Teaching and Technology Techniques for Teachers in Online Learning Environments:

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ABSTRACT

When developing and delivering instruction, whether online or not, the use of technology is secondary to well-designed learning goals and objectives. What distinguishes online instruction and technology in the classroom from entertainment or recreation is the conceptual development of teaching techniques based on solid learning theories. This paper proposes a conceptual framework for implementing teaching and technology techniques for online learning environments.

INTRODUCTION

It is imperative that educators provide adult students with the technological tools they need to utilize the learning resources currently available to them (Thomas, 1996) in addition to challenging, well developed in-class teaching techniques. Collis (1996) believes that the World Wide Web (Web) is the medium most likely to result in a significant breakthrough and future usage for education in providing students with technological tools and information.

The phenomenal growth of the Internet over the last few years, coupled with the development of various multi-media applications, presents exciting opportunities for educators. With the modern day Internet, music can be played, videos can be viewed, e-mail can be sent, airplane reservations can be made directly with the airline companies, packages shipped by UPS can be tracked from home, and video and text based "multimedia" libraries can be accessed (Wolf, Liang, Kozuch, Yu, Phillips, Weekes, & Debruyne, 1996). What could be the potential to have this power from any access anywhere in the world? This potential and resource is now being addressed by the academic world with on-line learning environments like technological mediated learning and distance learning programs.

In the context of online learning environments, the Web provides not only a wonderful opportunity, but also a unique challenge to geographically dispersed professors and instructors. As a new delivery mechanism for course material, the Web has the potential to allow students to take a course from anywhere in the world (Benyon, Stone & Woodroffe, 1997). Although Web technology has great potential for education, it is imperative that better tools and understanding of the pedagogic impact are needed to implement online learning environments. Effective conceptual guidelines and framework must be developed to help teachers implement instructional techniques that are based on known and proven learning theories and human computer interaction studies.

In addition to the conceptual instructional guidelines, high level multi-media development tools are needed which will enable the development of courseware with a consistent look and feel. Authoring and delivery tools are needed that will allow the control of information and how it is presented along with the control of navigation between pages. Moreover, educators need to integrate personal and shared communication spaces in order to exploit the power of the medium; a tight integration of media, an opportunity to learn from colleagues and enhanced interactivity of the course. At present, the Web does not provide educators with these things. The primary lesson for educators using the Web is that an incremental development approach, driven by sound pedagogy is of vital importance (Benyon, et al, 1997).

THE ONLINE LEARNING ENVIRONMENT

Across the world pages of notes, copies of overhead transparencies and other teaching materials have been made available to students. These materials frequently contain links that take the reader to other pages of related information. It is natural, then, that distance learning institutions should seek to exploit this technology - allowing students to study from anywhere in the world. As the access to new technologies has increased, so has their consideration for use in teaching. Although a body of knowledge has accumulated concerning hypermedia and hypertext systems (e.g. Nielsen, 1995; Barker, 1993; Cotton and Oliver, 1992; Bieber, Vitali, Ashman, Balasubramanian, & Oinas-Kukkonen, 1997), there is still little specifically on the Web as a teaching medium (Benyon, et al, 1997).

It has been recognized that the Internet is suited to distance learning and technological enhancement for classroom teaching for such reasons as it is ubiquitous, flexible, timeless, and interactive (Kenney, 1996). However, the bulk of the available information to do with Internet teaching does not concentrate on the instructional design or the teaching support aspects required for teaching and learning via the Internet but on the design of Webpages themselves, and how to make them interactive for learning (Benyon, et al, 1997).

THE NEED FOR A CONCEPTUAL TEACHING MODEL

In the new online learning environment, both the teacher and each student are challenged by new roles, functions, and tasks they need to perform. While instructors are asked to articulate more clearly their goals and methods to others in the development team, students are also asked to take more responsibility for their learning (Berge, 1996). It takes time for the instructor to develop effective use of technology in the classroom and the use of mediated instruction in addition to the classroom. Additionally, it is very important to understand that it takes even more time for students to learn in this environment. Moreover, without the right guidelines or framework, the student could even learn less with greater technology available than by reading the textbook and attending the lectures in a traditional classroom setting.

Through the desktop, computer students have access not only to the Internet as it currently exists, but also to an enormous database of information that pertains directly to their classes or jobs. Most of the information is in the form of text, but the library also contains audio and video clips, diagrams, schematics, blueprints, charts and graphs. These electronic libraries are stocked with the equivalent of buildings full of books, journals, and magazines. Sounds wonderful, but that is not teaching or training, that is an electronic athenaeum. It is a collection of subject support material, text aids and job related

information. Sure, the student can load reference documents or the company policy manual onto a server, but the only thing that has been replaced is the paper manuals; training and teaching has not been replaced. As an example, this is a different way to deliver the preflight checklist to the pilot; it is no substitute for the flight simulator (Gordon, 1997).

