

Simulation and Gaming

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Introduction

It is evident that the use of computing technology has become part of most American daily lives, from the work place to home entertainment, with a similar increase in popularity in educational technology from the work environment to the child's toy box. With the emergence of educational communication and entertainment technologies, such as computer games and simulations, digital books, tablet computers, e-learning, wireless and mobile computing, a plethora of opportunities are created for educational technology across educational institutions, entertainment, and training environments (Bonk & Dennen, 2004). The forces of globalization in the economy and ever changing information and communications technology (ICT) have combined with changing demographics and pedagogical reform movements to change the use of technology in teaching and learning (Bichelmeyer & Molenda, 2006).

Considering this rapid technological advancement it is inevitable, to an extent that technological evolution will occur within the educational environments and society as a whole. The field of educational technology holds more opportunity to influence instruction than ever before. The implications for teaching and learning, training and development, increased expediency in productivity and delivery, e-learning in higher education, online training for corporate environments, and massive multiplayer games online seem unlimited.

I will confine my discussion to the following main areas, history of communication technology, education K-16, online learning and distance education, corporate training and development, historical parallels, and implications for the future. History of Communications Technology Instructional technology is one of a small group of fields that has actively tried to define itself, from well before Heinich's (1984) (as cited by Molenda, 1987) classic to the current effort towards a new definition within the Association for Educational Communications and Technology (AECT). According to Saettler (1990), educational technology is complex and involves the integration and implementation of ideas in combination with technology which contains all aspect of human learning.

Given the historical trends in the use of technology, the speed of adoption of digital technologies varies from one organization to another based on both the social and economic aspects. Bichelmeyer and Molenda (2006), contend that this variation plays a major role in the adoption, training and development of technology in corporate and educational institutions. The role of our field has always been to improve and guide instruction, especially for schools and organization that have new technologies or challenges. The goal is to help organizations learn to explore and evaluate the plethora of possibilities, which can readily contribute to the improvement of new learning environments.

The transition from the industrial (analog) to information age (digital) has drastically changed our field. Constant changes in teaching and learning; online corporate training, pod casting, and massively multi-player online games are only some of the advancements that have increased the need for instructional technology support and innovation, not only in the educational sectors, but also in private and corporate entities as well. The use of audiovisual technology has a history in our field that can be traced as far back as the early 1600s. Johann Comenius promoted the need for individual's to employ "real objects and illustrations to supplement oral and written instruction" (Reiser, 1987 p.13).

Today's instructional technologist has more opportunities to supplement instruction than ever before. Many colleges and universities are dedicated to the use of technology to the point of becoming the cutting edge research laboratory of our field. They have created learning environments that allow learners unlimited access to millions of images through laptops on wireless networks and listen to archived lectures through podcasting. In some cases the notion of entering a classroom or online conference without the aid of audio, video, and use of internet to perform ordinary task is not practical. According to Newman and Scurry (2001), digital technology can provide students hand-on experience, that is in many ways better than authentic scientific laboratory research, allowing the educator to instantly change parameters of an experiment to better facilitate learning in ways that would be impossible using previous technology.

The most important aspect for a person in our field to remember about our history is not to let the electronics drive instruction, instead let careful instructional planning guide the selection and use of the electronics and other media. Comenius's mention of objects being needed to supplement instruction show he was looking beyond the book. It is a good idea for today's instructional technologist to be as forward thinking as Comenius and look beyond the electric technology. Just as powerful, a shift from the industrial to information age is the shift instructional theorists have made in the rethinking of ideas found in constructivism, cognitivism, performance technologists, problem-based learning, and hypermedia/multimedia, systemic thinking, and electronics support systems. Reigeluth (1997) contends that "the general social and intellectual climate of the times influences what ideas reach agenda status" (p.45). For example an important marker of the industrial age was standardization, whereas the information age has shifted to customization within standards; bureaucratic organization to team-based organization. This paradigm shift between "ages" prompts theorists to reexamine and reevaluate how technology can be successfully used in

educational endeavors. The new move toward online virtual environments simply gives our field a new arena to grow and develop. Implications for Information and Communications Technologies

