

Applications of Technology in Education

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### Abstract

Technology has advanced swiftly in the past few decades and the classroom of today (if it even exists) would be very unfamiliar to those who are not “digital natives”. This article will attempt to outline some of these changes and demonstrate the benefits of utilizing and implementing these new technologies.

### Applications of Technology in Education

Developments in technology over the past several decades has been remarkable in the rapid changes that have taken place in a wide variety of areas, but especially as regards education, and access to and delivery of information. Many things that were regarded as standard or innovative back in the 1970's and 80's, such as correspondence classes, 35 mm slides, overhead projectors, VCRs and reel to reel movies are now mainly headed the way of the dinosaur to extinction, replaced by newer technologies, mainly involving the rapid developments in computer technology (Firmin & Genesi, 2013; del Campo, Negro & Núñez, 2013). Although the technologies we use today were primarily in the realm of science fiction in Adler's lifetime, earlier technologies such as motion pictures and audio recordings (and the nascent television technology) were also viewed as possible boons to education which might revolutionize the educational industry, although their impacts were not as great as had been hoped and are dwarfed by the impact of computer technology today.

### **Classroom Technologies**

The classrooms of today are markedly different from those of just a few decades ago. Many students will often have their own technology with them (smartphones, laptops, pads, etc.) and one-to-one technology initiatives promote students having access to computing devices (be they iPads, laptops or other devices) at school, at home and on the go, which they have likely become accustomed to using since early childhood (Maldonado, 2012). These initiatives are often supported by companies who manufacture or sell the devices, such as Apple Computer and Microsoft. The danger of this, as point out by, among others, Microsoft VP of Education Anthony Salcito, is that the technology may become the center of the program instead of learning outcomes (Topper & Lancaster, 2013; Nielsen, 2012).

Besides the electronic devices, whether provided by the school or brought by the students (BYOD/Bring Your Own Device), modern classrooms have been transformed by the use of white boards and smart boards instead of old-fashioned chalk boards and digital projectors and sound systems, which can take the place of 35 mm slide projectors, overhead projectors and televisions. Some classrooms will even make use of learning platforms such as Moodle for in-class polls and chat/discussions (Monochehri & Sharif, 2010; Nelson, 2012). The pervasiveness of this technology has caused some pundits, such as Fox News' Bill O'Reilly, to rue the pernicious influence of the ubiquitous machines, but they are a part of life for most young people as well as many older adults (O'Reilly, 2013). Also the French government has proposed laws prohibiting employers from contacting employees outside of business hours because people are now always available with their cell phones, computers and other devices via e-mail, text, Skype, phone call, tweet, Facebook, etc. (de Castella, 2014). Both of these instances show concern about the technology being overused or abused by both children and adults.

Media that is displayed in courses is now also primarily digital and computer-based. Slide presentations and overheads have been supplanted by PowerPoint presentations and other applications which use computers. Video which in the past may have been on VHS cassette or reel-to-reel film are now primarily on DVD disk or available to be played online via the computer. Many individuals and even some institutions no longer have the technology to play older media on audio/video cassettes (or 8-track) or reel-to-reel film or audio. The promotion of the use of computer-based games in instruction is also an innovation (Proctor & Marks, 2013).

### **Access to Information**

Another change from previous decades (or centuries) in the experience of current students is the ease of access to information. Gone are the card catalogs and shelves of index

volumes for various journals and publications. Most libraries catalogs are now online (there is even a catalog aggregator, WorldCat, which connects to library catalogs all over the world) and the bibliographic databases and many of their journal and even book holdings are becoming increasingly available digitally, online. Often these full-text resources are done commercially by publishers and require subscriptions, but some are now being done open source and online only and are free. Also many government and United Nations publications can be found for free online. Projects such as Google Books ([books.google.com](http://books.google.com)), Project Gutenberg ([Gutenberg.org](http://Gutenberg.org)), The Internet Archive ([archive.org](http://archive.org)) and others seek to make available for free online older, out of copyright publications and occasionally an institution or organization, such as NĀSAP, will make older issues of its publications available publicly online (see [www.adlerjournals.com](http://www.adlerjournals.com)). There is a plethora of information available online, but not all of it is of equal value and users need to become critical evaluators when seeking out online resources (Jaeger, Thompson & Lazar, 2012).

