

INTEGRATING TECHNOLOGY INTO THE CURRICULUM FOR THE

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For the 21st Century Learner

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Introduction

The future generation of America's labor force is at a significant crossroad as they prepare to be a part of the global economy. It will not be enough for the future generation to enter the labor force with the same expectations as the previous generations' mindset relating to skills and job opportunities; but they must come prepared to enter a global job market. Dynamic forces have created a global economy that has shrank the world from a size small to a size tiny and flattened the playing field at the same time. This phenomenon coined Globalization 3.0 by Thomas L. Friedman, consists of a force with a unique [personality] - it is the new found power for *individuals* to collaborate and compete globally (Friedman, 2007, p.10). Part of this global economy was created as a result of the evolution of the personal computer, the internet and the World Wide Web; the other part as a result of merging of multinational companies. Society presently relies on computer's indispensable uses on a daily basis in homes, government, businesses and schools. Thus the 21st century learner interacts with technology on a daily basis and would benefit immensely from technology integration into the curriculum.

These benefits would be recognized as necessary skills required for communication, problem solving, critical and creative thinking that would help the 21st century learner compete successfully in a global economy. The use of technology in the classroom provides an efficient way for students to engage in lessons, manage information, understand content better as well as perform certain basic tasks quickly and accurately. For example, students can use the internet to research information for projects and then use the word processor to type and organize thoughts quicker than using an ancient typewriter. Furthermore, sophisticated word processors can help

improve students spelling and grammar however, student must still proofread for accuracy.

Integrating technology into the classroom is using the computer to access internet, World Wide Web and software that should be viewed as a tool that helps teachers deliver instruction and where students acquire knowledge.

Education and the History of Computers

In 1970, Alvin Toffler wrote "*Future Shock*" describing that change in society will come at an accelerated rate and those who are the most adaptable will survive (Toffler, 1970). The first computers were big and bulky and used minimally for classroom instruction. The popularity of using computers in the classroom did not really come about until 1983 when schools began to consider the benefits of using personal computers as part of instructional delivery in the classroom. A brief history of the personal computer and its impact on education follows:

- **1970** - Mainframes and minicomputers in use in some schools, but very little use in the delivery of instruction.
- **1975** - Some Apple 1 PCs are donated to schools; some schools have adopted mainframes and minicomputers and refuse to consider PCs.
- **1981** - IBM is the first mainframe manufacturer to develop a PC; drill and practice CAI (Computer Aided Instruction) gains acceptance in schools. The first educational drill and practice programs are developed for personal computers.
- **1983** - Apple II computer finds widespread acceptance in education because PCs better fit the teacher /manager model of instructional delivery (PCs can be used to "support" the ongoing teaching in the single classroom). Simple simulation programs are developed for personal computers.

- **1986** - 25 % of high schools use PCs for college and career guidance, K-8 schools buying mostly Apple II and Macintosh computers, high schools buying mostly DOS-based clones.
- **1992** - schools are using Gopher servers to provide students with on-line information.
- **1994** - Digital video, virtual reality, and 3-D systems capture the attention of many, but fewer multimedia PCs than basic business PCs are sold; object-oriented authoring systems such as HyperCard, Hyperstudio, and Authorware grow in popularity in schools; most US classrooms now have at least one PC available for instructional delivery, but not all teachers have access to a computer for instructional preparation.
- **1995** - The Internet and the WWW began to catch on as businesses, schools; most CAI is delivered on CD-ROM disks and is growing in popularity.
- **1996** - New graphics and multimedia tools are developed for the delivery of information and instruction using the Internet; many schools are rewiring for Internet access; a few schools install web servers and provide faculty with a way to create instructional web pages.
- **1997-2007** - The growth of the internet expands far faster than most predicted. It soon becomes the world's largest database of information, graphics, and streaming video making it an invaluable resource for educators. Educational software becomes more useful and interesting to students as graphics and video are incorporated. Larger computer storage capacity and the growing prevalence of CD-ROM and

DVD drives in personal computers make it easier for educators to store large graphic and video and sound files for educational applications (Murdock).

