in the traditional single media format (text) This not only provides the teacher with a more effective way to transfer knowledge and information to students, but also enable the students to learn in a more productive way. In recent years in Malaysia, institutions of higher learning are showing a rapidly growing trend in integrating ICT into their educational curricula and are marching towards e-learning and establishing digital universities (Cheok, 2000; Ismail, 2001; Mat, 2001). The focus in education is thus moving away from the conventional "chalk-and-talk" method to one which uses multimedia as the instructional media and a platform in teaching and learning. The multimedia technologies used will transform the traditional materials into interactive multimedia content.

With the introduction of multimedia into the various industries which engineered the multimedia revolution in the 1990s, many educators began to see multimedia as part of a combination of technology resources, which included media elements such as text, graphics, sound, video and animations, instructional systems and computer-based support systems. In fact, multimedia is changing the communication process and the exchange of information. The way messages are sent and received is more effectively done and better comprehended. The inclusion of media elements reinforces the message and the delivery, which leads to a better learning rate. The power of multimedia lies in the fact that it is multi-sensory, stimulating the many senses of the audience, which consequently leads to better attention and retention rates.   At the heart of any digital multimedia development is interactivity. With interactivity, the audience is involved in the

communication process and in the navigation of the content. Research has shown that interactivity enhances retention in learning (Lindstrom, 1994) (see Table 1).

Table 1 Interactivity enhances retention in learning

Retention rates in learning		
When people see	When people see and hear	When people see, hear and do
20%	40%	75%

Interactivity is, in fact, the heart of multimedia. Therefore, interactivity and interactive features in a multimedia application facilitate communication and interaction between the computer and the user. As such, many are turning to multimedia as a means to better communicate their message and to foster better feedback on the information exchanged. For many years, multimedia and multimedia developers were housed in selected industries such as advertising, entertainment and edutainment, games and corporate computer-based training (CBT) systems. However, multimedia is now penetrating the education field and changing the way teachers teach and students learn. With the advent of the ICT and multimedia in the classrooms, teachers can equip themselves with these technological skills and become better communicators of their content materials, and thus enabling the students to learn in a more productive way.

Integrating technology into the classroom: Its impact on education
The traditional way of teaching and learning is the chalk-and-talk or the OHP (Overhead Projector) and transparencies method and the instructional media used is mainly textual (printed books) (see Figure 2). This directed instruction model has its foundations embedded in the behavioural learning perspective (Skinner, 1938) and is a popular technique which has been used for decades as an educational strategy in our institutions of learning.

Figure 2The traditional instructional model

In this model, basically the teacher controls the instructional process while the content is delivered to the entire class where the teacher emphasizes factual knowledge. In other words, the teacher delivers the lecture content and the students obediently listen to the lecture. Thus, the learning mode tends to be passive and the learners play little part in their learning process (Orlich, Harder, Callahan & Gibson, 1998).

However, if now multimedia is integrated into the teaching and learning process, the situation immediately changes to one that will have great impact on our traditional educational system today. Previously, in the teaching and learning process, a single media (text) is mainly used as the instructional media and the presentation of the educational content is in a linear fashion. But with multimedia, multiple media elements can be used. The instructional materials can be delivered in a multi-sensory environment using the multimedia elements such as text, graphics, animation, sound and video. Tway (1995) posits that *"Multimedia offers an excellent alternative to traditional teaching. By allowing the students to explore and learn at different paces, every student has the opportunity to learn at his or her full potential."* Thus, with the combination of multimedia technology and educational content materials, the final interactive content can be delivered in various ways and made available for the different teaching and learning modes such as the teacher-centric, student-centric and mixed modes (Neo & Neo, 2000) (see Figure 3).

Furthermore, with the assistance of multimedia authoring software packages such as Macromedia Authorware