It is important to realize exactly what is available on the Web. So much is available and in so many different forms that students and faculty alike are bombarded with current information as well as with counterfeit ideas and rumors. It is vital for the instructor to guide the student through the enormous databases of information on the Web, deciphering what is truthful and which is not. Without a firm framework for teaching on the Web, teachers find themselves just as lost as the students they guide through the databases of information.

Additionally, to be successful, most on-line instructional situations need to promote and stimulate discussion among the students. This has proven to be more illuminating and conducive to learning than the one way transmission of facts and information from teacher to student that normally occurs in these environments. Online instructors need to be aware that this can make some students and faculty profoundly uncomfortable and take positive steps to build both confidence and communicative competence in online instruction (Berge, 1996).

DIFFERENT LEARNING AND TEACHING STYLES

Many universities and companies have used advanced technology, including intelligent modeling of the domain and the presumed knowledge of students, to build intelligent multimedia tutoring systems. Simulations, animations, sound, and videos are used to keep students learning and active. However, flashy graphics and simulations alone are not enough. For students to learn, the experience has to be authentic and relevant to their lives. Therefore, students are placed in situations where they solve problems while the system reasons about the problem being solved and about how to best respond to the students' idiosyncratic actions (Woolf, 1996).

There are many different instructional approaches and teaching styles which include lectures, demonstrations, quizzes, mentoring, counseling, audio and video clips, projects, simulations, role-playing, competitions, etc. What might work for one teacher in one subject might or might not work with another class or subject. Therefore, keeping sound adult learning theories in the design and structure of a class is of vital importance. For example, nothing facilitates a smooth instructor delivery more than properly prepared classroom materials. A set of clear and concise transparency overlays or graphical presentation slides improves not only the students' comprehension, but also allows the instructor to maintain eye contact and a conversational presentation style (Madland, 1998). However, in a

lab or technology based course, hands-on activities should be geared toward the students' specific needs with the subject matter. The finest and best-developed lecture would have little or no meaning without the hands-on or experiential learning step. This step helps the student to fully incorporate the kinesthetic mode of learning into their experience and feel the techniques they are learning are applicable and useful to their lives and jobs.

THREE ADULT LEARNING THEORY MODELS FOR ONLINE TEACHING

If educators can communicate a variety concepts in a manner that includes a variety of techniques and delivery methods, chances are more students in a class, both online and in the traditional classroom setting, will be able to comprehend and retain (Sethi, 1998) the knowledge imparted. As greater numbers of faculty rely on mixing delivery methods for communicating content, including on-line learning environments, it will become more and more important to have a well founded learning theory basis and for educators and their classes.

Three of the most relevant and proven adult learning theories of our time were chosen to develop a sound basis for the conceptual online teaching model. These three theories are (1) Gagné=s Instructional Design Theory (1988, 1992), (2) Knowles' Andragogy (1984), and (3) Gardner's Multiple (MI) Intelligence theory (1983). Based upon these theories, a conceptual comparison chart was designed (appendix 1).

GAGNÉ=S INSTRUCTIONAL DESIGN THEORY

Gagné's instructional theory has three major elements (Gagné & Driscoll, 1988). First, it is based on a taxonomy, or classification, of learning outcomes. Second, it proposes particular internal and external conditions necessary for achieving these learning outcomes. Third, and last, the theory offers nine events of instruction, which serve as a template for developing and delivering a unit of instruction.

This theory stipulates that there are several different types or levels of learning. The significance of these classifications is that each different type requires different types of instruction. Gagné identifies five major categories of learning: verbal information, intellectual skills, cognitive strategies, motor skills and attitudes. Different internal and external conditions are necessary for each type of learning. For example, for cognitive strategies to be learned there must be a chance to practice developing new solutions to problems; to learn attitudes, the learner must be exposed to a credible role model or persuasive arguments (Terrell, 1996).

Gagné suggest that learning tasks for intellectual skills can be organized in a hierarchy according to complexity: stimulus recognition, response generation, procedure following, use of terminology, discriminations, concept formation, rule application, and problem solving. The primary significance of the hierarchy is to identify prerequisites that

should be completed to facilitate learning at each level. Doing a task analysis of a learning/training tasks identifies the prerequisites. Learning hierarchies provide a basis for the sequencing of instruction. In addition, the theory outlines nine instructional events and corresponding cognitive processes. These events should satisfy or provide the necessary conditions for learning and serve as the basis for designing instruction and selecting appropriate media: (Gagné, Briggs, & Wage, 1992).

Gain attention: Reception
(e.g. present a good problem, a new situation, use a multimedia advertisement).

Informing learners of the objective or describe the goal: Expectancy
(e.g. describe the goal of a lesson (task), state what students will be able to accomplish and how they will be able to use the knowledge, give a demonstration if appropriate).

