

Computer-based Technology and Educational Change

Position Paper

CIT 767

Sherene Carter

University Nevada Las Vegas

Current research about the way people learn states that everyone requires different amounts of prompts and practice with content facts and concepts, but after those facts are mastered, every student needs the opportunity to transfer that knowledge to deeper learning experiences. Only through those higher order thinking experiences will content knowledge be assimilated into their permanent schema and future transfer, whether in school or out, will become easier (Bransford, 1999). Nearly seventy years ago Dewey taught the same idea, “there is an intimate and necessary relation between the processes of actual experience and education” (1938, p. 20).

Technology is a tool that *can* be used to facilitate these higher order thinking experiences. In the public education system, that tool is in the hands of teachers – thousands of them across the country. The sheer large numbers of the users of this innovation makes it difficult to be implemented; it will take a grand amount of time, and users will inevitably be staggered among stages of use. Technology can be used many different ways, but is yet to be used correctly or to its full potential by most teachers. Student achievement results will not go up due to technology integration, until it is integrated into a style of teaching that affords students actual experience with everyday social applications (Dewey, 1938).

It is obvious from viewing Dr. Chris Moersch’s Levels of Technology Integration (LoTi), that teachers across this country vary greatly in how they are putting technology to use in their classrooms (Table 1). At level 0: *Nonuse*, teachers do not have the time, ability, or motivation to use the computer in their classroom. With the requirements of electronic student databases, grade books, lesson plans, and e-mail communication, it is hard to imagine that any teacher could still be at this level. At Level 1: *Awareness*, teachers are using their computer for the above mentioned ‘housekeeping’ chores and even using multimedia applications to embellish teacher presentations. At Level 2: *Exploration*, students are using the computers; however, the focus is

not on content, but on basic computer use. Students are possibly being babysat by the computer. Level 3: *Infusion*, Level 4: *Integration* and Level 5: *Expansion*, are where students start using higher order thinking and problem solving skills. Finally, Level 6: *Refinement* creates a seamless integration of instruction and technology by the teacher and students (Learning Quest, 2004).

Technology in education is a huge (and ever changing) innovation, and any innovation, no matter how large or small, goes through many steps of implementation. In his model for innovation adoption, Gene Hall (1974) divides the steps of innovation implementation into Stages of Concern and Levels of Use. Hall's Levels of Use for any innovation in education are fairly concurrent with Moersch's levels of Technology Integration (Table 1).

Table 1:

Concerns Based Adoption Model		Level of Technology Integration
Stages of Concern	Level of Use	Level of Use
0 Awareness	0 Nonuse	0 Nonuse
1 Informational	1 Orientation	1 Awareness
2 Personal	2 Preparation	2 Exploration
3 Management	3 Mechanical	3 Infusion
4 Consequence	4a Routine	4a Integration (Mechanical)
	4b Refinement	4b Integration (Routine)
5 Collaboration	5 Integration	5 Expansion
6 Refocusing	6 Renewal	6 Refinement

It is unfortunate, yet understandable, that with such a multifaceted innovation, most teachers are clinging on to the *Preparation* level of Hall's Levels of Use and the *Exploration* LoTi level. In order for any innovation to provide successful results, the innovation must be successfully implemented and in full use with *Integration*, *Expansion*, and *Refinement* on the horizon. Educators are certainly past *Orientation*, yet very few are using technology

mechanically in their classrooms. There are three major reasons for this: available equipment, technology integration misconceptions, and teacher motivation.

Available Equipment

The way computers are being used is greatly affected by the equipment available to a teacher and students. It is true that billions of dollars have been spent on wiring, hardware, and software (Cuban, 2001), but classroom technology dramatically varies across the nation. There are four general classroom arrangements:

The first kind of classroom is composed of one computer that is the teacher-work station. Students are not to use it because it has confidential files on it such as grades and attendance. Teachers can collaborate through e-mail and use the internet to find lesson plans and download resources. This benefits the students slightly if the resources being pulled off the internet are more authentic than previously had. Yet, students do not realize they are the benefactors of technology as their teacher uses the computer behind the scenes. Students have absolutely no ownership of the technology; therefore, any improvement in achievement would be difficult to link to technology integration.

