

AC 2007-1067: DEVELOPMENT OF EFFECTIVE ONLINE LEARNING SYSTEMS FOR TECHNOLOGY-ORIENTED COURSES

Leslie Pagliari, East Carolina University

Richard Monroe, East Carolina University

David Batts, East Carolina University

Development of Effective Online Learning Systems for Technology-Oriented Courses

Introduction:

According to Everett M. Rogers, innovation is “an idea perceived as new by the individual,” and diffusion is “the process by which innovation spreads” (16; 10). According to the book Diffusion of Innovations written by Rogers (16):

“The essence of the diffusion process is the human interaction in which one person communicates a new idea to another person. Thus, at the most elemental level of conceptualization, the diffusion process consists of (1) a new idea, (2) individual A who knows about the innovation, and (3) individual B who does not yet know about the innovation.”

Online learning or distance education among individuals has been a topic of discussion for quite some time. There have been many different thoughts and theories as to what distance education should consist of; how people perceive distance education; and what should be included in a distance education course. In order to understand the confusion behind the acceptance of new technologies and ideas, many turn to the Diffusion of Innovation model. The Diffusion of Innovations model is based on the process of understanding how new ideas and products spread. It also discusses why some great ideas do not make it or take a long time to catch on. It analyzes and helps explain the adaptation of a new innovation. It helps us understand the process of social change.

We all realize that online learning is not easily successful. The instructor must give extra effort in order for the student to learn effectively. Students have access to the instructor 24 hours a day via email. The instructor must effectively participate in the course in order for the student to learn and understand materials in an effective manner. Many have asked what type of an individual it takes to participate in online learning. Social learning theories tell us many theories about success and how new innovations can inhibit learning or increase learning in an individual.

An individual must do their full part in order to be on the track of the secret of personal success. This type of person needs the following:

- energy and initiative
- self-reliance and tenacity
- sympathy and adaptability
- intelligence (22)

Cooley (6) states that we need all the opportunity that society can give us, but it will do us little good without our own personal force, intelligence, and persistence. These characteristics will help an individual succeed in any new environment. The characteristics listed above are exactly the characteristics a person must have in order to succeed in a new and changing environment that distance education provides.

Society and Technology:

Through the years, technology has gone through many changes. Rogers defines diffusion “as the process by which an innovation; is communicated through certain channels; over time; among the members of a social system” (16).

According to Rogers (16), an innovation usually has two identifiable components; a technologic component, which facilitates change in circumstance, and an idea or theory, which produces a particular outcome (p.11). In distance education, our technologic component is of course our computer, and our idea or theory is teaching a student effectively without that student having to sit in a classroom in a face to face setting.

The newness in an innovation does not just involve new knowledge. The innovation may have been planned where one has known about it for some time but has not been able to develop a favorable or unfavorable attitude toward it, nor have they been able to adopt or reject it. According to Rogers (16), there are important research questions addressed by diffusion scholars. They are as follows:

1. How the earlier adopters differ from the later adopters of an innovation
2. How the perceived attributes of an innovation, such as its relative advantage, compatibility, etc. affect its rate of adoption, whether relatively more rapidly or more slowly
3. Why the diffusion curve “takes off” at about 10-25 percent adoption, when interpersonal networks become activated (p.11)

In other words, the change agent or person introducing the innovation in a social system should take into consideration the following:

- The characteristics of the target population (the adopter categories)
- The characteristics of the change or innovation itself
- The stages of adoption

These three categories should be analyzed and planned for when introducing an innovation or change. When analyzing distance education, according to the above stages the following are examples of items that could be analyzed:

- The characteristics of the target population (the adopter categories): What type of student does the university/company want to attract; are we looking for well-educated or non-educated individuals; are we looking for a specific age group or type of person or will any individual be able to succeed.
- The characteristics of the change or innovation itself: What types of changes will need to be made in our current structure in order to succeed at this new innovation? Will there be training that will be necessary for the instructors? Will the new students need additional training in order to get started in online courses?