Stimulating recall of prior knowledge: Retrieval
(e.g. remind the student of prior knowledge relevant to the current lesson (facts, rules, procedures or skills). To show how knowledge is connected provides the student with a framework that helps retrieval.

Presenting the Stimulus (material) to be learned: Selective Perception.
(e.g. Present text, graphics, simulations, figures, pictures, sound, etc. by following a consistent presentation style, chunking of information (avoid memory overload, recall information. Tests can be included).

Provide guidance for learning: Semantic encoding
(Presentation of content is different from instructions on how to learn. Should be simpler and easier that content).

Elicit performance "practice": Responding.
(e.g. let the learner do something with the newly acquired behavior, practice skills or apply knowledge).

Provide informative feedback: Reinforcement
(e.g. show correctness of the student's response, analyze learner's behavior (or let the student do it), maybe present a good (step-by-step) solution of the problem.

Assessing Performance: Retrieval
(e.g. Assess performance test, see if the lesson has been learned. Also, give general progress information).

Enhance retention and transfer: Generalization
(e.g. Inform the learner about similar problem situations, provide additional practice. Put the learner in a transfer

situation. Maybe let the learner review the lesson.

MALCOLM KNOWLES' ANDRAGOGY, OR ADULT LEARNING THEORY

Malcolm Knowles' learning theory (1984), or andragogy, was specifically formulated for adult learning. The theory was developed as a response to the idea that the popular pedagogy, or learning theory as it related to children, was not adequate when recognizing the special needs of the adult student.

Andragogy focuses on the premises that (1) adults need to know why they need to learn something, or its significance with relation to their work or personal lives, (2) adults need to learn experientially, (3) adults approach learning as problem-solving, and (4) adults learn best when the topic is of immediate value and has relevance to their work or personal lives (Terrell, 1996).

Knowles produced theoretical support for his assumptions that adults need to focus more on the process and less on the content being taught. Strategies such as case studies, role-playing, simulations, and self-evaluation are most useful. Therefore, according to the theory of andragogy, instructors must act the role of facilitator rather than that of the lecturer (Knowles, 1984) which is very different from the lecture format of today's traditional college classroom. The basic andragogical principles are:

Adults need to be involved in the planning and evaluation of their instruction.

Experience (including mistakes) provides the basis for learning activities.

Adults are most interested in learning subjects that have immediate relevance to their job or personal life.

Adult learning is problem-centered rather than content-oriented.

Additionally, Knowles (1984, Appendix D) provides an example of applying andragogy principles to the design of personal computer training.

There is a need to explain why specific things are being taught (e.g., certain commands, functions, operations, etc.).

1. Instruction should be task-oriented instead of memorization -- learning activities should be in the context of common tasks to be performed.

Instruction should take into account the wide range of different backgrounds of learners, learning materials and activities should allow for different levels/types of previous experience with computers.

Since adults are self-directed, instruction should allow learners to discover things for themselves, providing guidance and help when mistakes are made.

GARDNER'S THEORY OF MULTIPLE INTELLIGENCE (MI)

The theory of multiple intelligences (MI) suggests that there are a number of distinct forms of intelligence that each individual possesses in varying degrees. In recent years Gardner's theory (1983) of multiple intelligence types has been a major force seeking to redefine intelligence and influence educational reform. A pivotal aspect of the MI theory is the recognition of a learners' overall intelligence being a function of seven types of intelligences (Sethi, 1998). These seven types of intelligences are:

linguistic / verbal
logical / mathematical
bodily / kinesthetic
musical
interpersonal (social skills)
intrapersonal (insight, metacognition)
spatial / visual

According to Gardner, the implication of the theory is that learning/teaching should focus on the particular intelligences of each person. For example, if an individual has strong spatial or musical intelligences, they should be encouraged to develop these abilities. Gardner points out that the different intelligences represent not only different content domains but also learning modalities. A further implication of the theory is that assessment of abilities should measure all forms of intelligence, not just linguistic and logical-mathematical (Terrell, 1996).

Gardner (1983, p. 390) describes how learning to program a computer might involve multiple intelligences.

"Logical/mathematical intelligence seems central, because programming depends upon the deployment of strict procedures to solve a problem or attain a goal in a finite number of steps. Linguistic intelligence is also relevant, at least as long as manual and computer languages make use of ordinary language. An individual with a strong musical bent might best be introduced to programming by attempting to program a simple musical piece (or to master a program that composes). An individual with strong spatial abilities might be initiated through some form of computer graphics -- and might be aided in the task of programming through the use of a flowchart or some other spatial diagram. Personal intelligences can play important roles. The extensive planning of steps and goals carried out by the individual engaged in programming relies on intrapersonal forms of thinking, even as the cooperation needed for carrying a complex task or for learning new computational skills may rely on an individual's ability to work with a team. Kinesthetic intelligence may play a role in working with the computer itself, by facilitating skill at the terminalY"