Using Technology to Enhance Teaching and Learning in K-16

Educational institutions (Clift, Mulle, Levin, & Larson, 2001), with support from the corporate and private sector, have invested billions of dollars to establish technological foundations for future development and its use by a broader audience. Many schools have found themselves investing a substantial amount of their budget into both maintaining and staying current with rapidly advancing methods of instruction. According to NCES (1999), "In both public and private schools with Internet access, teachers were more likely to have access to e-mail, news groups, resource location services, and the World Wide Web than were students in these schools" (p. 46).

With many new available forms of instructional technology, greater diversity in teaching methods and style will materialize. Bimber et al. (2002) contend that no matter what kind of technology will be available, some teachers will use more sophisticated technology than others; some still prefer to use the old blackboard or overhead. Careful examination of the instruction that needs to be delivered can help schools maximize the potential of the equipment they have available. The application of technology in K-16 is a prelude for students to a more sophisticated instructional infusion of technology as students enter colleges and universities. With the addition of technology standards at the federal and state level (NETS, 2005) schools find it crucial to prepare students at the elementary level to complete complex projects. In an effort to support schools, the Massachusetts Institute of Technology (MIT) created a website called Cyber Tutor whose mission is to provide students with assistance for their math and physics homework. According to Newman and Scurry (2001), Cyber Tutor provides students with immediate, and detailed analysis of their performance. The interactive website supplies students with necessary hints where most needed. While at the same time professors have access to the student's profile in order to provide one-on-one counseling or adjust the lecture based on student needs. As innovative as this technology might seem from the present perspective, many schools have already implemented some sort of internet capacities and applications. In short, the use of the internet for student support is feasible both technologically and pedagogically.

Online Teaching and Distance Education

According to the United States Department of Education (DOE, 2003), "1.47 million community college students [were] enrolled in at least one distance education course." With the physical infrastructure of computer technology in place, distance learning has been a central part of our field for decades and its recent upswing in popularity gives our field a big opportunity to both influence and improve education. Learners can explore alternative options and develop their method of participating in the learning process. Berge (1998) made a prediction that computer technology will free instruction from the constraints of time and locations, allowing available education resources accessible to all. Video pod casting and wireless networks certainly make this prediction look like it has come true. Online and distance learning allow learners to initiate interaction, and engage each other conceptually and intellectually. Keep in mind, meaningful utilization of distance education technology demands more planning from educators. This newfound interest in the planning of education using technology creates substantial opportunity.

Corporate Training and Development.

The globalization of the economy has brought major changes to business organizations. According to research on e-learning in the corporate sector (Gunasekaran, McNeil, & Shaul, 2002), the "US Department of Labor estimates that corporate e-learning revenues are expected to increase from \$550 million to \$11.4 billion, an 83% compound annual growth rate between 1998 and 2003" (p. 44). Business organizations, like educational institutions world wide, continue to experiment with changing learner expectations stimulated by technological innovation and increased possibilities for individualized learning. With the advent of the internet as a viable source of learning, and self-paced instruction, there is a greater opportunity for both business organizations to provide learners with more and flexible alternatives. Bichelmeyer and Molenda (2006) explain that the corporate spending for training declined for businesses from 2004 to 2005, possibly due in part to an increase in the use of Web-based or DVD-based delivery.

The decrease in corporate spending could almost be thought of as a victory for our field if improved training efficiency due to good use of technology is responsible for the savings. Corporate innovation has also created new opportunities for our field to grow, while still maintaining our core principles. The first version of music download service Napster ushered in a new interest in digital music worldwide. Although the original version of Napster has since been declared illegal, several businesses took advantage of this interest in digital music to develop other resources such Apple iTunes to legally sell music to a large number of customers world wide. The significant part for our field is the availability of portable MP3 audio players, many of which can also play interactive games and video. Our field now has the opportunity to produce instruction using any type of media that can be used in any situation. We could never, for instance make video that would be carried in the user's pocket, intended to be watched on an assembly line floor to teach a worker how to dislodge a machine. This is a revolutionary difference. Corporate training will most likely be the first beneficiary in our recent revolution in flexibility of delivery. These personal media devices are representative of the convergence of media and should be thought of as a huge opportunity for our field.

