Innovative Teaching: Using Multimedia in a Problem-Based Learning Environment

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ABSTRACT

Presently, traditional educational approaches have resulted in a mismatch between what is taught to the students and what the industry needs. As such, many institutions are moving towards problem-based learning as a solution to producing graduates who are creative, can think critically and analytically, and are able to solve problems. In this paper, we focus on using multimedia technology as an innovative teaching and learning strategy in a problem-based learning environment by giving the students a multimedia project to train them in this skill set.

The purpose of this project was to access the students' skills in framing and solving problems using multimedia technologies. The students worked in groups and each group had to pick a topic for their project, develop, design and present it in a CD-ROM. They were then surveyed on their attitudes toward the project and their skills as a team. Results showed that the students were very positive toward the project, enjoyed teamwork, able to think critically and became active participants in their learning process. Therefore, multimedia-oriented projects, like many other problem-based learning solutions, can be used alternatively as an innovative and effective tool in a problem-based learning environment for the acquisition of problem-solving skills.

Key words: Problem-based learning, Interactive Multimedia, Macromedia Director, Teamwork, Problem-solving.

INTRODUCTION

One of the major concerns of many countries today is that there is a mismatch between graduates' skills, acquired from higher education institutions and the skill sets needed in industry. Many of the current graduates are found to be lacking in creativity, communications skills, analytical and critical thinking, and problem-solving skills. Presently, many institutions are moving towards problem-based learning as a solution to producing graduates who are creative and can think critically, analytically, and solve problems. Since knowledge is no longer an end but a means to creating better problem solvers and encourages lifelong learning, problem-based learning is becoming increasingly popular in educational institutions as a tool to address the inadequacies of traditional teaching.

Since these traditional approaches "do not encourage students to question what they have learnt or to associate with previously acquired knowledge" We would like to extend this contention further by using multimedia technologies to create a multimedia-oriented project. By doing so, we hope to further develop the students' ability to become creative and critical thinkers and analyzers, as well as problem-solvers, within this multimedia-mediated problem-based learning (PBL) environment. This learning mode is constructivist in approach whereby the students participate actively in their own learning process and construct their own knowledge (Janssen, Peck & Wilson, 1999).

Multimedia in education

The use of multimedia in industries has been extensive, as it has been effective in increasing

productivity and retention rates, where research has shown that people remember 20% of what they see, 40% of what they see and hear, but about 75% of what they see and hear and do simultaneously (Lindstrom, 1994). This is especially significant in the CBT (Computer-Based Training) modules in corporations like Ernst & Young, and Union Pacific, where employees are trained in organizational procedures, and in flight simulations in the aviation industry to train pilots. It is now permeating the educational system as a tool for effective teaching and learning. With multimedia, the communication of the information can be done in a more effective manner and it can be an effective instructional medium for delivering information. A multi-sensory experience can be created for the audience, which, in turn, elicits positive attitudes toward the application. The evolution of multimedia has made it very possible for learners to become involved in their work. With multimedia technologies, they can create multimedia applications as part of their project requirements. This would make them active participants in their own learning process, instead of just being passive learners of the educational content.

Problem-solving

The multimedia project in the classroom

The move towards using problem-based learning in many educational institutions has resulted in a shift in the curriculum model. The focus is moving from content towards problems to provide a more realistic approach to learning and to create an educational methodology which "emphasizes real world challenges, higher order thinking skills, multidisciplinary learning, independent learning, teamwork and communication skills" via a problembased learning environment (Tan, 2000). However, this model can be further strengthened with the inclusion of multimedia technology into this problembased learning environment to enhance the students' learning experience.

This reinforced model is illustrated in Figure. With the use of multimedia projects, students can utilize the knowledge presented to them by the teacher, and represent them in a more meaningful way, using different media elements. These media elements can be converted into digital form and modified and customized for the final project. By incorporating digital media elements into the project, the students are able to learn better since they use multiple sensory modalities, which would make them more motivated to pay more attention to the information presented and better retain the information.

Multimedia-oriented projects are "a way for students to achieve high self-esteem, to increase their ability to function as self-directed learners, to learn to think effectively, and to practice problemsolving and decision-making" (Agnew et. al, 1996). Therefore, using multimedia in the teaching and learning environment enables students to become critical thinkers, problem-solvers, more apt to seek information, and more motivated in their learning processes. Multimedia is slowly gaining ground as



Fig. 1: The multimedia-oriented Problem-Based Learning curriculum model

a way for students to represent the knowledge that they acquire in class and to construct their own interpretation of the information acquired. It also fosters collaborative and cooperative learning between and among students, thus better preparing them with a skill set for real-life work situations (Roblyer & Edwards, 2000; Janssen et. al, 1999).

Limitations

Although the class demonstrated a positive attitude toward using interactive multimedia in a problem-solving learning environment, there are some limitations to this study which should be addressed. Firstly, to be able to be successful in such endeavors, there must be adequate number of computers made accessible to the students and teachers, in order for the work to be properly carried out. Secondly, multimedia authoring software like Director or Author ware must also be provided. And lastly, training in this software's should be provided to the teachers so that they can conduct these types of classes. By making the hardware and software available, such as in the Multimedia University, Cyberjaya, Malaysia, both the teachers and students can use multimedia successfully in their teaching and learning processes.

CONCLUSION

Think - Learn - Act – Grow

This paper has presented and discussed the use of multimedia in a problem-based learning environment to equip students with high-order thinking and problem-solving skills and to enable them to experience an IT-oriented learning situation. The multimedia project in this course enabled the students to exercise their creative and critical thinking skills in solving their design and development problems, work collaboratively to gain team-based experience, and to face the real-life situation of problem-solving. This is a studentcentered learning approach which allows them to construct their own knowledge and understanding, and determine their own learning goals. The role of the teacher, on the other hand, changes from the "sage on the stage" to a "guide on the side," assisting the students in the construction of their knowledge.

As such, the use of multimedia technology and project are an innovative and effective teaching and learning strategy because they motivate the students in their learning process and help them to acquire good problem-solving skills. As evidenced by this project, students became very active participants in their learning process instead being passive learners, and were able to use various digital media elements to accomplish their project. These findings are significant in that

- By using a multimedia project, we can move towards the Constructivist learning mode, which is student-centric. In this context, the students had to utilise their prior knowledge in other disciplines to breakdown the problem into component parts, and then synthesize and re-construct a possible solution. This experience is invaluable in creating a new generation of effective problem-solvers for the current industry needs.
- We successfully integrated multimedia technology into the problem-based learning classroom, instilling effective "learning how to learn" and lifelong learning attitudes into the students.
- Multimedia-oriented projects, therefore, like many other problem-based learning solutions, can be appropriately used as an innovative and effective tool in a problembased learning environment for the acquisition of problem-solving skills.

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