HUMAN COMPUTER INTERACTION

In addition to sound adult learning theories, when implementing new technology in classroom situations, the psychology and study of human-computer interaction must be taken into account as well. Human-Computer Interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them (Hewett, Baecker, Card, Carey, Gasen, Mantei, Perlman, Strong, & Verplank, 1992). Human-Computer Interaction (HCI) is the study of people, computer technology and the ways these influence each other. The study of HCI determines how computer technology can be more usable by people (Dix, Finlay, Abowd & Beale, 1993). HCI is about designing computer systems that support people so that they can carry out their activities productively and safely (Preece, Rogers, Sharp, Benyon, Holland, & Carey, 1994).

The instructor must be knowledgeable of the fact that when a student is interacting with a computer system, two highly complex information processors are effectively conducting a dialogue. One of these, the student, will be engaged in some purposeful activity that is directed toward achieving a task objective for the university class. The other, the computer system, is the tool that mediates the achievement of that objective. Both parties in the dialogue are manipulating and acting upon information that represents ideas or entities in a particular task domain (e.g. spaceships in a learning based simulation game; homework documents done on a wordprocessor; or even a computer program itself) (Barnard, 1995).

When choosing online instruction, instructors must be very careful to select products and tools designed with proper HCI interfaces. Design is extremely important to proper facilitation of learning.

The human mind is exquisitely tailored to make sense of the world. Give it the slightest clue and it will provide explanation, rationalization, and understanding. Consider common objects, books, radios, kitchen appliances, office machines, and light switches that make up everyday lives. These well-designed objects are easy to interpret and understand. They contain visible clues to their operation. Poorly designed objects, like universal remote controls and VCRs, can be difficult and frustrating to use. They provide no clues, or sometimes even provide false clues. They trap the user and confuse the normal process of interpretation and understanding. Alas, poor design predominates. The result is a world filled with frustration, with objects that cannot be understood, and with devices that lead to error (Norman, 1988).

Despite its importance, the user-interface design is one of the most poorly understood aspects of most computer systems. Complex, subtly interrelated issues determine the success or failure of the user interface. For example, is it responsive or sluggish, forgiving or

intolerant of human error, easy or difficult to learn, effortless or awkward to use? Even whether or not it is attractive and fun to use can make a crucial difference (Baecker, Grudin, Buxton, & Greenberg, 1995).

People and computers have quite different, often even opposite, capabilities (see Appendix 2). With a well-designed interface, humans and computers should augment each other to produce a system that is greater than the sum of its parts. Computers and humans share responsibilities, each performing the parts of the task that best fit each ones capabilities. The computer enhances our cognitive and perceptual strengths, and counteracts our weaknesses (Baecker, et al, 1995).

INSTRUCTIONAL METHODS AVAILABLE FOR ONLINE INSTRUCTION

Once the foundational adult learning theories and HCI components are identified, then the selection for instructional methods is important. Exactly, what is on the Web and how does a teacher find out what is available to them to use? One great resource that instructors have available to them is a publication entitled Syllabus (1998). This magazine based on technology for education is sent free to educators ten times a year for those who subscribe. Additionally, the Website at http://www.syllabus.com/ lists information for Syllabus Press sponsored and co-sponsored workshops and conferences.

Many textbook publishers now offer Web instructional technology packages to teachers who teach for Universities that adopt their textbooks. One such example is Irwin/McGraw-Hill found online at http://www.mhhe.com/. Their information technology textbook has a programmed WebPage located at http://www.mhhe.com/cit/concepts/pace/ , which has Web exercises for students and Web resources for the teachers.

Another great resource it the Web itself is a great resource for faculty members to find good instructional reference and methods. The best examples of information and ideas are other educational institutions identified by the ".edu" in the address found easily with Web search engines like http://www.dogpile.com/. Dogpile searches all other search engines on the Web making it quite simple to find anything quickly. A Dogpile search located the Yahoo Education:Instructional Technology:Online Teaching and Learning:Teacher Resources page at URL address: http://www.yahoo.com/Education/Instructional_Technology/Online_Teaching_and_Learning/Teacher_Resources/ which lists many technological research links and resources for teachers who what to implement technology in the classroom. A good example of information about other universities that was found on the Web was Kent State University.

DISTRIBUTED LEARNING AT KENT STATE

Kent State University was confronted with the problem of how to overcome the obstacle that exists between teachers and students who are not face to face in the same classroom. It would be a challenge for Kent State, a university with 150 miles separating the two most distant sites. By using new methods of information technology, Kent State launched the Distributed Learning Pilot Program, supported by desktop video conferencing and distributed multimedia content. Using LearnLinc, a PC-based distributed learning software environment from ILINC, Interactive Learning International Corporation, students and teachers are able to see each other in real-time, ask and answer questions immediately, solve problems collectively with other students, and interact as if they were in the same room together (Technology Across the Campus, 1997).