- The stages of adoption: What types of individuals will diffuse to this technology more rapidly; will it “catch on” quickly; if it does, will it enter the mainstream and continue in success or slowly fade away and leave the market?

There has been much research that has concluded that distance education requires a particular type of learner and teacher in order for the process to be successful. Rogers feels that there are different classes of potential adopters that “adopt” the technology quicker than others. Rogers work shows us there are:

- Innovators: those that are adventurous, who have financial resources and like to play with new tools (5%)
- Early Adopters: those who see strategic advantage in adopting an innovation (10%)
- Early Majority: those that are followers who make a deliberate choice to adopt (35%)
- Late Majority: those who are skeptical and who adopt when it is less risky (35%)
- Laggards: those who adopt a “not over my dead body” attitude (15%)

Clarke (4) describes it in an easier way. He describes the following:

- Innovators are venturesome, cosmopolite, risk-taking, information seeking, with a higher financial status
- Early adopters are respected by other members of social groups, greatest degree of opinion leadership, strategies with a motivational emphasis may be most effective at getting them involved in the diffusion process
- Early majority are those that are deliberate, adopt new ideas just before the average member of a system
- Late majority are those that are skeptical, adopt new ideas just after the average member of a system. The pressure of peers is necessary to motivate adoption. Intervention strategies that help them to overcome barriers are needed to get them to take up the innovation.
- Laggards are those that are traditional, last in a social system to adopt an innovation and pay little attention to the opinion of others.

The Diffusion of Innovation also tells us that there are two factors which have a bearing on the new technology and its diffusion into the world:

1. The degree to which the technology has diffused, and
2. The personal characteristics to the group begin studied

Depending on how long the technology has been accepted and to what degree the population has accepted the new technology will tell us how long that particular technology will survive. Distance education has been around for quite some time and many see it as a way of teaching for the future. Its success has only increased through the past few years and the trend shows us that it will continue to grow at exponential rates.

At East Carolina University, we have seen an increase from developing our own webpages to teach distance education courses, to using such course shells as real education and blackboard. Today, we continue to grow by implementing various techniques into the classroom. The

following examples will show how East Carolina adapted to the challenge of teaching these various types of students in an online classroom and the techniques that were used in our IDIS 3790 Technical Presentation course.

About East Carolina University:

Chartered by the North Carolina General Assembly on March 8, 1907, East Carolina University has moved in a rapid but orderly transition from its beginnings as a two-year normal school to a Doctoral/Research-Intensive level comprehensive university whose outreach now transcends its regional origins. On October 5, 1909, East Carolina Teachers Training School began its first regular session; during that year 174 men and women students were enrolled. The first class to graduate from the two-year normal curriculum received its diplomas on June 6, 1911.

The institution was authorized by the General Assembly in 1920 to institute a four-year teacher education curriculum and to confer the baccalaureate degree upon its graduates. The Board of Trustees proposed in 1921 that the name be changed. East Carolina Teachers College was authorized in 1929 to initiate graduate programs, and it conferred the first Master of Arts degree in 1933. In 1941, the college was charged to plan for a liberal arts program.

In 1951, to reflect the institution's expanding academic commitments, the name was changed to East Carolina College. As the fastest growing educational institution in North Carolina, by 1960 it had become the state's third largest institution of higher learning. During the expansion of the sixties, East Carolina was reorganized to reflect the structure of a comprehensive university. In addition to the College of Arts and Sciences, the Graduate School, and the General College, seven professional schools were established. In 1967, the General Assembly authorized university status. Thereafter, East Carolina University continued its academic advancement and extended its services to address regional and national challenges.

The General Assembly restructured public higher education in North Carolina in 1971, making the University a constituent member of the University of North Carolina. The charter class of the four-year medical school enrolled in 1977. In 1979 the University was authorized to develop five Ph.D. programs in basic sciences related to medicine. East Carolina University awarded its first Ph.D. degree in 1983. During 1998, East Carolina University was reclassified as a Doctoral/Research-Intensive institution. ECU offers doctoral degrees in Educational Leadership, Bioenergetics, Communication Sciences and Disorders, Coastal Resources Management, Biomedical Physics, Nursing, Pharmacology, Physiology, Microbiology and Immunology, Biological Sciences, Anatomy and Cell Biology, Biochemistry, and Medicine. The University presently consists of sixteen departments within the College of Arts and Sciences, twelve professional schools, one being the College of Technology and Computer Science, the General College, the Graduate School, and the Division of Continuing Studies.