In 1993, the internet grew to become a massive network of computers that were connected globally while the World Wide Web grew to disseminate large amounts of information over the internet. One fact worth mentioning is that Wide World Web grew by 341, 000 percent during this year! (Small Business Computing Channel, 2009, table 1). According to historic information compiled by Dr. Everett Murdock above, educators realized the significance of increasing the use of technology for instructional delivery in the classroom by 1997 when the personal computer became user friendly and educators realized there is an advantage to using technology. Although there was a promising start in many school districts during the latter part of the evolution of computers, there still remained areas that struggled to catch up with technology advances. In some areas it was due to lack of funding, resources and/or expertise. The Clinton administration (1993- 2001) did make technology a priority and increased funding to help build infrastructure that integrated technology with traditional curricula. The long term focus was to help meet "President Clinton's goal of linking every school to the information superhighway by the year 2000," said Education Secretary Richard Riley. "It would especially help link rural and inner-city schools to a wide world of learning" (Dervarics, 2007, ¶ 2-4).

During the Bush administration, the NCLB Act (2002) was signed to push schools to increase student performance in an effort to close the achievement gap across the nation by setting high learning standards and forcing schools to provide quantifiable results of student achievement in order to meet Academic Yearly Progress (AYP) mandates. One of the provisions

of the No Child Behind Act emphasized the improvement of student achievement through the use of technology in elementary and secondary schools in the following specific areas:

- Integration Initiatives – build technology infrastructure that encompasses all educational buildings in schools districts. This will ensure that all buildings are established at a level comparable to 21st century learning communities.
- Building Access – all educational buildings are required to include a solid electronic infrastructure in urban and especially rural areas (isolated geographic locations) that is capable of communicating information to parents regarding student grades. The goal is to have the infrastructure - wide area network and local area network in place that can provide student data and pertinent information to parents.
- Accessibility – Diverse population of students – exceptional education students, English Language Learners (ELL), minorities, low income students, etc will be provided technology integration and technology literacy in all schools.
- Parental Involvement – Families will have access to their children’s assessment data with the hopes that family involvement will support the efforts of the schools to improve student achievement (Learning Point Associates, 2007)

Integration of technology was beginning to take a foothold in several school districts, hence a new revolution in learning. Use of computers afforded students the opportunity to construct knowledge in a different way as classrooms were promoted to a more student oriented classroom. Students now have opportunities to seek information, collect their own material, communicate, make meaning and evaluate new products (Nelson, Christopher, & Mims, 2009, p. 81) It is a fresh and innovative way of learning that engage students to help them make

real world connections and view the World Wide Web as an informational superhighway where information can be attained and shared collaboratively.

In one of the speeches then president-elect Obama gave on his campaign trail, “Reforming and Strengthening America’s Schools for the 21st Century”, he stated, that all students [will be] trained to use technology to research, analyze and communicate in any discipline. After he was nominated as President, he followed through on this significant promise; hence the Obama administration earmarked \$500 million for education reform as part of the American Recovery Act in February, 2010 (The White House, 2009). In President Obama’s eyes, education reform is of the utmost priority for this nation’s children. “Reaffirming and strengthening America’s role as the world’s engine of scientific discovery and technological innovation is essential to meeting the challenges of this century,” said President Obama. “That’s why I am committed to making the improvement of STEM education over the next decade a national priority.” America is struggling to get a foothold as compared to other countries in science, technology, engineering and mathematics (STEM). As we move into 2010 and beyond, it is important that the education endeavor is uplifted by teachers, administration, policymakers, stakeholders, communities and students. All American children are entitled to receiving a high quality education – this is crucial to this nation’s economic future. Technology integration will help to move this nation forward in all disciplines that is vital to the survival of this nation.