Additionally, the LearnLinc Question and Answer function allows professor to immediately assess students' levels of knowledge of course content. Students are presented with questions on their computer screen, which they answer on-line. The instructor gets an immediate reading of the percentage of students answering correctly or incorrectly. The results give the professors an idea about whether students are actually understanding material being presented. The electronic hand-raising feature of LearnLinc allows the instructor of or the students to ask a question at any time (Technology Across the Campus, 1997).

This type of interactive software could be very useful for Embry-Riddle Aeronautical University College of Career Education with over 110 remote locations all over the world. Interactive teaching and communication is a vital link in the student/professor relationship. Andy Grove, who in addition to running Intel also teaches a strategic management course at California's Stanford University, understands this only too well. "Teaching requires a level of mutual trust and comprehension between human beings that is timeless" (Syrett, 1997).

MIRABILIS= ICQ AND EMAIL USAGE

Another great teaching tool online is the use of a chat room and electronic mail. One great free shareware program available to all on the internet is Mirabilis= ICQ. ICQ is a revolutionary, user-friendly Internet tool that informs the user who is on-line over a TCP/IP connection at any time and enables the user to contact them at will. There is no need to search for friends or associates on the Net because ICQ does the searching for each user, and alerts him or her in real time when selected friends, associates, or students log on. The need to conduct a directory search each time a user wants to communicate with a specific person is eliminated (ICQ, 1997).

With ICQ, users can chat, send messages, files and URL's, or play games. It lets you choose the mode of communication you wish to employ.

Regardless of the application, be it chat, voice, whiteboard, data conferencing, file transfer or Internet games, ICQ will send and receives the entire messages across in real time. ICQ supports a variety of popular Internet applications and serves as a Universal Platform from which can be launched any peer-to-peer application (such as Microsoft NetMeeting or Netscape CoolTalk). It can also be used in a multiple-user mode, so groups can conduct conferences or just converse on-line (ICQ, 1997).

ICQ is very simple to use and install. When installed, ICQ, the program asks the user to register at a server, which is connected to a broad network of servers spanning the Internet. At the time of registration, the user receives a unique UIN (Universal Internet Number). In addition, ICQ gives the user the option of entering personal information along with your UIN. This allows other ICQ users to recognize them when they log on. Once registered, the user can compile a selected list of friends and associates. ICQ uses this list to find selected friends and associates for the user. Meanwhile, ICQ waits quietly in the background without interrupting any other applications in use. As soon as the user logs onto the Internet, ICQ automatically detects the Internet connection, announces the users presence to the Internet community and alerts the user when friends or associates sign on or off (ICQ, 1997).

The educational uses of Achat@ are limitless. Chat, like e-mail, is a viable communications tool. The term e-mail is actually a misnomer. The technology's better name is "shared-idea network"--an information system that provides give-and-take. In other words, e-mail is a flexible and rapid format that encourages (almost demands) two-way communication (Federico and Bowler, 1996). If e-mail is a Ashared-idea network,@ then rapid usage of TCP/IP chat rooms is an even more powerful real-time educational tool. According to a survey of corporate communicators from 93 Fortune 500 companies, conducted by Cognitive Communications Inc., 42% of all employee communications will be delivered through e-mail by the end of 1997. In fact, the survey says that within the next three years, major companies will communicate by-mail as frequently as they communicate by print (Federico & Bowley, 1996).

WEBPAGE BASED Computer Mediated Information Exchange (CMIE)

Psychologists have found that music -- especially Baroque music (the music of Handel, Bach, Vivaldi, etc.) -- when it accompanies new information, helps left/right brain linkage. It creates an auditory and rhythmic association with the material being presented and it promotes a state of relaxed awareness that stimulates an alpha brain wave pattern (Doyle, 1991). With music in mind, the new computerized WWW technology of multimedia and the power of the personal computer now allows independent, continuous speech recognition and longtime playing of various musical masterpieces (Hemphill

and Thrift, 1995). A well-developed Webpage, using music and speech interfaces, along with other multimedia enhancements, while supplying the students with all pertinent course facts allows easy information exchange and an accelerated growth path for adult users. This concept is displayed in the Computer Mediated Information Exchange for student and faculty interaction. (Johnson, 1997).

