Developing a Student-Centered Learning Environment in The Malaysian Classroom - A Multimedia Learning Experience

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Abstract

In recent years, the infusion of multimedia into teaching and learning has altered considerably the instructional strategy in our educational institutions and changed the way teachers teach and students learn. The traditional teacher-centric method of teaching, used for decades in our educational system, has been modified and enhanced. In this paper, we focus on a course in the Faculty of Creative Multimedia, in which students used multimedia in creating a student-centered learning environment. Here, students were taught the basic multimedia design process (MDP) and the use of an authoring tool, Macromedia Director, and then to apply the knowledge they have gained to build a multimedia project of their own choice. In this learning environment, students must play an active part in their learning process and determine how to reach their own learning outcomes themselves. This student-centered approach empowers students to construct their own knowledge and enables them to think critically, learn to work in teams and solve problems collectively. A survey was carried out to ascertain the reactions of the students towards this student-centered learning mode. In general, students responded enthusiastically to the course and demonstrated positive attitudes towards the student-centered learning environment.

Keywords: Multimedia, Student-centered learning, Constructivism, Teaching & Learning, Project-based learning

Introduction

With the rapid progress achieved in the last few decades in the PC and multimedia technologies, it is now feasible and affordable to integrate multimedia technology into teaching and learning in the classroom This infusion of multimedia into the classroom environment has changed the way teachers teach and students learn. The instructional strategy in our educational institutions has altered and many colleges and universities including those in Malaysia are currently gearing their teaching and learning towards using multimedia technology to enhance the teaching and learning environments (Johns, 1999; Kachian & Wieser, 1999; Kamsah, Mokhtar and Yaakob, 2000).

The traditional chalk-and-talk method of teaching, which has been used for decades in our educational system, has been modified and enhanced by the technological advances. The instructional media in this model is essentially textual (sometimes a few graphics) and the presentation is linear. This traditional model of learning is essentially modeled on the behavioral learning perspective (Skinner, 1938). Basically, the teacher controls the instructional process and is regarded as the source of expert knowledge, which is communicated to the students through lectures in a classroom environment. The teacher decides how much information is to be delivered to the learners while the students remain as the passive and obedient recipients of knowledge and information and play little part in the learning process.

With the use of the PC and multimedia, the scenario immediately changes. Multiple media can now be used in presenting the instructional materials and delivered in a multi-modal environment. Furthermore, educators can incorporate features such as interactivity and navigational links into the content with the assistance of authoring tools such as Director and Authorware, and enable the learners to interact with the content in the way he or she likes best. The presentation is non-linear and is able to foster a two-way communication or interaction between the user and the computer. Learning can take place at the learner's own pace and time. This mode of learning is student-centered or self-directed learning, which will cater to individualistic needs in learning unlike the mass learning method as practiced in the teacher-centric or directed instruction mode.

In this paper, we sought to investigate the impact of a student-centered learning environment on student learning

via a multimedia project which would marry technology and the teaching and learning process. By effectively integrating multimedia technology into the curriculum, a student-centered learning environment can be created (Thornburg, 1995) and learning becomes "a social activity, facilitated by a new breed of educators" (Tapscott, 1999). Thus, a new paradigm is created, and this has a great impact on our traditional methods of delivering knowledge and information to the learners today.

Student-centered learning: A constructivist approach

The constructivist approach to learning describes a learning process whereby students work individually or in small groups to explore, investigate and solve authentic problems and become actively engaged in seeking knowledge and information rather than being passive recipients as in the traditional teacher-centric learning which has its foundation embedded in the behavioral learning perspective. In this traditional learning mode, basically, the teacher controls the instructional process, the content is delivered to the entire class and the teacher tends to emphasize factual knowledge and the focus of learning is on the content i.e. how much materials have been delivered and how much have the students learned. Thus, the learning mode tends to be passive and the learners play little part in their learning process (Mayer, 1998).

In the student-centered learning mode, students play an active part in their learning process and become autonomous learners who are actively engaged in constructing new meaning within the context of their current knowledge, experiences and social environments. Learners become successful in constructing knowledge through solving problems that are realistic and usually work in collaboration with others. Although developed in the 2nd half of the 20th century, the constructivist learning approach has its foundations in cognitive learning psychology (Jonassen, Peck & Wilson, 1999), and is rooted in the theories by Piaget(1952), Bruner (1985), and Vygotsky (1978).