and Director, features such as interactivity and navigational links can be added to the instructional content to enable the learner to interact and move around the content with ease in the way he or she likes best. Thus, the learner can control the pace of learning, suitable to his or her skill level. The presentation can take place in a non-linear manner, which will empower the learner to foster two-way communications or interaction between the user and the computer. This mode of learning is geared towards student-centred or self-directed learning mode which will cater to individualistic needs in learning unlike the mass learning as practiced in directed instruction method.
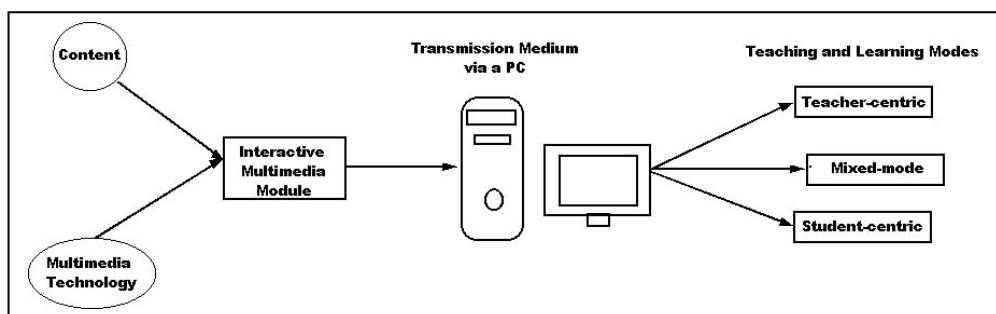

Figure 3 The technology-enhanced instructional communication process

Thus, the use of digital multimedia technologies has generated a new paradigm in our educational methodologies and strategies. It has given rise to new modes of learning and enabled new and innovative ways to deliver instructional materials to the learners (Neo and Neo, 2000). Furthermore, the advent of the Internet and the World Wide Web (WWW), which is a global network, in the mid-90s, has provided us with a global learning infrastructure for digital learning and a vast resource of information and educational materials, which can be procured almost instantly (Tapscott, Lowry & Ticoll,1998). It made it possible for anyone with an Internet connection to access the innumerable libraries and information resources of the world. The landscape in the education field is indeed fast changing into an IT-oriented one. The birth of Intranets, e-mail, chat-rooms and FTP is spearheading the establishments of e-learning institutions, digital universities and distance learning centres. The arrival of the digital technologies has been a boon to the educational field, and has led, in recent years, to many institutions of higher learning rapidly embracing digital multimedia technology in their educational curricula (McAlpine & Clements, 2001; McLoughlin, 1999). The full impact of the Internet revolution on our society as a whole is still continuing and has yet to be totally understood and measured (Kadlubowski, 2001). However, it has become a fact that the Internet has made information communications global and almost instantaneous (e-mail) and reduced the world into "a global village".

The multimedia design process (MDP) - Creating the interactive multimedia module using Authorware
The interactive content showcased in this paper utilised Authorware's multimedia and interactive features. The content for the application was based on a class lecture entitled, "The Multimedia Authoring Process". The main points in the creation process of the digital multimedia learning module using Macromedia Authorware consists essentially the following 5-step process:

> (1) Assembling the media elements needed to represent the educational content
> (2) Digitising the analogue media
> (3) Editing the media elements
> (4) Multimedia authoring
> (5) Packaging for delivery on a CD-ROM, the Web or the University Intranet.

(Neo & Neo, 1998; Luther, 1994).

- Assembling the media elements

The first step in this process is to determine the different media types that are to be used to represent the content. Images and graphics are used to visually represent a concept or provide an example while sound and

video clips can be created to provide information within the module. By assembling the different media types earlier on in the process, the developer or the author is able to use them at his/her convenience. Not all the materials gathered are in digital format, therefore, those materials that are in analogue format will need to undergo a conversion process.

- Digitising the analogue media

After all the materials have been collected and assembled in their raw analogue state, they are converted from the analogue format to digital format in order to incorporate the information gathered into the multimedia application. These digital media are then saved in the computer in a variety of file formats.

- Editing the media elements

Once the media elements have been digitised and stored in the PC, they can then be edited or modified in software packages. Editing of various elements is an important step in MDP since different images, colours, sounds and video can effect how the user perceives the application. Proper editing is needed to ensure that the media are in line with the focus and direction of the multimedia development process.

- Multimedia authoring

It is here that the various media elements are integrated and synchronised in the authoring tool, which, in this case, is Authorware. Authorware allows the author to integrate the various multimedia elements into a seamless application. This integration process is feasible and possible as a result of the rapid advancement in multimedia and computing technologies. At this stage, elements of interactivity and navigation are also incorporated into the content in order to involve the user in the application and to create a multi-sensory experience as well as to provide a two-way communication or interaction between the user and the computer and a two-way communication or interaction with the application itself thus enabling the user to explore and learn at his/her own pace (Willson & Thornton, 2001). Once this is completed, the application is ready to enter the final step of the MDP, which is packaging for delivery.