Rationale for Technology Integration

Two years ago, prominent business leader APPLE CEO – Steve Jobs openly criticized the public-school performance (eSchool News Staff, 2007.) He felt that inefficient teachers are a roadblock in helping children get the skills they need to be successful because they don’t want to use technology in the classroom. As a result, many students are not getting the education they

truly need to attain skills needed for a global economy. The American labor force is increasingly relying on foreign students for innovations and productivity. Sadly, American students are dropping out of high school and college, reducing a skilled labor force to critical levels. In some areas of math and science, foreign students earn more than one third of advance degrees (Jones, II, 2009). Given these startling facts reinforces an urgent need to support the twenty first century learner with technology integration to create a community of 21st learner environments.

The use of technology integration has been proven that it can increase problem solving, analytical and creative thinking skills. The future labor force is characterized by Thomas L. Friedman as the new “midders” of the 21st century who will maintain careers in the global marketplace through a blend of technological savvy and people and information management skills. Employment in the future work force will require a certain mindset and skills set which will allow students to be able to move through various careers because of changes that will take place rapidly in a global economy. Schools and University’s have to prepare students with lifelong learning skills so that they will be able to keep up with the innovations in the work force.

Characteristics of the Twenty-First Learner

The twenty-first century learner has different educational traits than past generations because of the way how much technology is a part of their life everyday. Many of them have access to a home computer or cell phone which they use to process and/or share information; technology is as natural to them as walking or talking. Many of them have never heard of a record player and albums let alone an eight track cassette player. They tend to not read as much; instead they spend time playing video games, using cell phones for conversing and text messaging. By the age of twenty one, these students will have spent 10,000 hours playing video

games, watched 20,000 hours of television, spent 10,000 hours on the cell phone and sadly, less than 5000 hours reading (Rodgers, Runyon, Starett, & Von Holzen, 2006).

The twenty-first century learner's brain learns differently because of the amount of information that they process on a daily basis. When I look at my children and how they multitask on the computer, I get tired. Both of them are capable of completing advance projects with software such as PowerPoint and Moviemaker and can easily understand how to play video games with complex instructions that would take me a few days to figure out. My daughter completes assignments quickly and accurately using the computer. For example, she had to create a travel brochure as part of a project about a European country while my son had to create a newsletter with articles that shared information about three famous people who helped runaway slaves. Students can use the computer for a variety of assignments that challenges their creative and critical thinking skills. There is so much information and so much going on around them that they have what Don Tapscott calls "screenagers" - the first generation that has grown up with a computer mouse and the assumption that images on a screen are to be interacted with. These technologies are their new learning tools, and also are something to project their very identity onto. They are what Marc Prensky calls "digital natives"

Diane Oblinger, Vice President for EDUCAUSE describes this generation in her research as:

- Digital natives
- Net Generation Learners
- Millennium Students
- Generation "Y"

One of the ways that the 21st learner acquires information is known as constructivist learning. Constructivist learning is concerned primarily with students constructing knowledge for themselves which follows the path of Dewey, Piaget, and Vigotsky theories (Huang, 2002, p. 27). Furthermore, constructivism can be applied to different learning categories that support learning outcomes. For example, collaborative learning forces students to develop critical thinking skills as well as improve interpersonal and communication skills. Authentic learning is important because the learning may be applied to real world situations. High quality learning reinforces constructivism theory in that it allows for students to develop higher order thinking skills as they learn meaningful material that can be applied in real life scenarios.

While constructivism is an important theory to 21st century students' learning environments, connectivism is also a learning theory for the digital age. Constructivism really was developed when learning was not impacted by technology. However, technology as stated earlier in the paper is a part of the digital students' life as food is to the body. Constructivism suggests that learners create knowledge as they attempt to understand their experiences. Behaviorism and cognitivism view knowledge as external to the learner and the learning process as the act of internalizing knowledge. Constructivism assumes that learners are not empty vessels to be filled with knowledge. Instead, learners are actively attempting to create meaning. Learners often select and pursue their own learning through real-life learning (Siemens, 1994).