Students of today are often said to be unable to imagine a time without iPhones, personal computers and the internet (or even Facebook and Google) (Margaryan, Littlejohn, & Vojt, 2011; Frampton, 2014). The success of computers based on the Microsoft (founded in 1975, Windows 1.0 introduced 1985) and Apple (founded in 1976, Mac OS 1.0 introduced in 1984) operating systems virtually drove other designs, such as Commodore, Tandy, Atari and Osborne from the market by the mid-1990's. Digital cell phones were introduced in the early 1990's and Apple introduced the first of its iPhone line in 2007, followed by the iPad in 2010 (traditional laptops had been around since the 1980's, but technology advancement keeps making them smaller/lighter/faster and more powerful). Today anyone with a smartphone probably controls more computing power than NASA used for the Apollo lunar program or the Skylab program

(neither of which current K-12 or undergrad students would likely remember) (APC, 2009). Two of the other tech giants which students of today are familiar with are the search giant, Google (founded in 1998) and Facebook (founded in 2004). All of these technologies have been around for most, if not all, of the lives of current students.

### **Online Technologies**

Online technologies have become prominent today, with a variety of online K-12 programs being available in many locations and the proliferation of online programs and totally online schools. It has changed the way people obtain and consume information and transformed many aspects of modern life. Popkin (2014) relates how he initially (in 1982-83) designed his Active Parenting program to utilize both a VCR and desktop computer, but focused instead on the video aspect of the program due to the high cost of computers at that time. Now he has incorporated the internet into the program fulfilling the role of the he initially envisioned for the computer (Popkin, 2014). His vision of a virtual parenting session could possibly be realized in virtual worlds such as Second Life or even World of Warcraft.

### **The Internet**

The internet, which began as a partnership between several large academic institutions and the US Defense Department in the late 1960's with ARPANET and other programs grew and became fully commercialized by 1995. E-mail utilizing the internet began in 1983, although some rudimentary online chat options had been available previously (Cerf, 2009). The internet has been the backbone of much of the technological innovation in education (and elsewhere) due to its growing ubiquity and ease of use. There were over 2.4 billion people using the internet in 2012, an increase of 566.4% over since 2000, with over 60% of the populations of North America, Australia and Europe utilizing it (Miniwatts Marketing Group, 2013).

## **Learning Platforms**

Delivery of courses over the internet required the development of a secure delivery mechanism (not open to the general public). These are typically called Learning Platforms or Content Management Systems (CMS). Blackboard, WebCT and Moodle have been among the most prominent of these to be developed. They provide a web-based virtual home for the course content and activities that is only accessible to authorized parties. These can also be employed to supplement traditional classroom based courses by moving some aspects (such as quizzes and other exercises) outside the classroom time and also allow for review of material such as photos and lecture presentations and the provision of additional materials via the CMS (Simonson, Smaldino, Albright & Zvacek, 2012).

One aspect that these platforms are not good at that is being increasingly regarded as important is building community and the social aspect of learning. Students in a classroom setting will usually have some degree of interaction with each other outside the classroom time that is unrelated or tangential to the course content. With online courses the students do not typically see each other or interact outside of the prescribed assignments. Promotion of this sense of community takes additional attention in the course design by the instructor, but can be important to student learning, comfort and retention in online programs (Palloff & Pratt, 2007; Kop, 2010). This is an area where Community Interest or Gemeinschaftsgefühl could be said to have a role in online education. The creation of a learning community among the online participants would be a reflection of this Adlerian ideal.

One way of making the class members seem more 'real' to each other and hence promote this sense of community is to use video response assignments where the students can get to see each other in videos. The University of Minnesota LT MediaLab developed a tool to make this

easier (FlipGrid), which eliminates the need for the student to create, edit and post a video response using sometimes expensive software and computer time; it is all done online by the tool, which could make it a ‘game changer’ in educational applications (Valenza, 2013; LT Media Lab, 2014b). Some programs seeking to enhance this community aspect have utilized platforms not designed for education, such as Ning or private Facebook groups, but they are lacking some of the grading and assignment aspects of the CMS (Brady, Holcomb & Smith, 2010).

### **MOOCs and Gemeinschaftsgefühl**

Massive Online Open Classrooms (MOOCs) are a new trend in online education, where courses or portions of courses that are offered for credit at institutions (either in classroom format or online) are repackaged and delivered via online programs for no credit to anyone interested in taking them, no matter where they are. They have a great deal in common with the Massive Multiplayer Online Role-Playing Games (MMORPG) discussed in Brack et al. (2013). Both are open to a wide, international community (hence the term Massive) and allow for interaction by participants within the environment. The story related in Brack et al. (2013) of a World of Warcraft (WoW) player whose entire participation in the game was confined to fishing along a river and chatting with other players who passed by is an extreme example from the MMORPG world. Both can provide opportunities for Social Interest (herein after referred to as Gemeinschaftsgefühl) in sharing experiences and resources with other participants.

