Leveraging Technology for Aided Learning

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CHAPTER 1
Introduction

"As educators, we always want to know where our students are coming from and what they're interested in so we can build on that in our teaching. By understanding how students may be positively using these networking technologies in their daily lives, and where the as-yet-unrecognized educational opportunities are, we can help make schools even more relevant, connected, and meaningful to kids" (UMN, 2008). -Christine Greenhow

We live in a connected world of seven billion people. Six billion of them have mobile phones, even if they don't have clean toilets (Rovnick, 2013). Many can recall a time when mobile phones as we know them today did not even exist, but a growing number have lived in the connected world since birth, perhaps never knowing what the world was like before the Internet, or appreciating a time when the computer was not a common household item. This population is commonly referred to as the Millennials, and they are shaping the way we have evolved as a connected global community. They are not only consuming and participating in digital technologies, but also creating them, coding the Googles, Twitters, and Facebooks of tomorrow.

Yet, despite their inherent propensity for mastering digital technologies, they are required by law (at least in America) to be educated in a certain system. It may be a strong statement-- and this debate is not the topic of this paper-- but at times it seems that the law mandates students to be educated by a behind-the-times system, rather than that the law mandates education in a system that happens to be behind-the-times, whether by design or due to a lack of resources. Whatever the political issues, an enormous difficulty lies in helping the education system catch up, understand, and best use available technology without losing the students' attention to online pursuits that are entertaining but empty, or worse. Were that difficulty resolved, the politicians might be forced by the results and the schools themselves to come around. It is that difficulty -- of using new technology effectively for education -- that this book hopes to help resolve.

"The rapid growth of multimedia technologies over the last 20 years means that today's children and young adults were born in a computerized world and are used to handling all kinds of software products and games (Girard, Ecalle & Magnant, 2013)." Schools can and should try to keep up, but the costs can be prohibitive. Fortunately, many students are already equipped with a powerful device that can do more than snap photos, text, and make calls. Smartphones are mobile computers that can be highly customizable with apps that can augment learning with very positive results. "Educational activities carried out with the help of portable technologies have proven highly adaptable to instructors' and students' needs and have been linked to higher grades and greater student satisfaction and motivation among both children and adults" (Chayko, 2008, p.104). Using these technologies in the classroom can help today's student learn in a manner that is organic to their environment.
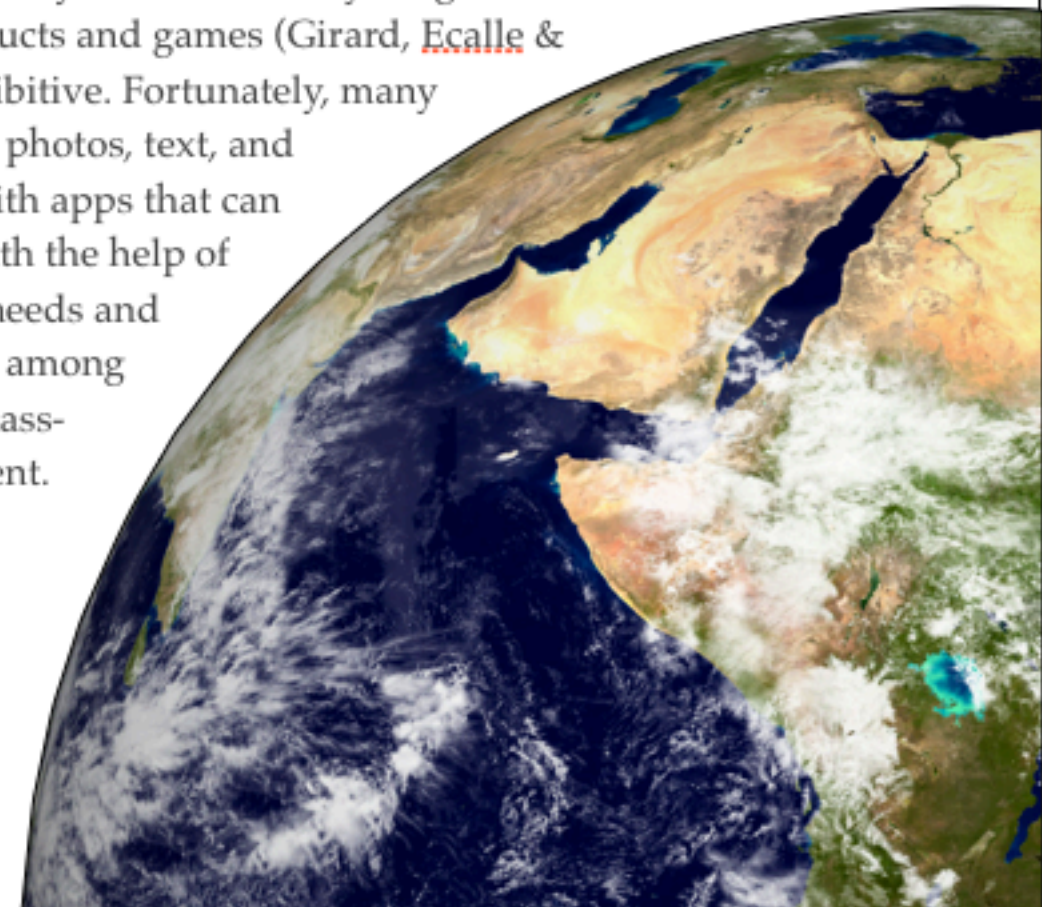
With so much potential it can be difficult to know where to start. This book aims to offer solutions on how and when smartphones can be used effectively in and outside of the classroom, for students working alone or in groups, and provide examples of how other teachers have incorporated digital technologies into the classroom (whether successfully or not).

