

Web-Enhanced Teaching of Construction Management Using Current Educational Technologies

V. K. Varma
Missouri Western State College

Abstract

The evolution of teaching in higher education has brought us from the old conventional blackboards to the most sophisticated forms of educational technologies using computers and electronic blackboards. Computer technology is now considered as the very basic, and fundamentally essential form of technology to enhance teaching and learning. With the explosion of internet and the world-wide web, and availability of a variety of software for course management, our methodology of teaching engineering courses has changed considerably. Use of Blackboard, WebCT, Front Page, and other software, has transformed teaching from a linear to a non-linear mode where students can jump, for example, from Chapter 3 to Chapter 8 and can bring in the required information as they need it to understand a topic. Teaching of construction management is no different than teaching a course in any other discipline. However, the use of Discussion Boards is of special significance in teaching of Construction Management course when many of the students have been exposed to the construction process either via a part-time job as a member of a construction team, or they are full-time construction workers, and are going through school as part-time students. In that sense, teaching of construction management goes beyond the limits of academic halls, and requires the use of all means available to make the class material relevant to the construction process. This paper also addresses some concerns of some faculty who are reluctant to integrating latest forms of educational technologies in the classroom because of their own personal biases, or their own personal fears.

Introduction

Over the last several decades, more and more technology innovations have been introduced in the classroom to improve teaching and learning. It is strongly believed that technology has the power to improve both teaching and student learning. Technology is constantly growing and changing, and at times, it seems, it is almost a Herculean task to integrate most relevant forms of available educational technologies into classroom. Some senior faculty either choose to stay with their old ways and refuse to adapt to newer ways of teaching, or simply give up and choose not to incorporate the various educational technologies available to them to improve teaching and learning, or they simply choose to retire. The field of higher education has enough interesting anecdotes. The learning curve of faculty who bear the responsibility of teaching with the latest tools of educational technologies is a variant, and so is the motivation of students who are the prime beneficiaries of teaching and learning innovations introduced by the educators. Both factors need to be viewed with equal emphasis with respect to goals of teaching and learning.

In the evolution of higher education, the role of the teacher has shifted from a lecturer to that of a facilitator. The objectives of education have shifted from a teacher-centered to

that of a student-centered. In essence, in the current realm of things, student learning is our prime focus. In order to accomplish that goal, the role of technology has become all the more important, and technology integration has become the key mantra in classroom instruction.

This paper discusses integration of educational technologies from the low to the high end, from the old conventional chalk board to electronic blackboard and the web-based discussion board , from the overhead projection (plastic transparencies) to the computer-based multimedia projection (power-point slides), from the paper-and-pencil testing to on-line testing utilizing WebCT, to assist students learn and grasp the essentials of their disciplinary knowledge. As an example, a course in construction management is used in this paper where the author has used Discussion Board to enhance student learning. The author uses web-enhanced approaches to teaching a course in structural steel design as well. The limits of integrating technology into classroom teaching are teacher-dependent, and every teacher must use what he/she feels most appropriate for the learning outcomes. Since the Industrial Revolution, science and technology have shaped the world in fundamental ways.¹ Integration of currently-available educational technologies in the classroom can similarly affect the student learning in the most fundamental way.

Integrating Educational Technologies in Teaching

Apollinaire, as quoted by Elliot W. Eisner in *Educational Researcher* (August-September, 1997):

“Come to the edge,” he said.

They Said, “We are afraid.”

“Come to the edge,” he said.

They came.

He pushed them.

And they flew.

There is uncertainty, and there is fear to take the next step, and the fear to adapt to new knowledge. An architect friend of mine had been teaching architectural graphics at a reputed university. He had evolved with time, and made the change from the drawing board to the desk top of a computer from the early 1960s to 1980s, and by mid 90s, he thought, he had seen the last version of the computer-aided drafting and design (CADD) software, but lo and behold, the newer versions of the CADD software kept coming in. He had to learn the software changes time and time again, and had to adjust to those changes. That was not the only problem, he said, he had to incorporate those changes into his teaching. By now, he was getting tired of the changes, and his learning curve was getting too unbearable. He decided to hang up and retire. “Let the younger faculty handle it,” he said.

There are many true stories like these. As professionals, sometimes we have to be pushed to be a part of the change, at other times, we simply evolve into change gradually. If we are to insure that we accomplish our goals of engineering education, we must set clear goals, define what teaching and learning should accomplish, and then use the right tools of technology to accomplish those goals.