A Computer Mediated Information Exchange (CMIE, pronounced "See Me is a technological enhanced system that allows electronic communication from an instructor to a student. This communication must allow for easy access to class information, use existing equipment, provide feedback -- either real-time or posted -- and allow interaction between student and instructor without a face-to-face meeting. A state-of-the-art CMIE is a multimedia learning experience. This multimedia learning experience, designed with human-computer interaction criteria, is a highly engaging presentation of content that is informative, intrinsically motivating, enjoyable, and makes learning easy. Key characteristics of this type of program include learner control. The greater the learner's control, the more interesting the information becomes, and in turn, the more likely the user will literally learn from the Computer Mediated Information Exchange. The state-of-the-art CMIE could incorporate distance learning technologies such as satellite teleconferencing communications, and desktop video conferencing such as the distributed learning software environment from ILINC (Technology Across the Campus, 1997). Or the CMIE could use wireless digital personal communications services (PCS) incorporating Multimedia PCS or other anticipated wireless services that allow real-time information and remote linked classroom sites (Johnson, 1997).

The state-of-the-art CMIE would allow the college professor to provide information on the subject as well as encourage students to decipher the wealth of knowledge available on the Internet and other electronic sources. An excellent example of a futuristic model that could be incorporated into all distance learning environments is ZDNet University (ZDU). ZDU is an online learning community that offers classes in computer-and Internet-related topics for a monthly subscription of only $4.95 a month. The subscribers can take as many classes as they want, have live on-line chats with other students and with the instructor and have access to a great resource library and help desk (ZDNet University, 1997).

According to adult learning theories, facilitation and responses are extremely important to learning. The human brain has enormous potential and it is capable of much more than is currently being developed in schools and universities. If teachers believe in their students' abilities to learn and if they convey this confidence using positive suggestions and positive feedback, thereby boosting the student's self-esteem, the student's learning will become accelerated and highly

successful. Unfortunately, the reverse is also true. If teachers attempt to double their students' abilities without positive suggestions and positive feedback, the students will be more inclined to fail - executing a self-fulfilling prophecy (Doyle, 1991). Communicating over the CMIE, by using e-mail or a "chat" mode, the instructor can instantly give positive feedback, constructive criticism, and helpful information to their students at a time convenient to the student=s busy schedule (Johnson, 1997).

GUIDELINES FOR CLASSROOM AND WEBPAGE PRESENTATIONS

The importance of understanding the limitations of working with technology displays is of great importance in HCI design considerations when implementing presentations in the classroom and on Webpages. Using presentation applications like Microsoft PowerPoint, Lotus' Freelance Graphics, Harvard Graphics, or Corel Presentations present HCI design problems. The limitations are similar whether implementing the presentation on-line on in the classroom. Fonts and colors play a major factor in the design of the Webpages and presentations. Many colors bleed over other colors and font sizes and shapes have limitations. The best way to make sure of the effect of the design is to have others view it before it is produced for student usage.

Classroom presentations using the TV/VGA converter have severe design limitations, although the use is of vital importance. TV picture tubes were not designed to deliver the sharp images computer monitors do. This, combined with the inherent weaknesses of the TV video signal, imposes restrictions on TV typography. The edges of characters tend to blur. If the presentation spaces characters too tightly, they can appear to run together. Also fonts with thin stems and serifs such as Helvetica Light are likely to appear blurry and hard to read. Faces with lots of variation between the thick and thin portions of characters will also cause problems; the thin portions will practically vanish. For best results use a sturdy, bold face such as Ariel or Helvetica. For a serif typeface, Century Schoolbook works well; there's less contrast between the thick and thin portions of its characters. Avoid small typeface, the title text should generally be no smaller than 14-point. When using color there is an added cautionary consideration. Where color is concerned, TV's limitations stem from the design of the TV signal. In a computer monitor, the red, green, and blue video signals travel in separate wires. This is why computer monitors are often called RGB monitors. For television, all color information is merged into a single composite signal. This compromise is the primary reason why televisions have a narrower color gamut than computer monitors. Specifically, TVs have trouble with bright, heavily saturated colors (e.g. brilliant reds and yellows). Such colors are prone to blooming (spreading into adjacent scan lines) and, because of their effect on the composite signal, can even cause an audible buzzing or humming (Heid, 1996).

Ten tips on how to create powerful presentations from Barbara Fillicaro, a Chicago-area computer trainer who has been teaching and delivering presentations for eight years, were used (How to make presentations that audiences will love, 1997).

Choose or create a template, including a set of colors and font style, and use that format throughout the presentation. Showing a lot of different styles, colors, and layouts is disconcerting for the audience. If the speaker uses many styles, colors and layout, the audience will focus more on the graphics of the presentation than on what the speaker presents.

Choose a plain font such as Arial and stick with it. Many times when teachers design their presentation, they attempt to use at least half a dozen different fonts for contrast or to prove different points. Too many fonts will make the slides messy and difficult to read. The same rule applies to the effects chosen for slide transitions and bullets. Designing a presentation is a lot like desktop publishing; pick one design and stick to it. If a point needs to be emphasized, then change the color or layout of a single slide. If the same format throughout the presentation otherwise is intact, then the difference will make it more powerful than if every slide were a different color.