Video requires internet connection to play.

YouTube 1.1 How is Technology Transforming Education? Sir Ken Robinson Video Series from Adobe Education

"The fact is most people who are teaching now in schools were born before these tools were available, and our students take them completely for granted... Our students have a facility with digital technology, and it is right and proper, therefore, that we should build them into the heart of education."

Teenagers and their cell phones go together like a books and a classroom. Most American teenagers have grown up with unprecedented access to the technology, they've developed the know-how to use it, and technology has become an influential proponent of their environment. Only in our tech-filled society today cell phones and tablets are more than capable of being alternative methods for reading, and because of this there is ample opportunity to embrace mobile technologies in the classroom. These devices are not only cost effective to educational institutions, but already ubiquitous to the students they educate. Native and third-party applications bring functionalities to cell phones beyond their original design, most of which can be utilized to not only bring digital technologies into the classroom in a cost-effective fashion, but also engage students in a manner to which they are already accustomed.

Presently, there is a precedence for keeping cell phones out of the classroom as they can be distracting to students. In an attempt to keep students focused on learning, some school districts develop policies designed to keep outside technologies out and even punish those who disobey, leading up to expulsion. While cell phones are themselves social distractions, especially amongst the student demographic, they may also prove to be a viable and cost effective solution to many modern problems.

Computers bought in bulk are expensive and often rapidly depreciate in value and technological capability. Word processing suites such as Microsoft Office are a required standard for students and their homework, but are also costly. Software designed for specific educational subjects can likewise be expensive and infrequently updated. The cost to not only purchase but maintain these modern technologies can be prohibitive to many schools.

The simple beauty of today's cell phone is not that it can make calls or compose text messages, but that it can virtually take the place of a computer, and most students are already carrying them around in their pocket.

Tap on notepad icon to take notes!

Moving From Past To Future

"Yet, as institutions for learning, schools have become somewhat anachronistic, whereas museums have retained the potential to engage students, to teach them, to stimulate their understanding, and, most important, to help them assume responsibility for their own future learning" (Gardner, 2008).