Generally, constructivist learning places emphasis on the learner and propounds that learning is affected by their context and their beliefs and attitudes. Learners are encouraged to seek information and knowledge on their own, determine how to reach the desired learning outcomes themselves and build upon their prior knowledge and experiences rather than relying on teachers to supply them with information. In a constructivist learning environment, students learn by fitting new information together with what they already know and actively construct their own understanding. Learning takes place in a meaningful, authentic context and is a social, collaborative activity, where peers play an important role in encouraging learning. In doing so, they gain a deeper understanding of the event and thereby constructing their own knowledge and solutions to the problems (Duffy & Jonassen, 1991; Jonassen, 1994). In this respect, the teacher is no longer perceived as the sole authority of learning as in the behaviorist perspective, but rather, as the person to facilitate learning, guiding and supporting learners' own construction of knowledge (Orlich, Harder, Callahan & Gibson, 1998). In this learning mode, the focus is on the learning process rather than on the content i.e. learning ' how to learn' rather than 'how much is learned'. This learning environment encourages students to develop critical thinking skills, problem-solving and team skills, experiential learning and inter-disciplinary knowledge, with technology being integral to their learning (Cook & Cook,1998; Oliver, 2000). It also represents a move away from the traditional modes of education to one where the learners are active participants in the learning process (Oliver, 1998).

The class project: Creating the student-centered learning environment

The adoption of multimedia technologies in the classroom teaching and learning environment has made it possible for learners to become involved in their work and create multimedia applications as part of their project requirements. This would enable them to become active participants in their own learning process, making use of the knowledge presented to them by the lecturer, and represent them in a more meaningful way, using different media elements, instead of just being passive learners of the educational content. As such. multimedia application design offers new insights into the learning process of the designer and forces him or her to represent information and knowledge in a new and innovative way (Agnew, Kellerman & Meyer,1996).

To create a student-centered learning environment in the classroom, students (N=46) in their second-year at the University taking a course in interactive multimedia, had to do a multimedia application project. Here, students worked in groups of 4-6 people. Each group had to decide on their group members, their team topic and their group leader and assigned various tasks to their members and managed their own projects. They had to use a multimedia authoring tool, Macromedia Director, as the instructional tool to create the project and deliver it on a CD-ROM. As a group, students had to decide on the conceptual model of their presentation, the design of the multimedia interface, navigation paths and the interactive features to use to best convey their topic of interest. In the process, they had to employ their experience and previously acquired knowledge in different disciplines to breakdown the application design into various component parts, synthesize the media elements that represent the information, create the digital interactive application, and work as a team to accomplish the project's overall objectives as well as their own learning outcomes. The teacher and students met twice a week to discuss the progress of their group projects and to consult on any issues or concerns that they may arise. Students were given the entire semester (14 weeks) to develop their projects. Since these students have had no a priori knowledge in multimedia authoring and authoring tools, they were given lectures and tutorials in order to provide them with basic skills in multimedia application development. They did, however, have prior experience in design and other multimedia software such as Adobe Photoshop, Premier, Macromedia Flash and SoundForge, which they can utilize together with Director to develop their projects.

This student-centered learning environment is constructivist in approach in that multiple perspectives to the problem can be developed and students can actively participate in their own learning process (Cunningham, Duffy & Knuth, 1993). Thus, by designing a multimedia application that is multi-sensory and interactive, students are challenged to develop skills in problem-solving, and to exercise analytical, critical and creative thinking in their work, to learn more about their chosen subject material and to develop their abilities to analyze and draw conclusions from it (Boud & Feletti, 1999; Newby, Stepich, Lehman & Russell, 2000).The role of the teacher in this class was that of a facilitator and consultant to these students, supporting them in their process of learning and constructing their projects.

Students' interactive multimedia development

The students' interactive multimedia development process began with an ideation process that was implemented using technology and finally resulting in a tangible final product, i.e., the interactive CD-ROM application, which was turned in to the lecturer for evaluation. In terms of documenting their development, students undertook a multimedia development process (MDP), a five-phase procedure that led them from the drawing board to the computer and finally to the CD-ROM. The five phases of the MDP were as follows:

- *Phase One: Planning & Organizing*

In this initial stage, students had to first decide on their team members. Here, the groups embarked on a planning and organizing process, which entailed scheduling meetings for discussion, working with their timetables for research and development times, team organization, discussion of the team's topic. In this phase, brainstorming was prevalent and the ideation process gave way to the conceptualization of their pool of topics, which, in due course, was narrowed down to one. The chosen topic was then presented to the lecturer for discussion. Storyboarding was also carried out to better visualize the topic and its flow of action, and division of tasks were made.