Developing these open-enrollment classes serves as both publicity for the school and the instructor, both of whom get global exposure to a much wider audience than they would otherwise be able to engage and a show of good will or Gemeinschaftsgefühl by enabling those who would otherwise be unable due to their location or financial situation to access such classes.



A challenge when creating such a course, which can have hundreds or thousands of participants, is that some of the institutional resources that may have been used to support a for-credit class, mainly subscription-based video or text resources, would not be available for use in the MOOC environment due to usage restrictions or the cost of providing the access to a wider audience (Couros, 2010). There are thousands of courses available as MOOCs covering the full range of academic topics from technology and medicine to history, art history and psychology. Some of the biggest organizations offering courses in the format are Coursera, edX, Saylor.org and Canvas.net. There are a growing number of universities and colleges participating in these programs around the world (Millman, 2012; Kay, Reimann, Diebold & Kummerfeld, 2013; Simonson, 2012).

The author has recently completed an eight week Coursera course about Ancient Nubia taught by a faculty member from Emory University which has hundreds of students enrolled in it from all over the world (except Mongolia for some reason!). It utilizes a closed Facebook page for students to use for interaction and sharing of information outside of the more structured environment of the course's learning platform itself. This has allowed the sharing of information, pictures and comments among the students (and instructor) which would not be possible within the course site itself. Coursera also promotes Meetups where class participants from a particular area can 'meet up' in person to interact about the class and other things in a social setting.

### **Social Media**

Social Media, i.e. Facebook, Twitter, etc., have become an important part of many young people's lives (many have their devices with them so as to have access almost 24/7) and can be turned to educational purposes. Many educational organizations (museums, societies, expeditions, etc.) have Facebook pages and Twitter feeds which can enhance student learning

(Faizi, El Afia & Chiheb, 2013; Vanwynsberghe & Verdegem, 2013). Even in places such as the Dominican Republic, where access to computer networks is spotty, many people still have smartphones which can access educational apps and online media, as keeping in touch and being able to communicate is viewed as essential (A. Sintjago, presentation in LTMedia Lab, May 9, 2014). Private Facebook groups associated with an online class (or even an in-person one) can help promote group cohesion and *Gemeinschaftsgefühl*, benefiting student learning. Twitter feeds can be embedded into a CMS to provide an additional way for students to contribute and interact with the material and the class (Escobar-Rodriguez, Carvajal-Trujillo & Monge-Lozano, 2014).

### **Adventure Learning**

One of the concepts pursued by the LT Media Lab at the University of Minnesota is Adventure Learning, which was in part developed by faculty members Aaron Doering and Charles Miller. It involves expeditions to far off places (usually) that broadcast material back for use in classrooms around the world and provides the opportunity for communication synchronously and asynchronously between the people “in the field” and the students and instructors in the classrooms. The concept of ‘experts’ communicating directly with students and instructors from various locations (as well as communication amongst participants) is another key facet of Adventure Learning. To accomplish all this involves using many technologies which have only become available in the last decade or so, satellite communications, streaming videos, video chat, as well as more established technologies such as e-mail, websites, social media and learning platforms. Participating students and instructors are encouraged to also develop smaller-scale adventures that can be done locally such as examining environmental issues (i.e. water, soil, etc.) or geographic changes as part of their studies (Doering &

Veletsianos, 2008; Koseoglu & Doering, 2011). Doering and Miller have conducted a number of Adventure Learning expeditions since the early 2000's, at first mainly to Alaska, but their latest series of expeditions, entitled Earthducation (LT Media Lab, 2014a), is going to all seven continents (including Australia and Antarctica) and, like many of their previous endeavors is co-sponsored by the National Geographic Society. It utilizes virtually all the technologies discussed elsewhere in this article (Doering, 2006; Doering, Miller, & Veletsianos, 2008).

### **Conclusion**

Technological innovation has begun to transform the educational experience in ways that previous generations only dreamed or hoped for. Where hopes that audio recording, motion pictures, television or even early computers would revolutionize education have fallen short of expectations, the Internet, with its growing ubiquity and content makes possible a greater and more equal availability of information around the world. The challenge of keeping up with technological innovation and its many applications to education may seem daunting, but the benefits to education

It is a bold, fresh and brave new world out there in education as technology makes things both easier and more accessible and more difficult at the same time. There is so much out there, it a virtual Amazon jungle of information and opportunity, and navigating it can be a challenge but it is the key to providing better educational opportunities in the future. Mozdierz (2011) notes that Dreikurs, without knowing it, anticipated the continued need for humans to connect by stating "Although he meant something entirely different, the Internet, e-mailing, texting, voice mail, Skype, and social networking tools such as Facebook and Twitter all attest to today's connection between technology and human relationships" (p. 188).

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