MALCOM KNOWLES WOULD BE PROUD OF INSTRUCTIONAL TECHNOLOGIES

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When Thomas Edison invented the motion picture in 1893, educators praised it as a way of bringing the world into the classroom (Withrow, 1997). Classrooms that depended solely on textbooks for delivering history and language lessons were now equipped with what would become one of many new technologies for delivering instruction. As Withrow noted, this invention moved education a giant step forward.

When the first digital computers were invented in the 1940's, research institutions and the military used them primarily as number-crunching machines, not for delivering instruction. These computers were programmed only for performing calculations and it would not be until the 1960's that education would benefit from this new technology. During the 1960's the Department of Defense developed a communication strategy called ARPAnet (Advanced Research Projects Agency Network). ARPAnet flourished in the 1970's and 1980's as non-military users such as colleges, universities and businesses came on-line. Global communication became the buzzword of the 1980's as new 'virtual learning communities' emerged and began a new era in communication called the Internet.

However, it has only been in the last 5 years that technology has affected the role teachers' play in the learning environment. Web-based learning and other Distance Learning opportunities literally free students from geographical boundaries that may otherwise limit their participation in adult education programs. Judith Boettcher, Executive Director of the Corporation for Research and Educational Networking (CERN), noted in a recent *Syllabus* article a shift in higher education from a teaching paradigm to a learning paradigm. That is, many educators have begun to accept the importance of learners being active participants in their learning. As Boettcher notes, the only changes in the teaching process have occurred in the way we store information. "The major difference" Boettcher explains, "is in how we store information – whether it is stored on a slate, on a blackboard, on a book, or on a computer" (p.50). Teaching in the 21st century now means that the teacher becomes what Boettcher identifies, as the "embedded teacher" (p.50). In this capacity, the teacher is now captured in silicon, embedded in the software, the web, or videos that many distance learning and higher education courses use for the delivery of education.

Some educators, particularly those who have been scripted in the ideals of Malcolm Knowles argue that this influx of instructional technology negates the Principles of Adult Education. On the contrary, instructional technologies have provided educators with a variety of tools that can assist in the delivery of instruction. Following the notion that adults learn differently, and enroll in learning situations for various reasons, the following table illustrates how the use of Instructional Technologies can assist adult educators in meeting the needs of adult learners. All types of instructional media allow the adult educator the ability to vary the method of instruction.

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Instructional Media	How you can use IM to meet the needs of the Adult Learner
Chalkboards AND/OR Whiteboards	*Method of instruction should vary.* While the mention of the word "chalkboard" may send some into an uncontrollable fit of laughter, chalkboards and their newer counterpart, the Whiteboard are still very applicable in today's learning environment. Many students still request that important information be presented either on paper or in some visual format. Chalkboards or whiteboards meet the need of the visual learner.
Flip Charts AND/OR Computer-Created Transparencies	*Students should participate and accept some responsibility for the learning process.* Most undergraduate and graduate education classes now require students to present some project as part of a learning contract. By encouraging students to use flipcharts and transparencies, they become involved in their own learning and utilize their creative talents to meet their objectives. Transparencies are good when major points need re-addressing or summarizing. Flipcharts are a good visual tool to reinforce prior learning and targets visual and auditory learners. Technology, through programs like PowerPoint, and others, provide the tools to create better visuals.
Normal Classroom AND/OR Computer-Aided Classroom AND/OR Multi-media/Distance Learning	*Learning should be related to and should make use of the students' life experiences. There should be an informal and friendly learning environment.* By utilizing the Internet, or software on a CD-ROM or computer hard drive, students can actively participate in the learning process. Through assigned multimedia projects students can use past skills or experiences. Online courses allow students to break the geographical/social boundaries and complete their work from home without the fear of stereotypical thinking or prejudiced responses based on ethnicity or social status.
Classroom Small Group Discussions AND/OR Listservs, Distribution Lists, E-mail	*Learners should be involved in planning, evaluating and problem-solving.* Utilizing electronic forms of communication students are encouraged to interact with one another, to challenge, to create scenarios, and to do real-world problem solving in real-time. Through technology this is often accomplished across distances and disciplines either in the classroom or in classrooms at far locations. The discussions are not limited to information available at the learner's site.
Online Assessments AND/OR Quizzes, Tests	*Students should be aware of his/her progress.* Technology offers instantaneous grading, self-assessments and even simulations to test and reaffirm a student's learning. Through spreadsheet programs and databases the student can manage his/her own learning and assessment.
Lecture with Interaction AND/OR Video in Class, Streaming Video, Audio Tapes, Tutorials in Class or at Home	*Multimedia should be used to address the various multiple intelligences in meaningful ways.* The use of technology opens the door for using sound, movement, visuals, and color as a means to address the learning modalities of all the students. Even the student that requires movement can become engaged with joysticks, keyboards, and simulators.

Using instructional technologies in the teaching and learning process can also impact a learner's cognitive domain. Understanding the different levels of Bloom's (1971) Taxonomy is important and can influence what type of instructional media is used in the learning process. For example, if the objective

is to teach at the *knowledge* level, that is, the recall of specific events, information or sequences, teachers can use flip charts, chalkboards and whiteboards to reiterate information. Teaching to the *comprehension* level, the ability to use knowledge without relating it to other material, can be accomplished by having the student demonstrate the opening and closing procedures of a computer program. This can be completed via whiteboards, bulletin boards or flip charts. The *application* level, the ability to "abstract information such as rules, general methods, and procedures, and to apply them" (Driscoll, 1998, p.50), can be addressed by the student designing a learning module on basic computer competencies. Students can demonstrate this learning level using flip charts, whiteboards, transparencies, and handouts. *Analysis* is the ability to break down items into different elements or parts. Students can use whiteboards, email, chatrooms, transparencies, flip charts, and the Internet to assist them in the analysis of the components of a computer. *Synthesis,* the ability to bring all parts together and see the whole picture, is described as a higher order thinking level and demands more complex activities. Using audio/video conferencing, the Internet, chatrooms and listservs will assist the advancing through the synthesis level of learning. Activities that encourage learners to synthesize information include having students design a 3-hour workshop on "An Introduction to Computers." The workshop should include all previous learning through the levels of learning and culminate with one final project. This final project can be showcased via flip charts, handouts, transparencies, multimedia presentations, bulletin board discussions, chatrooms and audio/video conferencing. Finally, having students evaluate the workshop encourages the use of the last learning level, *Evaluation.*

        Instructional technologies, when used properly, can assist adult educators in providing meaningful learning activities that involve learners in the learning process. As Knowles postulates, adult learners demand learning that is based on experiences, is meaningful and is presented in a positive environment. By using media that encourages collaboration, analysis and synthesizing, educators not only follow the cognitive domains of learning but also equip learners with the knowledge and tools necessary to excel in the technology-driven marketplace.

<div align="center">References</div>

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