Choose background colors that are appealing without giving viewers a headache. Red and orange are high-energy colors but can be difficult to stay focused on when used excessively. Greens, blues, and browns are mellower but may not be as attention grabbing. A good compromise is to use a lighter version of your chosen color in the background with black or other dark lettering. Additionally, light or white lettering against a dark background is difficult to read, especially if you are 10 to 30 feet from the screen. If light lettering must be used, then it should have a black or dark gray shadow behind the text.

Use complimentary colors those opposite each other on the color wheel. The combination of naturally opposite colors is appealing to the eye. Blue and yellow is the most commonly used complimentary color scheme.

Make the font size no smaller than 22 points for bulleted items and 28 points for the title. If the font is much smaller, the viewer will not be able to read the slide. Additionally, the presentation

should stay below 36 point type -which is half an inch tall.

Keep each bullet point to one line - two at the most. The points do not need to be full sentences, just key words or phrases. Text should cover no more than one-third of the screen. If the material needs to cover more than one-third of the screen, then the point needs to be broken into two or more slides.

Limit the number of bullets on a screen to six (four if contains large titles, a company logo, or other visuals). If too much text is crowded onto the screen, the audience will not read any of it. If the material must appear in the presentation, the ideas need to be broken into two or three slides. This will give each point greater emphasis.

Use clip art, animation, video, and audio only if it serves a purpose. A funny cartoon or video clip that is relevant to the subject then it should be included. However, a picture of a little guy sitting at his computer serves no real purpose except to take up space. When graphics are chosen the question must be asked, does it make the presentation clearer, more interesting, or more entertaining. If it is just placed for novelty then it should be deleted.

If possible, the presentation should be delivered on the same computer that it was created with. If not, the chosen colors could look washed-out or rough-edged on a lower resolution computer screen or television.

2. Don't use the presentation as lecture notes. The slides should compliment and emphasize what the instructor says, not reiterate it. Most presentation programs have a lecture-note function that allows the speaker to write additional ideas under the slide graphic in their personal notes.

CONCEPTUAL APPROACH MODEL

The conceptual approach model for online teaching techniques was designed in accordance with three adult learning theories (Gagné, Knowles, and Gardner), current teaching techniques and trends, and HCI design concepts. Appendix 3 displays the chart that correlates each theory with its corresponding teaching technique and HCI/online counterpart. The model is designed both as an implementation selection tool and as a checklist for a multimodal teaching approach.

CONCLUSION

Realizing the significance that should be placed on the goal or implementation of using technology, not only in the classroom, but also as a tool

for communication outside of the classroom is paramount. It is important for educators to meet the challenge and incorporate the new trends into their own teaching styles (Frank, 1992).

Alas, the Internet, especially via Transmission Control Protocol/Internet Protocol (TCP/IP) connections affords a unique opportunity for educators to create rich online learning environments. Creating a rich online learning environment is a challenging and difficult prospect for educators to effect without some concentrated thought to visual presentation of the course information and activities and the functionality of the interface. The functionality of the interface involves the interaction style (e.g., menus, command, language, graphical user interface [GUI], etc.) that the student uses to communicate with the computer, as well as the navigational process a learner must follow to locate information or complete a task. The visual presentation and functionality of the online course interface form a mirror that reflects how the learning environment will be perceived by students and faculty as a dynamic location for communication and learning (Dringus, 1995).

The conceptual approach to applying adult learning theory to present online and in the classroom techniques upholds the art of teaching in its quintessence. It is the art in training that goes beyond teaching to transform people. This art of teaching takes time and considerable skill. It is important to understand that training will not succeed without a solid foundation in both science and business. However, that foundation alone is not enough to make people sit up and take notice, or walk out changed. It is the art of teaching that does is the effective change agent of learning. This art of teaching, call it inspiration or creativity, is the least tangible and most powerful ingredient in learning (Cohen & Jurkovic, 1997).

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APPENDIX 1

Gagne's 9 Events Of Learning	Malcolm Knowles' Andragogy	Gardner's Multiple Intelligence Theory
Gain Attention - Reception	- Understanding why the subject is being taught	- Linguistic / Verbal - Visual / Spatial
Inform Learner of Objectives - Expectancy	- Involvement in Planning - Work Related Significance	- Linguistic / Verbal - Logical / mathematical
Stimulating Recall of Prior Learning	- Involvement in Planning - Self-Evaluation of prior learning	- Linguistic /Verbal - Intrapersonal
Present the Stimulus (material to be learned	- Significance of Information - Focus on Process	- Linguistic / Verbal - Visual / Spatial
Provide Guidance for the Learner	- Experiential Learning - Simulations	- Linguistic / Verbal - Visual / Spatial
Elicit Performance "Practice" - Responding	- Self-Directed Problem Solving Situations	- Bodily / kinesthetic - Logical / mathematical
Provide Informative Feedback - Reinforcement	- Relevance of student responses	- Linguistic / Verbal - Intrapersonal
Assess Learner Performance - Retrieval	- Involvement in Evaluation Process	- Linguistic / Verbal - Intrapersonal
Enhance Retention and Transfer	- Review of Relevance and Significance of what was learned	- Linguistic / Verbal - Visual / Spatial

APPENDIX 2 Capabilities of computers and People. Adapted from lecture notes, D.Hill, University of Calgary.