- Packaging for delivery

At this stage of the process, the multimedia application is completed. The final interactive presentation can be packaged for several different delivery modes. It can be packaged as a standalone, self-executing file, or an EXE, that would enable it to be delivered on a CD-ROM and be used as a self-paced, student-centred learning module, which the student can use to revise his or her work and further strengthen his or her understanding of the subject matter. It can also be packaged as a Web-enabled module, or "shocked" for the Web, to be delivered and viewed in the Web environment for a more asynchronous, student-centred learning mode. Both the EXE and the "shocked" module can also be delivered over a synchronous learning networked environment for a more teacher-centric mode of teaching and learning. The choice of the teaching and learning mode will depend on the instructor, as the final interactive Authorware module can be delivered in different learning environments (Neo & Neo, 2000). Figure (4) illustrates the schematic diagram of the multimedia design process (MDP)
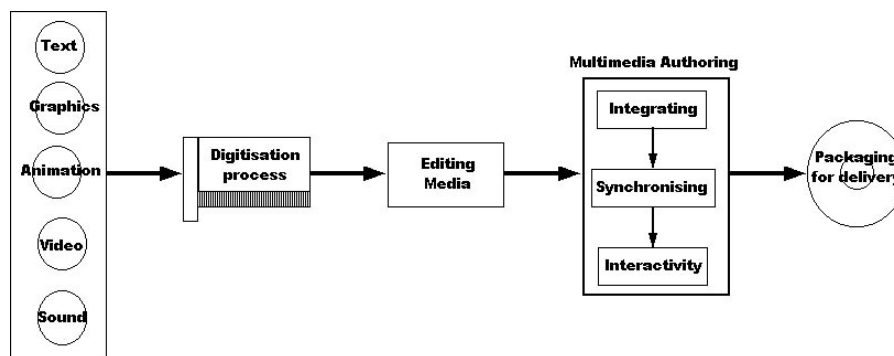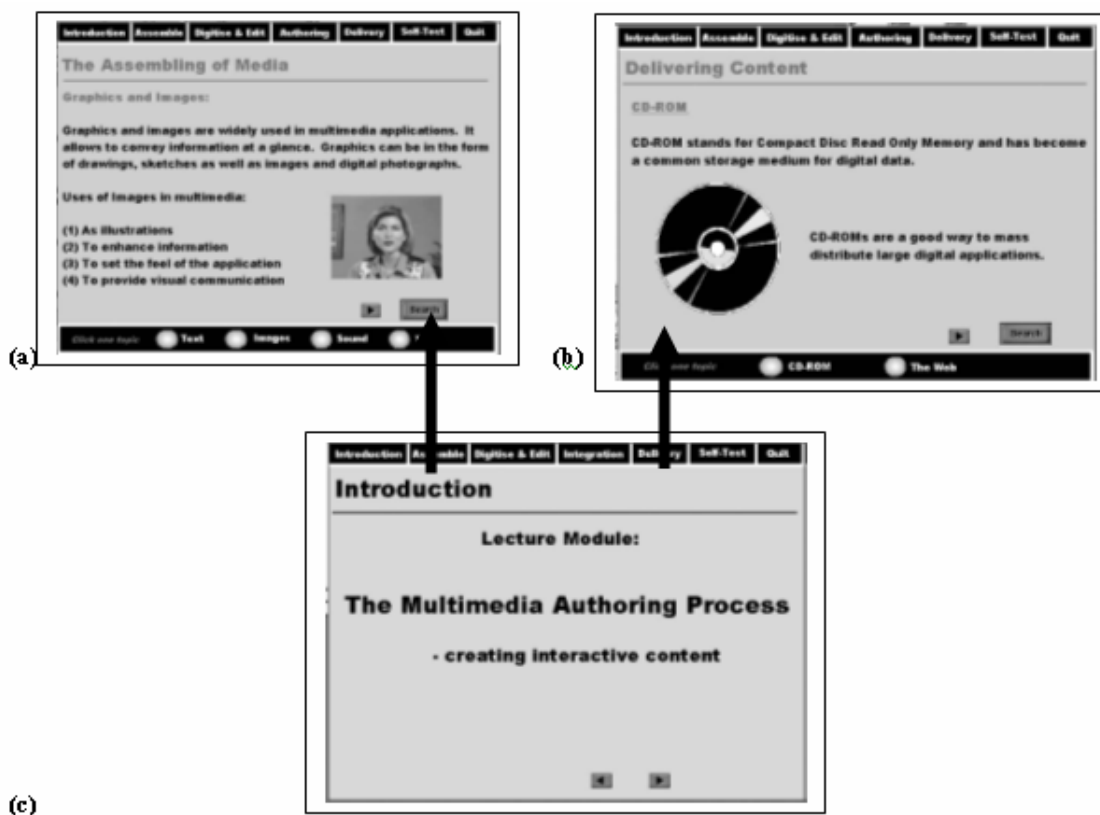

Figure 4The multimedia design process (MDP)

An interactive learning module entitled " The Multimedia Authoring Process", authored in Authorware, will be showcased to demonstrate the robustness of Authorware to create a media-rich, interactive and multi-sensory learning environment (see Figures 5(a), (b) and (c)).