The next kind of classroom has a computer with some type of projector to show the students what is on the screen of the teacher's computer. This arrangement is enjoyed by many educators; however, it is very conducive to the frequently controversial executive style of teaching about which Dewey stated was "imposition from above" (1938, p. 19). With the projector teachers can have students view videos, PowerPoint presentations, internet resources, and various curricular programs, but the only one able to interact with the computer is still . . .the teacher. There continues to be no reason that students should be achieving more through technology because the teacher is still the only one to use the technology. This arrangement still

keeps the teacher and students at LoTi level 1: *Awareness*, where “multimedia applications are used to embellish classroom lectures or teacher presentations” (Learning Quest, 2004).

The third type of classroom not only has a teacher work station with projector, but also a few computers placed around the room, for individual students or groups to work on. This atmosphere allows the classroom to be at any LoTi level from 2 to 5: *Exploration to Expansion*, where the computer can be used as a babysitter for those who finish class work early, or a valuable mind tool with which they can create presentations, websites, and on-line businesses.

The ideal type of classroom arrangement (and the rarest) is that where all students have access to technology at all times. The classroom is either a lab with computers at every seat, or students are each equipped with a wireless laptop. (Equipping students with laptops is happening in several schools and the effects are currently being studied.) Here it is possible to attain LoTi level 6: *Refinement*, which eliminates the division between instruction and technology use. A learner-based classroom can be achieved; the content stems from student interests, needs or aspirations, and there is unlimited access to current applications and equipment.

It should be noted that many schools have computer labs available for teachers and students to use as an alternate classroom setting. They are often difficult to schedule for due to high demand and low flexibility of available dates. In order to use the lab successfully, a teacher must plan weeks or months ahead to have the lab beneficially fit into the content curriculum. In any case, it is an available option for those willing to plan far in advance, but that is difficult and time consuming.

It is evident that despite the money spent, many schools are still not equipped appropriately to have most of their teachers using technology at the level required for greater student achievement.

Technology Integration Misconceptions

Attempts at technology integration are not all created equal. Computers in the classroom can be used many different ways; some of those ways are more educational for students than others. There are a plethora of computer programs that can enhance subject curriculum in any classroom. However, upon evaluation of these programs you will find that they vary in the degree of educational value. Many programs are simply created with the intent of relaying information. Other programs lend themselves more freely to higher-order thinking levels requiring the user to develop, solve, analyze, modify, and assess a real-life simulation.

By studying over 13,000 students in a mathematics curriculum, Wenglinsky found that it did not matter how much time was spent using computers in the classroom, what mattered was *how* computers were used. He found that technology has positive effects on education if they are used the right way (1998).

Far too often at technology professional development classes, teachers are taught ways to simply enhance lecture, or are introduced to computer applications that do nothing more than deliver the same information contained in the students' textbooks. For example, the latest technology innovation among the Clark County School District is an online database called KLVX Video Streaming. It contains thousands of educational videos that can be downloaded to your computer and played for the students by using a projection device. As convenient and efficient as this database is, it should not be confused with higher level technology integration. It does not matter if you watch a movie from a VHS tape, a DVD, or streaming from the internet – a movie is a movie. Video clips can enhance, help illustrate, and clarify concepts certainly, but streaming video is not a way to use technology that will enhance student transfer of knowledge.

Most teachers who use these types of technology, (video streaming, PowerPoint presentations, etc.) feel satisfied that they *are* integrating technology successfully into their

lessons. Educators are in need of a clarification on the *types* of integration teachers are to be striving for.

Teacher Motivation

Innovation overload! Are teachers supposed to develop technology integration in their lesson plans before parent conferences, between committee meetings, or after importing grades? Most teachers do not have a moment to spare during their work day; many take work home. Lesson plans, grading papers, meetings, discipline issues, and new innovations are some of the responsibilities taking up teacher time, beside the ever important, and central to education, teaching students in the classroom. One period (out of six) for planning and preparation, is not enough time to complete current responsibilities; asking or requiring teachers to also learn more about using technology is bound to meet resistance no matter how much equipment you set up in their classroom. All creators of innovation adoption models will tell you that one of the requirements for adoption is time. No matter how valuable the innovation may be, if there is no time to develop and practice using it, it will become a bother. Simply put, “unwanted innovations can be another source of annoyance” (Fullan, 2001, p. 120).