	Computer	Human
Precision and repeatability	X	
Fast and accurate calculations	X	
Reliable memory	X	
Tirelessness	X	
Objectivity	X	
Patience	X	
Physical robustness	X	
Holistic pattern matching		X
Creativity		X
Initiative and exception handling		X
Ability to learn from experience		X
Ability to handle ill-defined problems		X
Good motor skills		X
Judgement		X
Sense of ethics and responsibility		X
Ability to apply social context to task		X
Ability to fail gracefully		X
Flexibility and adaptability		X

Figure 1 (Baecker et al, 1995).

APPENDIX 3

Gagne's 9 Events of Learning	Malcolm Knowles' Andragogy	Gardner's MI Theory	Instructional technique	HCI & Online Selection
Gain Attention - Reception	- Understanding why the subject is being taught - Work Related Significance - Relevance to life	- Linguistic / Verbal - Visual / Spatial - Logical / Mathematical - Musical	- Verbal description / lecture - Marketing of Subject - Attention Step - Advertising Video Clips	- Webpage marketing - General distance learning information - Hypermedia links - On-line syllabus - Multimedia (virtual campus / class tours /
Inform Learner of Objectives - Expectancy	- Involvement in Planning - Work Related Significance - Relevance to life situations	- Linguistic / Verbal -Logical / mathematical - Intrapersonal	- Lecture - Review of syllabus - Demonstrations - Samples	- Webpage details (e.g. On-line syllabus and course objectives) - Hypermedia links to examples / demos of previous classes (e.g. student showcase)
Stimulating Recall of Prior Learning - Retrieval	- Involvement in Planning - Self-Evaluation of prior learning	- Linguistic /Verbal - Intrapersonal	- Pre-assessment quiz - Student / instructor discussions - Pre-test for self-evaluation	- On-line pre-test, pre-assessment exam, or self-assessment evaluation quizzes - Listserve or discussion forums for sharing and planning for the course
Present the Stimulus (material to be learned) - Selective Perception	- Significance of Information - Focus on Process - Problem Centered	- Linguistic / Verbal - Visual / Spatial - Logical / Mathematical - Musical	- Lecture & Elaboration - Graphical Presentations - Audio & Video	- CMIE (scheduled chats, listserves, discussion groups) - Email - Graphical presentation of chapter summaries - Multimedia based Audio
Provide Guidance for the Learner - Semantic Encoding	- Experiential Learning - Simulations - Small Group discussions	- Linguistic / Verbal - Visual / Spatial - Logical / Mathematical - Musical - Interpersonal	- Advisement, mentoring - Practice: Small Groups - Practice: Simulations - Practice: Role-	- Multimedia tutorials - Threaded discussion groups - Listserves(chat rooms) - CMIE:chapter reviews - Online Library resources for research assignments

Gagne's 9 Events of Learning	Malcolm Knowles' Andragogy	Gardner's MI Theory	Instructional technique	HCI & Online Selection
Elicit Performance "Practice" - Responding	- Self-Directed Problem Solving Situations - Role Playing - Case Studies	- Bodily / kinesthetic - Logical / mathematical - Musical - Interpersonal	- Case studies, Q&As - Presentation of projects, Articles - Competitions - Research assignments	-Tutorials - Chatroom & listserve Q&As - Simulations - Class Challenges & Competitions - Online knowledge and
Provide Informative Feedback - Reinforcement	- Relevance of student responses - Experiential Learning by understanding Correctness and/or mistakes	- Linguistic / Verbal - Intrapersonal - Interpersonal	- Results & discussions of case studies, posttests and competitions - Return of graded work with descriptive analysis	- Personal E-mail & student progress reports - Online private Chats - Chat rooms - CMIE: Student Showcases
Assess Learner Performance - Retrieval	- Involvement in Evaluation Process - Progress Reports - Self-Evaluation	- Linguistic / Verbal - Intrapersonal - Interpersonal	- Assessment: Statistical results - Class ranking	- CMIE: Class and test performance statistics - Online post-tests
Enhance Retention and Transfer - Generalization	- Review of Relevance and Significance of what was learned	- Linguistic / Verbal - Visual / Spatial - Intrapersonal	- Lecture: review of relationship between objectives and learned principles - Samples and Demonstrations	- CMIE: Review of course material on Web with significance and relevance detailed - Student showcases of best work done in class

(Johnson, 1998).

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