- *Phase Two: Research & Information Gathering*

In this phase, the groups set out to collect as much information about their chosen topic as possible. Many of this information gathering and research activities were carried out on their own time, and included interviews, collecting brochures, and meetings with key persons. Materials that were gathered during this process were mostly analogue data. The groups had to learn about being professional in their approach as many were dealing with the corporate industry, improve their presentation and communication skills in order to access relevant people and be successful in their endeavors.

- *Phase Three: Digital Media Content Acquisition*

The digital media content acquisition involved groups organizing the digital media content to be used in their final application and to plan on acquiring them. This included deciding on whether to create the digital media content themselves, or use third-party content. For example, many groups wanted to use digital video footage for their applications, and therefore had to use a digital video camera and edit the media appropriately. Other groups preferred to use footage in a company's archives. Whatever their sources, these groups would have to use media-editing software such as Adobe Photoshop (for images), Macromedia SoundForge (for sound), and Adobe Premier (for video) to achieve their aims.

- *Phase Four: Multimedia Authoring*

This phase involves three significant procedures: the integration of the digital media content, the incorporation of interactivity and navigation, and packaging it onto a CD-ROM. Here, students would use the multimedia authoring tool, Macromedia Director, to integrate all the media elements that they had acquired during the previous phases. After doing that, they would then decide on the navigational structure of the application, based on their storyboards. Interactive features were also incorporated into the application to create user involvement. These features include hotspots, menus, buttons, hypertext and hyperlinks. Finally, when the application was completed, it would be packaged into a standalone application (*.exe) and then "burned" onto CD-ROM for distribution.

- *Phase Five: Reflection*

Here students were given a chance to reflect on their work and their interactions with their team members and group leaders. This was carried out via student feedback and interviews.

The multimedia design process (MDP) used in developing the student-centered learning environment is illustrated in Figure 1, and a showcase example of one group's work about Malaysia's Central Market is illustrated in Figures 2 (a) - (e).
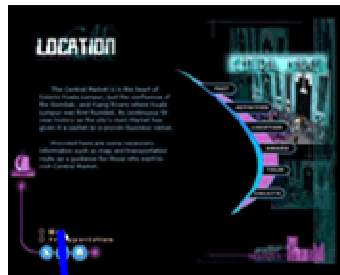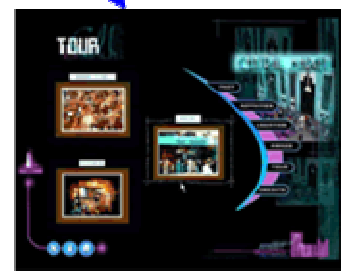
Figure 1 The Multimedia Design Process (MDP)
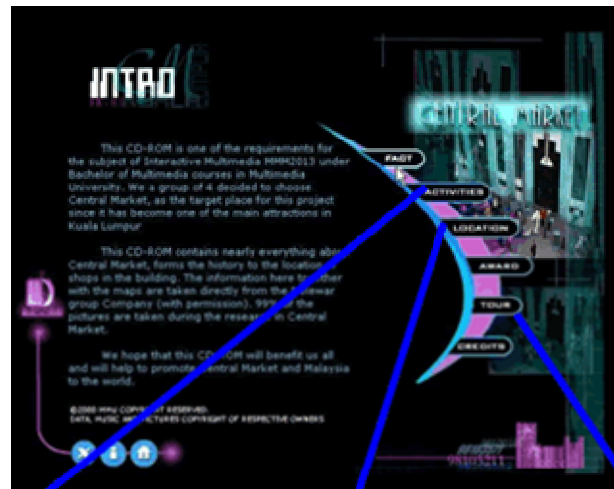
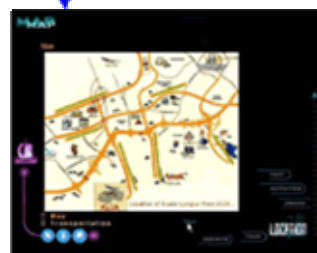*Figure 2 (a) The "Intro" screen for the application shows a menu of topics that the user can explore*
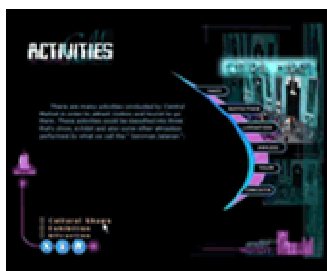
Figure 2 (b) The "Activities" page

Figure 2 (c) The "Location" page

Figure 2 (d) The "Tour" page

Figure 2 (e) The "Map" page, which is accessed from the "Location" page

Figure 2 (a) - (e) A showcase example of one group's work on Malaysia's Central Market

As shown in the example above, this group of students, comprising of one female and three males, with little or no experience in design, created a CD-ROM application highlighting Malaysia's Central Market, a popular tourist spot in the heart of Kuala Lumpur. The application starts with a Flash intro and then proceeds to the main menu page, called "Intro" [see Figure 2 (a)]. From the "Intro" screen, the user is presented with a variety of topics about the Central Market, which they can explore, including "Fact", "Activities", "Location", "Award", "Tour" and "Credits". A global navigation panel for "Exit", "Information" and "Home" is located on the bottom

right-hand corner of the screen and is present throughout the application, as well as a 3D revolving logo of the Central Market.