According to the East Carolina University website (9), the mission of the University is as follows:

East Carolina University, a constituent institution of the University of North Carolina, is a public doctoral university committed to meeting the educational needs of North Carolina. It offers baccalaureate, masters, specialist, and

doctoral degrees in the liberal arts, sciences, and professional fields, including medicine. East Carolina University is dedicated to educational excellence, responsible stewardship of the public trust, and academic freedom. The university values the contributions of a diverse community, supports shared governance, and guarantees equality of opportunity. East Carolina University's motto is "service," meaning "to serve," and it seeks to meet that obligation through the following interrelated components of its mission—education, research and creative activity, and leadership and partnerships within its region.

Distance Education at ECU:

East Carolina University (ECU) has always been involved in distance education and today offers entire degree programs online. ECU has been a leader in this area with over fifty years handling distance education courses. ECU recognized the potential of online learning early and was among the first schools in the nation to develop and offer a degree completely over the Internet.

Since this time, the university has created more than 50 degree and certificate programs in all areas including technology related fields. As a result of this vision, East Carolina University's distance education enrollment far surpasses the other 15 universities in the University of North Carolina System. With East Carolina University being a leader in distance education and wanting to provide the best education for the students, faculty members must keep up with the latest techniques and trends in instructional technology.

Implementation of Techniques at ECU

ECU's College of Technology and Computer Science offers entire degree program entirely online. Students attend from all over the world. One particular class is IDIS 3790, Technical Presentations. This course requires students to complete an entire presentation online that is reviewed and critiqued by the professor and their peers. In order to complete this task, other types of software had to be implemented in the classroom. The two software programs picked were Camtasia and Microsoft Producer.

These techniques have been effective tools in the online classroom setting by providing students with a 'real' person to watch and hands on tutorials they can follow. The interaction of student to faculty for basic questions has decreased while the interaction among the classroom students has increased. These programs can be found online and have been a benefit to our students. Our students have one main commonality. The basic system used for our entire online classroom setting is Blackboard. Blackboard offers a complete suite of enterprise software products and services that power a total "e-Education Infrastructure" for schools, colleges, universities, and other education providers. Blackboard solutions deliver the promise of the Internet for online teaching and learning, campus communities, auxiliary services, and integration of Web-enabled student services and back office systems. ECU is currently using Blackboard's Academic Suite 6.0. More information about blackboard can be found at <http://www.blackboard.com> (3).

Camtasia:

Camtasia is a relatively new multimedia, screen capture software from TechSmith. This product was first used in IDIS 3790, Technical Presentations so the online students could have the same presentation skills as on campus students. The format allowed students to view lectures and record technical presentations that could be viewed by fellow classmates.

Tutorials were created for the class that demonstrated how to execute technical tasks required to record and view presentations online. Examples of tutorials created were:

- how to make a Web page using various applications
- how to obtain and use transfer protocol to send a Web page to the server
- how to choose appropriate settings and record a technical presentation
- how to link a production to a Web page

Students did not have to have previous experience or computer literacy skills to execute the necessary computer tasks. Without Camtasia it would have been too difficult and too time consuming for most students to learn how to use the various required software programs on their own.

Camtasia software is multidimensional and can do many things. A student can be taught how to produce and easily edit narrated power point presentations. It allows them to capture all animation, video, and sound effects. For classroom purposes quiz slides can be included in the slide presentation that ask students relevant questions and allow them to see the correct answer at the instructor's discretion. Quiz results may also be automatically sent to the instructor if desired.

For a more personal lecture, Camtasia has a picture in picture feature that captures images from a web cam and synchronizes them with the recorded presentation and narration. Recording with this feature allows students to view the instructor's face while hearing the lecture and seeing the Power Point slides.