WHEN I WAS A KID

It is a modern marvel that virtually anyone is capable of going about their daily lives with a computer in their pocket. The emergence of mobile telephones and Web 2.0 over the past ten years have made connection to the internet in many parts of the Western world both ubiquitous and constant, and people of most ages are taking part.

When I was a kid in school I always looked forward to the random or rainy days when our entire class would venture off to the computer lab to play Where in the World is Carmen San Diego?, The Oregon Trail, and other games. This was a time before the average family had a computer in their home. The Internet wouldn't be available to us for years to come. Practically no one had a mobile phone, and if they did it was a brick with a tiny screen that you could only use to dial numbers and talk.

In that computer lab, games were played off of big floppy drives and if we were lucky we could hook up an enormous pair of headphones for a more immersive experience. The only drawback was that class sessions were less than an hour long. It was an extraordinarily different time by today's standards, where I can sit in bed and play multiple games, glance at the news, read a book, watch videos, TV shows, and movies, and write this all on one device (full disclosure: I'm still wearing my pajamas). When I was a child who loved to go to the computer lab, I also loved Inspector Gadget and his niece, Penny, who had a book-like computer she used to help solve mysteries. I always wanted one of those, and now I have one.

Many people do. My cell phone in high school was still a more analog interpretation of digital life, capable of making calls, texting, and maybe playing a game. Today cell phones are smartphones; full libraries, vast catalogs of entertainment, game centers, and applications that not only aid in immersion, but put a virtual desk in the hand of the person holding it.

A lot of people sleep with their phones by their bed. Purses have special pockets to hold phones. These devices are so ubiquitous we've not only allowed them to change our lives, we've refashioned ours to accommodate them. But I don't need to convince you that these devices are everywhere. Chances are you're thinking about yours as you read this.

While the mobile phone may have been evolving with a much simpler design in mind a couple decades ago, today they are multi-purpose, and those purposes can be expanded upon infinitely. No longer do kids have to wait for a rainy day to go to the computer lab - they have one in their pocket. Rather than discouraging kids from using them during class time, educators could instead be encouraging them, even participating with them.

Amongst a group of American teenagers questioned in a study by the Pew Internet and American Life Project, texting, "is the dominant daily mode of communication mediated by technology between teens and all those with whom they communicate" (Lenhart, 2012):

- *63% text daily*
- *14% talk with their friends daily using a landline*
- *26% talk with their friends daily using their cell phone*

The explanation for this preferred method of communicating is simple: it's entertaining. "Teens often use instant and text messaging because it enlivens their lives; increasingly, younger and older adults do as well, also using social networking sites, blogs, podcasts, and other applications just to give [themselves something] to do" (Chayko, 2008, p. 69). Furthermore, "The convenience and efficiency of using portable technologies to interact are noted by adults and children alike as prime reasons for their popularity" (Chayko, 2008, p. 97).

According to a more recent study, (Madden, Lenhart, Duggan, Cortesi & Gasser, 2013) 78% of American teens own cell phones, almost half of which are smartphones. One in four teens owns a tablet (such as an iPad) and most teens (nine out of ten) own a computer or have access to one at home (most of which are shared with another member of their household).

According to the same report, fully 95% of teens in the United States are online, a number that has not changed much since 2006. They and their peers in the Millennial generation are designated as Digital Natives, "'native speakers' of the digital language of computers, videogames and the Internet" (Prensky, 2001, p. 1). They have grown up with digital technologies freely available to them throughout their life and are more likely to have an intuitive, comprehensive understanding of how to use them.