Goals of an Undergraduate Course on Construction Management

I have taught a course on construction management course a few times over the last several years. With the advent of outcomes-based criteria as per the ABET (Accreditation Board for Engineering and Technology) accreditation guidelines, it has become important to clearly define the goals and objectives of the course, to assess student performance, to incorporate the outcomes into a continuous improvement plan, and demonstrate implementation of the continuous improvement plan. How a single course is integrated in the overall curriculum of the program is just as important as the course itself; therefore design and delivery of the course must incorporate all relevant aspects of instruction, assessment, and technology integration.

When the construction management evolved in the 1970s, the construction industry experienced its first major shift away from traditional design-bid-build and the resulting impact on the management of contracts. More recently, design-build has emerged as a significant option, such that today's owner can select from a variety of different procurement systems. In order to insure that my students of construction management are aware of the construction process, one of my most important goals in the course is to get them to understand the make-up of the construction industry. This indirectly sets the stage for integration of a discussion in my course goals. This discussion at times is oral, sometimes it is over the email, sometimes it is on the course listserv, and sometimes in the class on the electronic discussion board where every student's responses are read by every other student in the class including the instructor. And sometimes, I simply use the ordinary marker-board (equivalent to the old blackboard). The information is in front of everybody in black and white on the discussion board, and everybody sees, reads, dissects, and agrees and disagrees; in other words, it is a live discussion. Students are continuously nudged to respond, and to communicate. A sample of a discussion board question on "The Eichleay Formula: How do you Recover Costs?" is as follows. The instructor posted the following question on the discussion board:

Question: In order to recover costs on a delayed construction project, a contractor must establish two elements before Eichleay formula can be applied. What are those two elements? Review the Instructor Hand-Out, and discuss the case, and give your critical opinion.

Each student posted a response to the above question. A sample of a response from a student follows.



Assessment of Discussion Board Assignment

The discussion question that was posed to the students was taken from a court case decision that appeared in an engineering journal.² The Eichleay formula had been discussed in an earlier class period, and the students were aware of the use of the Eichleay formula. This was now to be an application of knowledge that my students already had acquired prior to this class period. It was intended to be a spontaneous and open discussion, in oral and in writing. The participation of each individual student was graded by the instructor, and students' written responses were critiqued and evaluated. As per the ABET criteria on integration of writing and communication skills in student work, it served as one of the student assignments demonstrating the achievement of that key objective.

Using The Web-Enhanced Teaching and Learning Mode

For my course on construction management, the required textbook was *Construction Administration* by Fisk.³ As a part of assignments on topics related to electronic construction administration, the students were required to demonstrate learning by using internet and the web; one particular assignment dealt with explanation of the advantages of using a software called Project Edge which enables the user to keep the project information in check to manage and run projects successfully. In an electronic age, information sharing for all parties involved in the project is a necessity, and nothing is more simpler than utilizing the speed of the internet, and the web. Preparation of on-line quizzes, using FrontPage, and WebCT only enhanced further integration of technology in the curriculum, and played a major part in students' understanding of the essentials of key concepts of the course.

Besides, students are in touch with the instructor via the course listserve, and email, in addition to classroom face-to-face discussions. The classroom discussions are aided by powerpoint presentations, and explanation of project drawings including project notes and project specifications.

Conclusion

It is important to realize that the old forms of teaching and learning must give way to newer forms of teaching and learning. In that regard, integration of technology in classroom setting can not be avoided. The electronic plan rooms, the electronic databases, and the electronic help desks require that our students be job ready, and be ready to hit the ground running on graduation. To reduce the time of on-the-job training by employers, it is important that schools of construction, and especially the construction faculty incorporate web-enhanced teaching methodologies in their coursework to enhance student learning in a way that students are extremely comfortable in utilizing computer technology in their day-to-day work.

Bibliography

1. Roblyer, M.D., and Edwards, J (2000). *Integrating Educational Technology into Teaching*. Columbus, OH: Merrill Publishing.
2. Parvin, C. "The Eichleay Formula: Does it Fly? *Roads and Bridges*, September 2002
3. Fisk, E. (2000). *Construction Administration*. New York, NY: Prentice Hall.

VIRENDRA K. VARMA

Virendra K. Varma, Ph.D., P.E., F. ASCE, is Professor of Construction, and Chairman of the Department of Engineering Technology at Missouri Western State College. He has presented and published extensively in engineering journals and conferences. He is a Past President of ACI-Missouri, and a Past President of NW Missouri Chapter, MSPE of NSPE.