Student responses in this class were extremely positive. The students appreciated being able to view the instruction at their convenience; and as many times as necessary. They also appreciated being able to scroll forward and backward, reviewing the information.

There is however, one disadvantage to Camtasia. The instructor is required to decide which video production format best suits the needs of students. The program has the ability to produce video in AVI, SWF, Windows Media, and QuickTime. For this particular course, Windows Media format was chosen for its ability to create smaller streaming video files with only a slight loss in video quality. This was an important issue given the number of students who were downloading the file using dialup connection.

More information about Camtasia can be found at <http://www.techsmith.com/camtasia.asp> [18].

Powerpoint Producer:

In addition to Camtasia, IDIS 3790 also utilized a utility called Powerpoint Producer. This program allowed students to effectively upload a presentation with powerpoints and voice

overlay. This gave the students the ability to effectively complete the course with the required presentations in an online environment.

Microsoft Producer can help easily capture, synchronize, and publish audio, video, slides, and images. It is a great tool to use when creating presentations, training, and business communications. According to Producer's website (14) Producer can be used to do the following:

- Develop training content. Content providers, media departments, or training groups can create on-demand content that engages users and complies with eLearning standards developed by Instructional Management Systems (IMS) Global Learning Consortium, Inc. and the U.S. Department of Defense Sharable Content Object Reference Model (SCORM).
- Generate high-quality online presentations. Companies of all sizes can create rich-media presentations that can help them meet important business goals, such as introducing a new product.
- Index archived videotapes. Take existing video training content, synchronize it with PowerPoint slides, and then publish your updated content to the corporate network to reach users in a cost-effective and engaging way.

The IDIS 3790 course used Microsoft Producer for powerpoint presentations. The course also used Camtasia to effectively teach students how to use Microsoft Producer. At the end of the semester, students reviewed Camtasia lectures and then effectively created their own training powerpoint presentations using Microsoft Producer. These were archived on the College server for use in other areas. The use of blackboard, College servers, Camtasia and Producer provided an active and engaging environment for our students to learn through distance means.

Conclusion:

William F. Hamilton states that (7):

“The primary value of investments in emerging technologies is in the options created through opportunities for future development and profitable commercialization....to manage emerging technologies and capture their full value successfully, managers need to move beyond traditional methods to this dynamic process of creating and exercising real options.”

The implementation of new technologies will always help an organization, as well as individuals grow. With the implementation of these new technologies, East Carolina University's College of Technology and Computer Science will always be on the cutting edge of helping students learn in the best, easiest, efficient, and most practical way.

Change does not come easy. However, there are many ways that organizations can help individuals overcome change and adapt to it in an easier manner. According to the book, 16 Steps on becoming a Learning Organization [1], there are 16 steps to follow to have an effective organization:

- Commitment from top leaders within the organization

- Connection: Leaders within the organization must connect clearly and explicitly link the process and products of knowledge and learning to the strategic goals of the organization
- Assessment: Access the organization existing strengths, weakness, and resources
- Communication: Once the organization commits itself, it must communicate the vision to all employees and stakeholders
- Recognition: People in the organization must recognize the importance of systems thinking/systems action
- Demonstration/Modeling: Organizations need leaders to demonstrate their support and to model their commitment to the organization
- Transformation: transform the culture
- Strategy: Quantum leaps in learning and Knowledge Management cannot occur without corporation-wide strategies and tactics for expanding individual, team and organizational levels of learning/knowledge management
- Cut and Streamline: Cut and streamline the organization to fit the needs acquired
- Empower and Enable: Empower employees to have the necessary freedom and trust, influence, opportunity, recognition and authority to do their jobs
- Extend: Organizations must extend their knowledge and learning efforts to all stakeholders, including customers.
- Capture and Release: Employees at every level will be challenged to develop new knowledge, to take responsibility for their new ideas and to pursue these ideas as far as they can
- Acquire and Apply Technology: Organizations need to acquire and apply the best technology to help capture learning and knowledge, and also have the ability to release this learning and knowledge
- Encourage, Expect, and Enhance: A learning organization promotes learning at 3 levels; the individual worker, the group or team and the organization itself
- Learn: Help the organization focus on knowledge and learning
- Adapt and Improve: These organizations will always need improvement

The College of Technology and Computer Science at ECU has focused on these principals and has adapted the knowledge of acquiring and applying technology to help the faculty and students learn, adapt and improve. They expect the best out of the students of the University and will continue to strive to meet the needs of these students.