From the "Intro" screen, the user can choose to enter, in a non-linear manner, any of the topics displayed. Clicking on the "Activities" button will take the user to the "Activities" screen where he is presented with three options, "Cultural Shows", "Exhibitions" and "Attractions" [see Figure 2 (b)]. Clicking on the "Location" button will enable the user to choose to view a map of the area and to even find out the types of transportation available to travel there [see Figures 2 (c) and (d)]. And similarly, the "Tour" button displays a screen with image maps of the area's Ground Floor, Mezzanine and Annexe [see Figure 2 (e)], with floor plans and lot numbers of retail shops available for viewing should the user click each image map. The depth of each topic from the "Intro" screen ran for about 3 - 4 levels, with some topics providing digital video clips for the user's viewing pleasure.

For many of the screens, the design and layout were kept consistent and balanced, adhering to many multimedia design principles which the students had researched on their own and from the multimedia lectures in class, with changes in the title and the very last screens. This design is also prevalent in their design of the application's CD-ROM jewel case, for which they were also responsible and assessed. There is also a "Credits" screen which lists the students involved in this application, giving them a sense of ownership over the application, and a web link to the Central Market's official website.

Assessment and results

In terms of assessment, several criteria were applied to the projects. In particular, the students were assessed on:

- Their creativity and originality in developing their applications
- The depth of content displayed in the applications and their documentation
- The successful and effective transformation of their concept from ideation to the final executable product
- The successful and effective implementation of the multimedia design process, with the appropriate use of the multimedia authoring tool, Director, and other helper applications
- The level of difficulty achieved in using the multimedia authoring tool in terms of navigation and interactivity
- Proper representation of the content via media elements
- Teamwork and group management
- Overall presentation of digital application and documentation.

Overall, the class did well in their projects and class results. 29% of the class achieved A grades (which includes A+, A and A-), 60% achieved B grades (B+, B and B-) and 11% achieved C grades (C+ and C). This particular group of students received an A- in their project as a group. In terms of individual grades, which included other course requirements, they received grades ranging from a B+ to an A. These results are consistent with the overall class performance in doing the project, where those who scored high overall results in the class also scored high marks for their projects.

Evaluation of student learning

Students in this student-centered learning environment were evaluated through a 5-point Likert scale (N=46), with 1 for Strongly Disagree (SDA), 2 for Agree, 3 for Undecided, 4 for Disagree and 5 for Strongly Agree (SA). The items in the survey made up several constructs to measure many student-centered learning traits, such as problem-solving skills, collaborative efforts and teamwork. The results of the survey showed that all items measured yielded means of 3.83 and above (see Table 1), thus showing that the students were enthusiastic about the project and were very positive in their attitudes towards working on a multimedia project and in working in teams.

Table 1 Means for items on survey of student projects (in descending order)

Items	Mean
1. Found the project challenging	4.17
2. Better able to represent concept using digital multimedia	4.15
3. Project allowed me to be creative in my thinking	4.15
4. Able to have creative input	4.02
5. Understood subject better after project	3.98
6. Project allowed me to be think critically about the topic	3.98
7. Felt very motivated doing this project	3.98
8. The group was able to achieve its goals	3.83
9. Able to learn more working with teammates	3.83

