

Technological Innovation for the 21st Century Learning: How
Smartphone and Tablet Technology Impacts Learning

Abstract

The contemporary classroom expands beyond the traditional brick and mortar walls. The modern classroom can be accessed from homes, work, places of leisure, and more. Technology is integral in providing access beyond four walls. Smart phone technology allows the 21st Century student to engage in a learning environment while being mobile. Educational applications (i.e. apps) assist students in accessing interfaces to virtual classrooms, researching specific subject matter, studying flash card notes, and much more. This method of learning appeals to the various learning styles of students, and it allows students to have autonomy and ownership in their learning process. Smartphone technology and applications also encourages educators to develop more creative pedagogy to reinforce subject matter content, and serve as a useful instructional aide. This paper will examine how smart phones and tablets are used for both secondary and post-secondary students, and how smart phones positively impact pedagogy and student comprehension.

Keywords: smart phones, tablets, technology, instructional aide

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The 21st Century students are not limited to the knowledge of life, even in the classroom setting, where there are now various forms of technology. The face of the contemporary classroom is ever-changing. Innovations in technology are influencing how students access, learn, retain, and apply information, and it influences pedagogy of educators in using technology as instructional aides and training media. Since technology is the process, method, and knowledge of a manner to accomplish a task; classroom technology to achieve educational task may include computer applications, SMARTboards, smartphones, and other technological devices (Merriam-Webster, 2012). Such devices capture students' attention; however, educators must stay abreast of this modernization and how to incorporate it into their pedagogy.

Educators must be aware of using these applications to reach all learning styles (i.e. audio, visual, and kinesthetic). Instructors must also be mindful of using such applications as instructional aides that will reinforce learning objectives for the 21st Century learners. Students are interested in ways that they may become more engaging and have more autonomy over their educational experience. They no longer desire the traditional method of basic lecture. However, students thrive on applications that meet the interest of their generation through captivating technologies.

According to Kamenetz (2010), American children now spend 7.5 hours a day engrossing and creating media. This is almost as much time as they spend in school. Amazingly, students tend to multitask across screens to pack 11 hours of content into those 7.5 hours. Since more activities are occurring on Smartphone equipped with audio, video, SMS, and other numerous

applications, there must be methods put in place to use such affectively in education—for both instructors and students.

Literature Review

Cellular or mobile communication has been in existence for decades. The purpose of this mobile communication is to have telephone call transactions while in transit. In 1973, the first hand-held mobile phone was demonstrated by John F. Mitchell and Dr Martin Cooper of Motorola with a handset weighing around 2.2 pounds. April 3, 1973 was deemed as the birthday of the cell phone. Dr. Cooper stood at street level outside a Hilton Hotel in Manhattan, and was quickly connected with the cellular station of the Burlington Consolidated Tower, which then patched the call into the landline phone network. Dr. Cooper called his main rival, Joel Engel. Mr. Engel was the head of research at Bell Laboratories, which was a section of AT&T—the chief competitor to Motorola during the sixties and seventies. The two companies were consistently occupied with advance telecommunication projects to put them both on the cutting edge of technology (<http://www.brophy.net/PivotX/?p=john-francis-mitchell-biography#CELLPHONEINVENTOR>). AT&T followed Motorola a year later, in 1974, with their cellular device, the first car phone. In 1983, the DynaTAC 8000x was the first to be commercially available. From 1990 to 2011, worldwide mobile phone subscriptions grew from 12.4 million to over 6 billion, penetrating about 87% of the global population and reaching the bottom of the economic pyramid (Teixeira, 2010 & Saylor, 2012). The technology continued to evolve and more features are constantly added to enhance the functionality and the intelligence of the cell or mobile phone—the phone has become the “smartphone”.