Simulations and Games

As Rieber and Noah (1997) noted, "it has long been believed that the origin of games may lie in training simulations conducted by our most remote ancestors" (p.1). The military has used mock training to prepare soldiers for combat for centuries. The first organized sport was wrestling, simulated combat between two men. Modern combat training uses the same concept; the simulated environment replaces the physical game space, which provides a variety of military tactics that substitute face-to-face encounters with no casualties and minimal use of resources. Simulations and games are not for entertainment only, even though in the United States they have a reputation for being primarily a children's entertainment media. Herz (1997) explains that it was retailers' hesitance to sell games after the early 1980's video game market crash that made Nintendo repackage and remarket the Nintendo as a child's device. Just as our field should utilize the convergence of media seen in portable digital media devices, our field should also take advantage of the convergence of media seen in video games.

An innovative bridge to new learning may lie with games that the private sector has already developed. Rieber and Noah (1997) comment that the online games, which draw users by the millions, are now featuring environments that are robust enough to support many types of learning. The educator of tomorrow will think to integrate games and simulations from the beginning. In a class teaching the French language, students could meet up with students on line in France through a previously developed game. In addition, Bonk and Dennen, (2004) make a parallel comparison between virtual training and simulations wherein simulations are becoming more popular in business training and development. These activities such as SimCity, SimTower, SimAnt, and SimCoaster from Maxis add a new dimension to the learners' collaborative efforts. They provide instant feedback, which give instructional designers more opportunities to design and develop more sophisticated activities that will suit different pedagogical needs. As Bichelmeyer and Molenda (2006) point out, the usage of simulations and games may not be in high demand yet. In a longitudinal study conducted with organizations between 1997 and 2004 there is a steady decline in the use of non-computer games and simulations.

The student and worker of tomorrow will think digitally when they hear the word game, so our field should be ready to take advantage of this change. Historical Parallels It was not long ago that instructional television was innovative and widely used in corporate training, schools, universities, and later on in the eighties and nineties, was replaced with computer hardware and software (Cuban, 1986). It is interesting what Cuban's statement means in today's environment, where the computer has even taken over for the television for display of video. It is impossible to predict what the future will hold for even basic concepts like literacy in the context of video's continuing presence in instructional technology. However, it is inevitable that we can predict the occurrence of accelerating convergence of instructional technology with the use of information and communication technologies in schools around the world (Leu & Kinzer, 2000). As Grabinger (1996) stated, one major issue for research in instructional technology is to focus more on process and less on media. It is very important to be open-minded when developing instructions along side of digital technology.

It is easy to rapidly adopt technology based on novelty rather than careful evaluation. The rapid adoption of the now-abandoned laserdisc format is the early 1990's, even seen in our own school of education, is a great example of investing in a technology without looking closely at the process. Since there was no way for our department to make laserdisc content, it was difficult to include laserdiscs in the development process. Compare the flexibility of the laserdisc to an instructor with access to Google's image and video search and a copy of Microsoft PowerPoint, and it is easy to see the rules for media development are unlike any other time in history. Corporations see the need for one-stop-shopping by combining separate entities such as film, telephone, cable television, radio, and the internet into one format, just as our field is finding the need for convergence towards customized, take-anywhere media. Bichelmeyer and Molenda (2006) delineate the convergence of formats stating, "functions that were once performed by separate devices-telephone, radio, television, calculating, text messaging are now converging into a single instrument, usually designed to be handheld . . . along the same lines, instructional methods that were once seen as a distinct face to face classroom, video, web-based are converging into hybrid or blended learning formats" (p.3).

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