On the other hand, Connectivism is the integration of principles explored by chaos, network, and complexity and self organization theories. Learning is a process that occurs within nebulous environments of shifting core elements – not entirely under the control of the individual. Learning (defined as actionable knowledge) care side outside of ourselves (within an organization or a database), is focused on connecting specialized information sets, and the connections that

enable us to learn more are more important than our current state of knowing (Siemens, 1994). Based on these theories, students need more interactive ways to learn because of the way they interact with technology on a daily basis. Connectivism and Constructivism are learning theories that support the new digital learner and offer explanations on how they truly learn in preparation for technology changes in their forthcoming job perspectives.

Educational Technology Implementation

There are benefits of educational technology implementation that include increases in standardized test scores, support for development in early literacy skills, promotion of students' mastery of mathematical concepts and increases in students' understanding of core science concepts (O'Donnell, Hmelo-Silver, & Erkens, 2006, p. 1). When technology is used in the classroom, it allows students to use technology based online assessments such as www.studyisland.com where teachers can use benchmarks to target student strengths and weaknesses. Students also have access to online resources that can be used to reinforce concepts and receive individualized tutorial assistance that fosters student independence. Using technology allows educators to implement strategies that can address student's individual needs and increase their technology skills. Curriculum integration needs to support:

- Active engagement
- Participation in groups
- Frequent interaction and feedback
- Connection to real world examples
- Must be routine, transparent and support curriculum goals.

Furthermore, integrating technology will prevent boredom and encourage students to be responsible for their learning. There are various software programs that are available to teachers

that can be used for to enhance learning outcomes such as *Comic Life* – a program that uses comic strip attributes to teach a concept or expand on a learning objective. Another one is *Voice Thread* – allows for collaborate activity in the classroom and can be used also to teach concepts and reinforce learning. Students who are shy or need to work on communication skills will benefit from this application because it allows them to talk with classmates in a nonthreatening manner. Lastly, *Moviemaker* is a great application that students can use to create movies that support digital storytelling. These three sources of technology integration enforce speaking, analytical and creative thinking skills in a collaborative setting. These skills are lifelong learning skills that can be transferred to real world scenarios.

Barriers to Technology Integration

The major barriers to technology are:

- Lack of time – teachers do not have enough time to learn how to use computer, applications, etc efficiently due to meetings and other duties. No time to collaborate to learn how to integrate technology into the curriculum or use in lesson plans
- Lack of access – hardware not set up accurately, no internet service, outdated computers.
- Lack of resources – school district not able to provide resources to support technology implementation
- Lack of support – no one to train teachers on using the technology, no one available for support.
- Lack of funding – no funds available to upgrade.
- Lack of teacher motivation – teacher not interested; likes same old lesson delivery.

To successfully implement technology and remove barriers to technology, school administration will need to provide adequate technical training support to the faculty. This means that the required technical training will need to be offered to staff with the support of a trained media specialist or instructional technologist. In addition, the instructional technologist will provide guidance to faculty on how to integrate technology into the curriculum so that it is aligned with Georgia Performance Standards. Teachers will also attend professional development that will support the initiative of technology integration in an efficient and sustainable manner. Finally, the school should reward faculty in their attempts to integrate technology in their teaching by, allowing them to earn PLU credits and stipends to motivate those teachers who otherwise would not be interested in learning about technology. Additional reward could also be to allow teachers comp time where they will be allowed to leave work early.

Teachers' Role in Technology Integration

- Help develop solutions to the gaps in computer availability and access in the classroom, school and the community.
- Become facilitators in the classroom and allow students to take control of their own learning.
- Integrate Technology in effective, meaningful ways – (for example – infuse Web 2.0 applications into learning – blogging, voice thread, digital storytelling or using advance PowerPoint).
- Provide support and timely feedback.

Conclusion

As the digital student moves rapidly towards a skilled global workforce, it is important that they receive the necessary skills required to be successful. Digital learners acquire knowledge much more differently than past generations and must be afforded the opportunity to receive adequate instruction that is going to them the competitive edge in the job market. The skills that they must have should be lifelong skills that will allow them to work in a variety of positions. Teachers must embrace the new way of teaching in order to foster positive values about learning and attending school. It is not enough anymore to use only textbooks to drive instruction. Instead teachers must be creative and innovative to deliver instruction that benefits the 21st century learner.

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