Image Credit:
Ambro/FreeDigitalPhotos.net

This is in contrast to those born in previous generations, who are designated Digital Immigrants.
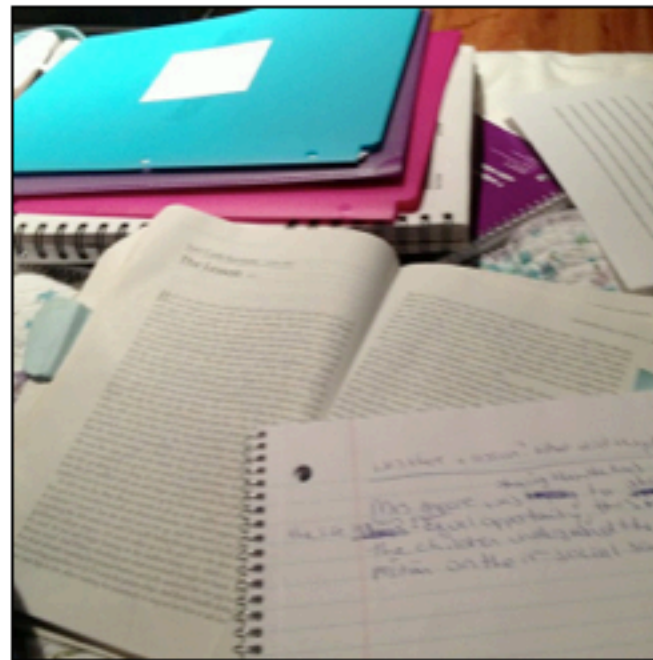
The problem, Prensky (2001) elaborates, is "that our Digital Immigrant instructors, who speak an outdated language (that of the pre-digital age), are struggling to teach a population that speaks an entirely new language" (p. 2). It is therefore "important to maintain a level of continuity and consistency between the tools used in education and users' everyday home activities" (Burnett, 2009 via Girard, Ecalle & Magnant, 2013)

Rather than replacing one pedagogy with another, consider instead a symbiotic relationship between the tried-and-true and the new-and-improved. A computer connected to the internet does not replace a library, but internet-connected computers within a library expand search possibilities and maximize learning potential. Digital technologies have created both wholly new processes and shortcuts for older ones, and students have come to expect the instantness of those shortcuts because they've existed most of their lives. Traditional pedagogies should be scaffolded by the instantness and synchronous capabilities of digital technologies.

Instagram 2.2.1 @katieashmead

YouTube 2.1 Technology Integrated Across All Subjects Engages High School Students

Twitter 2.1 #PrenskyPerspective

Marc Prensky tweets his thoughts on integrating digital technologies into the classroom. Follow him @marcprensky for more of his #PrenskyPerspective.

You know the semester started when.....# collegelife #sophmoreprobs #Studying #reading #ahhhhh

Cell Phone Use In School Today

This instantness, however, has created a stigma by which many students are judged. In campuses across the United States educators make and enforce policies about cell phone use in school, policies which are defied in varying degrees by the students.

Rick White, supervisor at Thompson Junior High in Bakersfield, CA says that there is "really no use for cell phones on campus" and that there is "no positive use for them at all in school" (Barrientos, 2010). Students are reportedly using their cell phones to not only secretly communicate with each other at school, but to cheat, share pornographic photos, organize fights, and cyberbully. Positive or even educational uses of cell phones are not included in the article.

According to the article, educational codes in the Kern County School District allow campus authorities to search and seize student cell phones, and punishment can include confiscation and lead to possible expulsion. One post in the comments section by a self-identified teacher in the same school district, suggests that, "a harder and stiffer consequence MUST be established like automatic suspension for so many days" (emphasis their own).

**YouTube 2.2** What is the Value of Digital Technology in the Classroom?

These views are legitimate, even if they may seem a bit extreme. While cheating in school is hardly a new idea, using a mobile device to do so is, relatively speaking. Their size and ability to access vast amounts of information present a genuine concern to those tasked with the responsibility to foster an environment suited for learning.