Figures 5 (a), (b) & (c) show the interfaces of the learning module

This interactive module has several characteristics that make it a more effective way to teach and learn:

(1) It is a visual-based module that allows the user to see the concepts presented.
(2) It contains materials that allow the students to learn at his or her own pace.
(3) It contains interactive features that would empower the user to control the content and the flow of information and encourages students to be responsible for their own learning.

This learning module was used to deliver the educational content in various teaching and learning methods such as the teacher-centered and student-centered modes.

Students' responses
A survey was also carried out among the students (N=53) to assess their attitudes and reactions to these methods. The survey was measured in a 5-point Likert scale (1= Strongly Disagree, 5= Strongly Agree). In particular, the students were asked to respond to questions that included 1) what they thought of the use of technology in teaching, 2) how appropriate was the use of media in explaining concepts, 3) whether they found the lecture module stimulating, 4) whether the information presented was clear and concise, 5) whether the interface of the module was easy to understand, and 6) whether they were satisfied with the amount of information received.

Results showed that 88.6% of the students were very favourable towards the use of technology in teaching

(mean = 4.42), 88.7% found the use of media appropriate in explaining concepts (mean = 4.3), 84.9% found the lecture module very stimulating (mean = 4.11), 88.7% found the information presented clear and concise (mean = 4.19), 90.6% found the module's interface easy to understand (mean = 4.23), and 83.1% were satisfied with the amount of information received in the module (mean = 4.02). Table 2 illustrates these results.

Table 2 Mean and percentages of survey results

	Items	Mean	% Students
1.	Prefer technology-based teaching	4.42	88.6
2.	Use of media appropriate	4.30	88.7
3.	Found lecture very stimulating	4.11	84.9
4.	Information presented was clear and concise	4.19	88.7
5.	Interface of the module easy to understand	4.23	90.6
6.	Satisfied with the amount of information received	4.02	83.1
	N=	**53**	

Discussion

Five significant factors have emerged with the integration of multimedia into the teaching and learning process:

1) It has changed the fundamental concept of learning. The students are no longer passive learners, i.e., passively absorbing the information from the teachers, but can actively participate in their own learning process.

2) With multimedia, the teachers now have more options to represent their educational content using a combination of media rather than just text only. That means that their content can now be interactive and media-rich.

3) In the survey, 88.7% of the students (with a mean of 4.3) liked the use of media in explaining concepts. This is in conjunction with Tapscott's (1998) position that the new generation looks to using digital media in their learning process.
4) The teachers can now strengthen their instructional strategies and methods of communicating content to the learners, thus enhancing the teaching and learning environment.

5) The learners preferred technology-based teaching (88.6% with a mean of 4.42). This could be due to the innovativeness of the method of teaching coupled with the fact that these students belong to the PC generation and find using computers and technology-based instruction a more effective and innovative way to learn.

In effect, this infusion of multimedia technology into the teaching and learning process has generated a new paradigm in education and changing the way teachers teach and students learn. And its impact on learning is far-reaching.

Conclusion

In conclusion, learning with multimedia technology has introduced an important paradigm shift in education that will have a very important impact on our educational system and the way teachers teach and students learn. The trends strongly indicate that digital teaching and learning will gain ground in the Malaysian institutions of higher learning and multimedia will emerge as an effective platform for teaching and learning in the classroom.

The changing role of teaching and learning is inevitable with the introduction of multimedia technologies in the educational field and the spawning of a technological savvy generation of youths. Information is being

exchanged in a digital mode, and the educational curriculum is evolving to incorporate multimedia elements and interactive features that create a better teaching and learning environment for the students as well as the teachers. The future trend in educational methodology and strategy is towards integrating technology into the classroom.

In this context, multimedia can be used as the strategic instructional medium for teaching and learning in our education system. Incorporating multimedia into the classroom has become a global trend, and in recent years, many institutions of higher learning in Malaysia are incorporating multimedia into their educational curricula. By integrating ICT and multimedia technologies into education, we will be better able to produce a workforce that meets the needs of the 21st century IT society.

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