Figure 3 illustrates the percentages of the items on the survey and Figure 4 illustrates the percentage response on the survey scale obtained for one of the items measured.
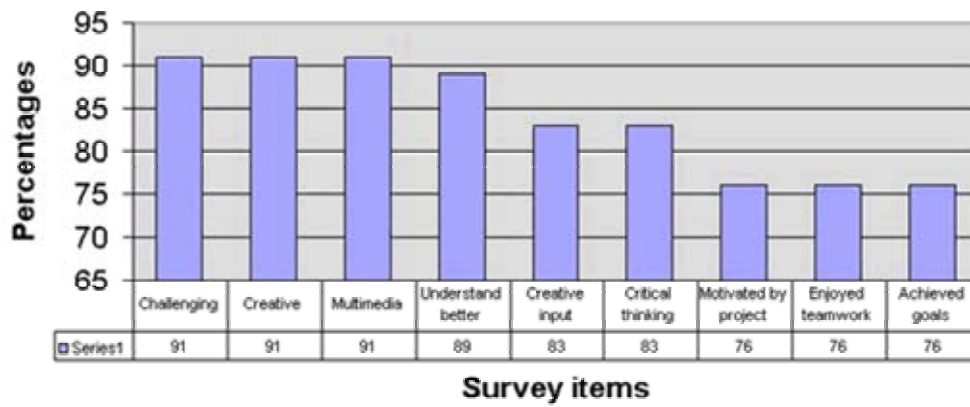

Figure 3 Percentages (p) of student responses on survey (in descending order)

Figure 4 Percentage response on a survey scale for one item

Discussion

As shown in Figure 3, the tabulation of the survey results clearly indicated that students responded positively to the multimedia project. Item 1 showed that students found the multimedia project challenging to them (p=91%, mean= 4.17). Item 2 showed that the project enabled them to think creatively (p=91%, mean=4.15). Item 3 indicated they were able to represent effectively their concepts, knowledge and information using multimedia elements (p=91%, mean= 4.15). Students indicated that their understanding of the subject matter became better

(p=89%, mean=3.98) in item 4 while doing the project. In items 5 and 6, it was observed that students were able to have creative input in the project (p=83%, mean=4.02),and exercised their critical thinking on their topics (p=83%, mean=3.98).Students were motivated by the project (p=76%, mean=3.98), achieved group goals (p=83%, mean=3,83) and enjoyed their teamwork with their peers (p=83%, mean= 3.83) as shown in the items 7, 8 and 9.

In the results, it was observed that the items rated highest by the students in the survey concerned the use of multimedia in the project, the ability to be creative and the challenge that the project posed to them. This indicated that these students liked to conceptualize and express their ideas with a combination of media elements and bring to the project innovative ideas which were derived from their group discussions and brainstorming sessions among themselves.

From the above observations, it can also be concluded that this project empowered students to develop and exercise their creative and critical thinking skills through their organizational and research activities and in the conversion of their initial ideas and concepts into their concrete projects. They learned about planning development and project management, and how to select the appropriate hardware and software applications for their development, skills that are important in a real world setting. And through working with an authoring tool and using other applications to build their projects, students were able to acquire the technical skills in multimedia technology and incorporate interactive features into their presentations. Furthermore, in many of the groups, students had to develop their communication and presentation skills since gathering information on their chosen topics involved interviewing people and visiting the actual sites. They also had to learn to select the appropriate information to display in the electronic applications.

In the survey, teamwork was rated favorably (mean=3.83), indicating that students found teamwork and cooperation essential for them to complete their project and to take advantage of the skills and expertise of each member of the team. In the interviews conducted during the "Reflection" phase on the MDP, some of the feedback expressed by the students included:

1. "We got to know each other better since we spent a lot of time together"
2. "We learnt more about our topic. Fun to know everyone on the team and had fun shooting video, never done it before."
3. "We learnt more about multimedia, developing a CD-ROM, software, navigation and interactivity"

They were thus able to develop interpersonal skills and take part in brainstorming activities while making decisions concerning their project. Many expressed the ability to work through their problems via group discussions as an integral part to the successful completion of their projects and in achieving their group goals. This aspect of the project is important as teamwork is crucial to the success of a knowledge-based IT organization in which collaboration and knowledge-sharing among members in a team constitutes the very essence of the corporation.

Conclusion

The results indicated in this project showed clearly that multimedia technology greatly influences a student's learning process and widens the scope of learning skills and knowledge. This multimedia mode of learning provides an alternative to the traditional teacher-centric learning and enables students to enjoy a richer learning environment. It empowers students to become active learners and display their ideas and information in terms of the multimedia format and use their higher level thinking skills like analysis, synthesis, evaluation and reflection while solving authentic problems. This learning mode also allows the teacher the flexibility to present their curriculum in an innovative manner and to become a facilitator, a consultant or guide on the side, helping students to access, organize and obtain information to provide solutions to the problems rather than the one supplying and prescribing information and knowledge to the learners as in the traditional behaviorist learning mode. In this learning mode, student learning, in particular, the learning process, becomes the main focus, not the content, teacher or the technology used, which play only supportive roles; thus showing that creating a student-centered learning environment using multimedia technology can contribute substantially towards enhancing student learning and the learning process.

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