Changing Attitudes and Methods
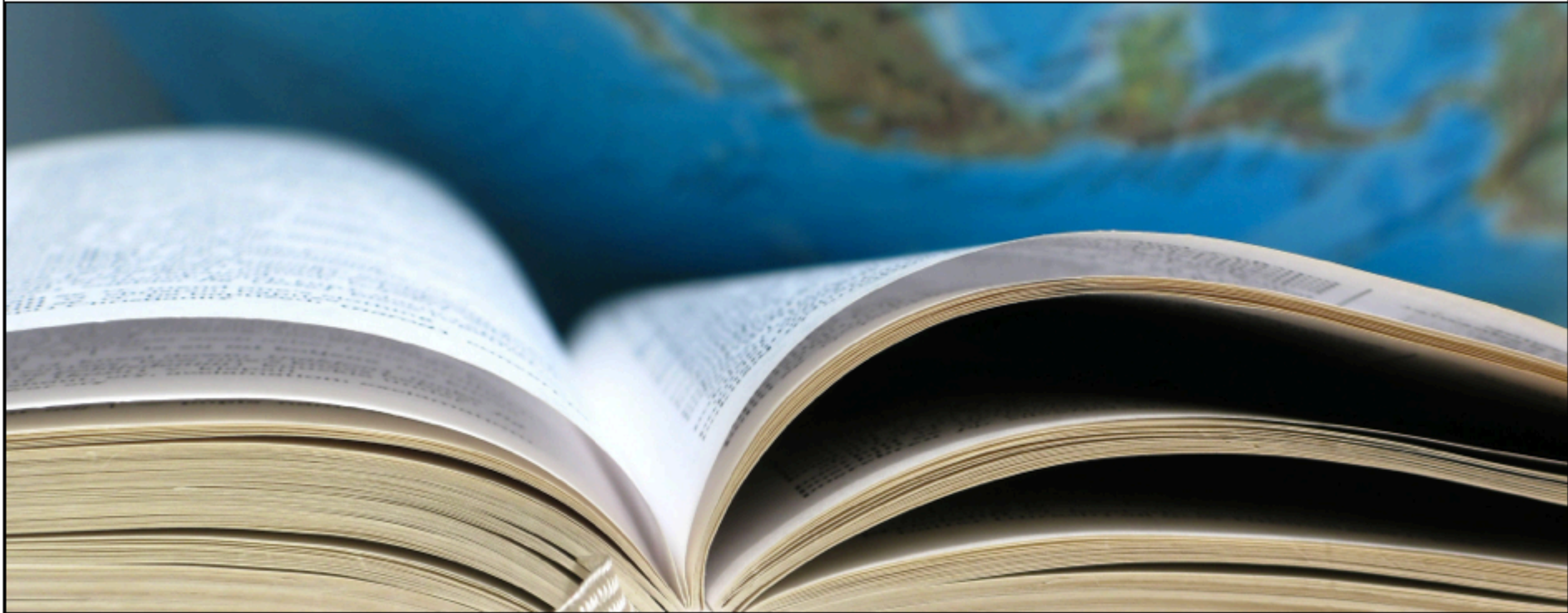
"The goal need not be to convert each school into a museum, nor each teacher into a master craftsman, but rather to think of the ways in which the strengths of a museum atmosphere, of apprenticeship and learning, and of engaging projects can pervade all educational environments, from home to school to workplace" (Gardner, 2008).

Cheating and Distractions 2.0

Students can easily share test answers with each other via text messaging, snap photos of exams to pass around to others, and find essays online to copy. They may not see these acts as committing academic dishonesty because the same methods can be used to aid in learning (as will be discussed later in this paper). After all, what is the difference between taking a photo of lecturer notes on the whiteboard to use as a study notecard and using that image to later cheat on an exam? *Intent*.

Theoretically a student could bypass class discussions, lectures, activities, and assigned readings and yet still score well on tests with a bit of internet searching. Or a student could bypass studying all together and use quick searches online to appear knowledgable when partaking in class discussion. It's a double-edged sword. The same ways mobile devices can aid in learning can also aid in cheating. However, it is the student who is responsible for cheating, and not the device itself.