The smartphone is a mobile phone with a mobile operating system (OS) that is combined with a personal digital assistant (PDA) functions. The term "smartphone" did not appear until

1997, when Ericsson described its GS 88 "Penelope" concept as a "Smartphone" (Sager, 2012). The distinction between smartphones and feature phones can be vague, and there is no official definition for what constitutes the difference between them. One of the most significant differences is that the advanced application programming interfaces (APIs) on smartphones for running third-party applications can allow those applications to have better integration with the phone's OS and hardware than is typical with feature phones. With such revolutionary efforts in mobile technology and more accessibility, this began to provide more affordable options of communications that could reach rural and urban schools, public and private schools, and the "haves" and "have-nots". This is another method of bridging the "digital divide".

Secondary Impact: Digital Divide

The uses of smartphones, especially on a secondary level, require a very structured format for students to follow. Since phones may be used for texting, web surfing, emailing, downloading and listening to music, playing games, and engaging in social networking; students should have clear and concise directions on how to use smartphones for educational purposes. Smartphones must be used to reinforce learning objectives for students and as an instructional aide for students inside and outside of the classroom. However, smartphone technology provides accessibility to mass of students, regardless of geographic area or social economic status.

According to Freeman (2012), smartphones help to bridge the gap of the still existing digital divide. Smartphones serve as the easiest and most inexpensive way to connect to the internet. This allows students to have access to information and the ability to easily communicate with others. This has been shown to provide a better classroom.

Freeman referred to the Qualcomm's Wireless Reach Initiative, which aims to conquer the digital divide between those who can and can't afford wireless Internet access. After smart-

phones were distributed to low income students, standardized test performance drastically increased because students could more easily communicate with their peers and access information throughout the day—score increased by 30%. This is reflective of the student engagement factor and the use applications used. Bradley contended that a StudyBlue report indicated that students using the mobile app from a smartphone spend 40 minutes more studying each week compared with the students who rely solely on the website. Apps offer a better experience and easier to navigate and use; they are designed for the smartphone platform.

Student Engagement

According to Bradley, StudyBlue's CEO, Becky Splitt stated that students using the mobile app from a smartphone spend 40 minutes more studying each week compared with the students who rely exclusively on the website. Studying from a smartphone allows those same students to multitask and get in 10 or 20 minutes of studying here and there throughout the day to make more productive use of down time between activities. Smartphones make studying more convenient and enable students to study anytime and anywhere, making it significantly more likely that the studying will get done. While mostly secondary students are being directed on educational uses for smartphones, post-secondary/college students are distinguishing applications that will be of greater assistance in their educational research and studying.

Post-Secondary: College Students Use of Apps

Lytle in USA Today (2012) reported that a random sample of college students indicated using StudyBlue Flash cards to assist in memorizing key terms in test preparation. Some iPhone users employ the Evernote Peek as a note-taking cloud service, which provides allows students to organize their notes into study materials. Graphing Calculator assists students majoring in a math field or fulfilling basic math requirements. The School Helper app aides in

managing a college schedule—managing academic schedules by tracking grades, homework assignments, notes, and exams on the home screen. Students can add widgets to this main screen as reminders for assignments that need to get done. Since numerous college courses require group projects, Trello is an ideal application. Trello helps organize an entire project, large or small, by assigning each person a label and filtering responsibilities to that individual through the app.

In addition to schedule organization and class projects, there is also a major research component that college students must fulfill. Various textbook companies such as Amazon allow students to purchase electronic books (e.g. eBooks) or subject matter and/or additional reference. EBSCOhost Publishing provides digital databases, eBooks from various libraries, on-line journals, etc. This is essential for research papers and other class projects. Students may also access virtual class rooms through Black Board and Second Life interfaces, for virtual class meetings, on-line discuss forums, review previous lectures (i. e. voice or video recordings from instructor or presentation postings). These are just to name a few applications, but a student can become inundated with the amount of apps that will support them through their academic pursuits. However, educators may also take advantage to these features while directing students learning.