Furthermore, it has already been noted that success with technology will depend upon how much technology is used to bring students to a higher level of thinking, and for many teachers that will require an innovation not only in technology use, but in their style of teaching as well. Computers can be used for the ever-dreaded fifty minute lecture with notes just as well as an old overhead projector or whiteboard. Students may be more interested due to the new mode of communication, but the novelty is sure to wear off.

There is certainly pressure from the national government to integrate technology into education, but it currently depends on the administration of a school for whether or not there are

any consequences for not integrating technology into lessons. Licensed Employee Appraisal Reports, which are filled out yearly by administration for a teacher here in Clark County, Nevada, have many professional requirements listed, such as using varied instruction, providing a safe environment, and keeping student records, but the checklists do not specifically mention using technology in the classroom. It is up to each school administration to require such integration; therefore, a teacher who is not motivated to learn more about technology, and is not pressured at their school site, may not feel any need to become motivated – yet.

When teachers make technology integration a priority, they will make the time to use available resources. Many schools have technology specialists that can assist in obtaining and setting up equipment, troubleshooting, and even locating appropriate software for content matter. Joining the technology committee will help teachers view the technology integration plan for their school, how it will be implemented and how it can be improved.

With most teachers at such a low level of technology integration, it is debatable as to whether the innovation has even been implemented yet. Changes that take place at the classroom level require the use of new technologies or revised curriculum, new teaching approaches, and the alterations of beliefs that are preventing the innovation from taking hold (Fullan, 2001). In regards to this innovation, educators are still struggling with all three.

In five years, public education will still be in the middle of this continually innovative innovation. Where most teachers today are currently at the LoTi level of *Awareness*, most will be at the level of *Exploration* and approaching *Infusion*, with many more computers in classrooms, and many more projects being completed on the computers by the students. The few teachers who are currently at the *Exploration* level, will be set in *Integration* and dabbling with

Expansion and Refinement (LoTi) all the while tugging at, and setting a good example for, those in lower levels.

In order to meet the requirements of the No Child Left Behind Act in technology integration (NCREL, 2002), teachers will have to be motivated (whether by self desires or administrative pressure) to create an environment where students use technology to research, analyze, and solve real-world problems. They will realize that computers are not just another way to deliver information to all thirty-five students at once, but a tool with which students can create, manipulate, and improve current ideas while transferring factual knowledge to a higher level.

Cuban asserts that the promises made to education by technology integration have yet to prove fruitful (2001), and he is right. While technology integration has been, and continues to be, a monumental and worthwhile reform, “computers are [not] a cure-all for problems facing the schools” (Wenglinsky, 1998). Technology cannot overcome crowded classrooms, lack of parental support, burnt-out teachers, and many other ills facing education, but used in the right way they are a valuable mind tool which evoke critical thinking, creativity, and greater motivation for learning. If teachers view computers as simply the new way of relaying content information, then when that bell rings at the end of the day, we have helped our students in using nothing more than a *really* expensive textbook. Any innovation is only as valuable as the extent to which it is used.

References

- Bransford, J., Brown, A., & Cocking, R., (1999). *How people learn: Brain, mind, experience, and school* (1 ed.). Retrieved November 26, 2004 from, <http://books.nap.edu/html/howpeople1/ch1.html>.
- Cuban, L., Kirkpatrick, H., & Peck, C. (2001). High access and low use of technology in high school classrooms: Explaining an apparent paradox. *American Educational Research Journal*, 38(4), 813-834.
- Dewey, J. (1938). *Experience & education* (1 ed.). New York, NY: Simon & Schuster by arrangement with Kappa Delta Pi.
- Fullan, M. (2001). *The new meaning of educational change* (3 ed.). New York, NY: Teachers College Press.
- Hall, G. E. (1974). *The concerns-based adoption model: A developmental conceptualization of the adoption process within educational institutions*. Research and Development Center for Teacher Education. University of Texas.
- Learning Quest, I. (2004). The loti connection. Retrieved November 26, 2004 from, <http://www.loticonnection.com/level6.html>
- No child left behind act of 2001. North Central Regional Educational Laboratory. Retrieved September 13, 2002 from, www.ed.gov/legislation/ESEA02
- Wenglinsky, H. (1998). Does it compute? The relationship between educational technology and student achievement in mathematics. Retrieved November 25, 2004 from, http://acclaim.coe.ohiou.edu/rc/rc_sub/vlibrary/4_abs_e/research_reports/ED425191.htm