There is also the issue of distraction. While immensely helpful in searching for information, mobile devices are also commercials, television shows, movies, concerts, video games, hangouts, photo booths, and so much more. Over the years headphones that plug in to devices have shrunk in size to the point where they can be very easily hidden underneath a hooded jacket, scarf, or long hair so as not to be seen at all. Used in a classroom they instantly remove a student's presence from the classroom and disconnect them from the intended purpose of school.

Image Credit: Ambro/FreeDigitalPhotos.net

Perusing Facebook, tweeting, swiping through an Instagram stream or Tumblr dashboard are all as equally distracting even if they don't require sound or earbuds. When not a part of the curriculum or teacher-sponsored activity in a classroom, they serve little other purpose than to distract the student from learning.

Distraction is *attractive* to the social teenager. When the allure of viral videos and celebrity tweets are more engaging than algebra or World War II, it is not difficult to understand why a student would choose to disconnect themselves from the classroom and immerse in social media.

Where educators can turn the tide is in making the learning as interesting as the distraction. Instead of punishing students for these behaviors by taking away their phones or banning them all together, educators could look for ways to include the very same devices, social networks, and apps that distract to augment the learning, to make it so that a student won't desire another distraction.

Instagram 3.3.1 @bata_javi

#StudyingBiology "Studying" hahaha #WhatHappenIfYouTryToMakeMeStudyAloneWhenNobodyIsWatching Lol, I was trying to study the f***ing biology when I start drawing in the side below and then I wrote "bored" and…I'm a disaster, really #Cute #Draws #Studying #notebook #beauty #Lol #YeyIAmGoingToPass :/ I'm not going to pass if I continue like this :) #help

BYOD Programs

Some schools have BYOD (bring your own device) programs, which is just a school-appropriated term for what students are already doing: bringing their mobile devices to school. Cell phones, smartphones especially, are like Swiss knives; many functions can be performed in just one device. With each phone variation (Android, Apple, Windows) there is a store where users can download apps that perform even more actions beyond what was initially conceptualized for the phone. Using parts built inside of an iPhone third-party apps can turn phones into a compass, an electromagnetic force detector, and a device that measures sound amplitude. Many apps are available for free or at little cost, which is not only cost effective for the student and their parent(s), but also their school.

High school teacher Jamie Williams, in an article on the evaluation of cell phone policies in schools (Watters, 2011), makes the point that many devices students bring with them have more processing powers than the computers owned and maintained by the school. And because of the apps made for those phones students are quite possibly more equipped than the schools themselves.

Williams, an art teacher, encourages his students to use photos taken on their phones as inspiration for their artwork, and because most (if not all) smartphones are capable of taking video in resolutions up to high definition, students have a mobile movie-making studio in the palm of their hand.

Cloud computing makes homework available anywhere across every device, so forgetting it at home isn't really an option. Shareability between devices, in many cases aided by cloud computing, makes it easier for students to collaborate on group projects asynchronously. Each new generation of phones boasts new features and capabilities at incredible speeds that should only aid in the education process.

Flipped Teaching

A recently-published article by the blog MindShift (Barseghian, 2012) highlighted the experiences of three high school teachers employing digital technologies in their classrooms in various and similar ways. While their results were promising, they were not without complication.

Every day at the start of AP Chemistry class at Sacred Heart Cathedral Preparatory School in San Francisco, Ramsey Musallam text messages his students with a question and receives their responses immediately. The students come to class expecting the text from him, and though he admits it can be quite gimmicky, he says that it is a fun way to keep the students motivated. When a student has a question he answers it, recording his voice and writing on an iPad to upload it to the class website so that everyone can learn from it. Rather than having to disrupt individual or group work sessions or answer the same question repeatedly, he has created essentially a database of online tutorials for the their benefit. He calls this method "flipped teaching".