Educators Use of Applications

There are apps that are beneficial to educators. These apps help educators to organize course materials, grade assignments, reinforce learning objectives, and better interact with students. Grade Book for Professors are Google Spreadsheets that are useful strategy for organizing and tracking student grades, either through the paid or free version. Percent Calculator gets grades done harder, better, faster, and stronger—using this quick and easy

calculator aids in figuring out percentages. The eClicker Polling System let educators poll their students about anything and everything during class. Voice Recorder is ideal for Android users or the iTalk for iPad users allow educators in making permanent records of lectures for students who can't make it to class for whatever reason. Blackboard Mobile Learn basically provides a classroom for an app, available on almost all smartphone and tablet platforms. CourseSmart allows subscribers to use digital textbook services, and enjoy unlimited access to thousands of digital reads on their phones and tablet devices (Edudemic, 2012). Although smartphones and their applications (apps) are instrumental in the teaching and learning processes, the smartphones and apps may be vital in saving lives.

Smartphone Apps Save Lives

Mobile phones and smartphones serve as a major medium of communications, and students and school staff rely on this source. With this in mind, Emergency Management (2011) stated that Personal Localized Alerting Network (PLAN) (formerly the Commercial Mobile Alert System—CMAS) was implemented by the federal government makes emergency alerts geographically targeted and available on mobile phones. The Emergency Management Magazine further explained that the free service send text-like messages to enabled devices based on the user's location. The emergency alerts are not stalled by user location congestion, and using cell towers, wireless providers will push the emergency alerts provided by government officials. Schools have incorporated similar alert systems, especially on secondary and post secondary campuses, which send students warning of any incident or potential danger. Students can then notify others and immediately seek safety or evacuate if possible. Nevertheless, phone apps can greatly assist as well.

Since a great population of students own smartphones and consistently download phone apps, it should be encouraged that students download apps that will assist in emergency instances. Students, school staff, and administrators can download phone apps that forecast and give warning of those approaching hazards and incidents. In 2011, FEMA implemented a text messaging alerts and a smartphone app to aid the general public, including the academic community, on preparation and disaster recover. The public and the academic community may sign-up to receive alerts by texting “PREPARE” to 43362 (4FEMA) for monthly preparedness tips. Those using the alerts may also text “INFO”, “SHELTER”, and “DRC” for general information, local shelter information, and local disaster recovery centers, respectively (FEMA, 2012).

According to Ellmers (2011), the new FEMA smartphone App will help make disaster preparedness and recover information available for growing mobile society. To users, there is access safety tips for various disasters, an interactive checklist for their emergency kits, emergency meeting locations and plans, and maps to help locate nearby shelters or FEMA Disaster Recovery Centers. Additional smartphone apps include smart-ICE, store the current medical problems, the medications, allergies, any medical devices such as defibrillators or pacemakers, medical history, any past medical problems, the surgeries, hospitalizations, immunizations; Droid 911, locates you via GPS and finds the nearest hospital, police station, tow truck, ATM or bank, and etc; Peace of Mind (POM), takes your geographic location and when things happen that are in your area, whether it be a weather alert, an earthquake, tornado, etc.; and others (Romero, 2010). Schools on all levels will benefit by ensuring the all essential staff are knowledgeable of such applications to ensure that they are equipped for all types of incidents. However, social media expanding and society relies greatly in it as a means of communication.

Summary

Some schools limit or restrict the use of mobile phones, and set restrictions on the use of mobile phones. This reason is due to use of cell phones for cheating on tests, harassment and bullying, causing threats to the schools security, distractions to the students, and facilitating gossip and other social activity in schools. Many mobile phones are banned in school locker room facilities, public restrooms and swimming pools due to the built-in cameras that most phones now feature. With proper guidelines in education and use for students and educators, smartphones and applications can be helpful to the academic community.

The 21st Century learner depends on technology to engage them in the educational process. Basic lecture no longer stimulates their interest and may render low achievement. Instructors must be willing to recognize the best strategy that will engage students. By implementing contemporary technology, it will not only engage students in their work, but it will connect them to unlimited resources, which will enhance educational value.

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