East Carolina's College of Technology and Computer Science program was given as an example to show that change can occur, although it may not be easy. Change is not easy for any organization, but as one unknown poet once wrote:

"This life is a test; it is only a test. If it were a real life, you would receive instructions on where to go and what to do!"

References:

- [1] ASTD (issue number 9602), 16 Steps to becoming a Learning Organization, 2001.
- [2] Barney, J. "Firm Resources and Sustained Competitive Advantage," *Journal of Management* 17 (1991): 99-120.
- [3] Blackboard. Online: <http://www.blackboard.com>. 2007.
- [4] Clarke, Roger. A Primer in Diffusion of Innovations Theory. Xamax Consultancy Pty Ltd. 1999.
- [5] Cooley, Charles Horton. Social Process. New York: Charles Scribner's Sons 1918.
- [6] Cooley, C.H. On Self and Social Organization. Chicago: University of Chicago Press. 1998.
- [7] Day, S, Schoemaker, P. Wharton on Managing Emerging Technologies. Chapter 12. John Wiley and Sons. 2002.)
- [8] Diffusion of Innovations. University of South Florida. Online: <http://hsc.usf.edu>. 2003. East Carolina University. Online: <http://www.ecu.edu>. 2002.
- [9] East Carolina University Mission. Online: <http://www.ecu.edu/ecu/ecumission.cfm>. 2002.
- [10] NASA HQ Library. Diffusion of Innovations. Online: <http://www.hq.nasa.gov/>. Revised. October 23, 2000.
- [11] Lado, Boyd, Wright, "A Competency-Based Model of Sustainable Competitive Advantage: Toward a Conceptual Integration," *Journal of Management* 18 (1992): 77-91.
- [12] Patterson, T.C. Change and Development in the Twentieth Century. New York: Berg Publishers. 1999.
- [13] Porter, ME. Competitive Strategy. New York: Free Press, 1980.
- [14] Powerpoint Producer. Online: <http://www.microsoft.com/office/powerpoint/producer/prodinfo/overview.mspx>. 2007.
- [15] Research into Practice: Diffusion of Innovations. Online: (<http://www.shef.ac.uk>). 2003.
- [16] Rogers, Everett M. Diffusion of Innovations. New York: Free Press; London: Collier Macmillan, 1995.
- [17] Saghafi, M.M. & Gupta, A.K. Advances in telecommunications management. Greenwich, CT: Jai Press Incorporated. 1990.
- [18] Schneiderman, Leo. The Psychology of Social Change. Human Sciences Press, Inc. New York. 1988.
- [19] Techsmith Online. Camtasia Product. 2007. <http://www.techsmith.com/camtasia.asp>
- [20] The Communication Initiative. Planning Models: Diffusion of Innovation. Online: <http://www.comminit.com>. 2003.
- [21] Thompson, James D. Organizations in Action. New York: McGraw-Hill. 1967.
- [22] Turban, King, Lee, Warkentin, Chung. Electronic Commerce: A Managerial Perspective. 2002. (Upper Saddle River, NJ: Prentice-Hall, 2002.
- [23] Ward, Lloyd Gordon and Throop, Robert. The Mead Project. Department of Sociology, Brock University. Ontario, Canada. 2001.
- [24] Wilkins, K.G. Redeveloping Communication for Social Change: Theory, Practice, and Power. Lanham, MD: Rowman & Littlefield Publishers. 2000.
- [25] Wright, Kroll, Parnell. Strategic Management Concepts. Upper Saddle River, NJ: Prentice-Hall, 1998.