Also in San Francisco, at Sacred Heart Cathedral Preparatory, seventh grade history teacher James Sanders uses Socrative, a tool that shows real time poll results for multiple choice and short answer questions, at the end of each class to gauge how much understanding students obtained from the day's lesson. Each student has a Chromebook - the Google made laptop that runs off of the Google cloud system rather than an operating system - and a majority of students have smart phones or iPod touches that they use together in group activities.

Not all methods for using digital devices in the classroom work according to plan, as Paul Bamwell found out in his 8th grade English and digital media classes at Fern Creek Traditional High school in Louisville, KY. Like James Sanders, Bamwell used a polling tool (Poll Everywhere) to gauge understanding and administer quick tests. While the students were excited at the opportunity to use their cell phones and there was high engagement in the activity, exceptions arose. Not every student had a cell phone which meant some were excluded, and some students took advantage and used the opportunity to be anonymous to goof off. While Bamwell feels there is not an app that, "promotes efficient best practice yet," he admittedly is not actively searching for one that does.

Digital Natives Teaching Digital Immigrants

YouTube 3.1 Embracing Technology: A Classroom Veteran Adopts Digital Tools
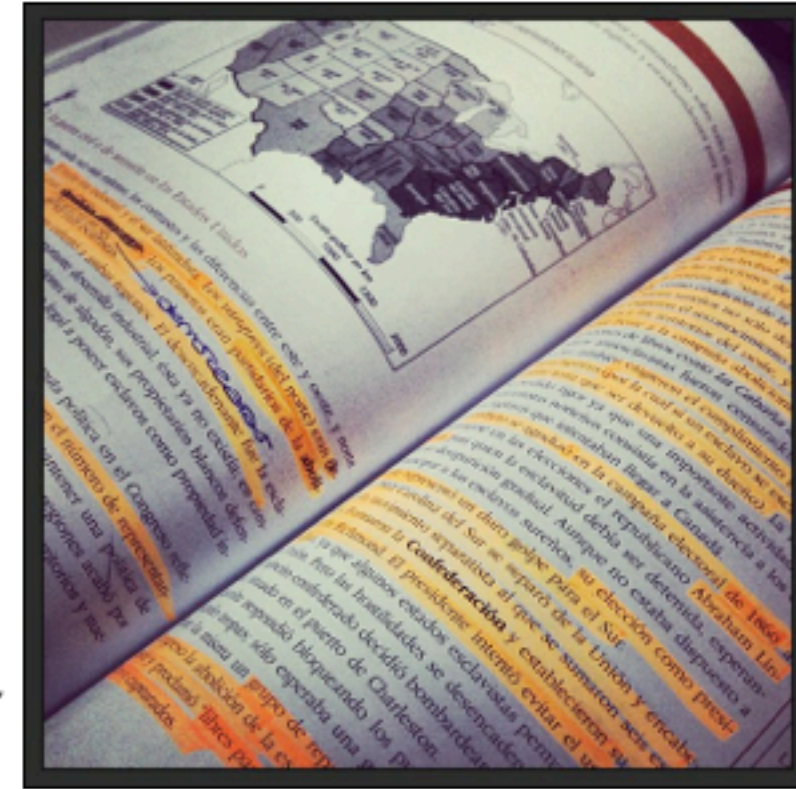
Ideas for Integration

"Think about not only incorporating technology into your lessons, but creating more and more compelling assignments so that 21st century skills, the kinds of things students will have to develop in terms of critical thinking, problem solving, collaboration, global participation - that these are incorporated into assignments. The best spaces will incorporate social media, and interacting with others." Karen Cator, U.S. Dept. of Education

Learning in the classroom today, though different from my own childhood experiences a mere twenty years ago, is still, as Henry Jenkins puts it, "locked into a model of autonomous learning that contrasts sharply with the kinds of learning that are needed as students are entering the new knowledge cultures" (2008, Kindle Locations 3934-3935).

#bored #studying #dying #tomorrow #exam #hate #history #teacher

Rather than lecturing and writing notes on the chalk/white board for students to copy (as was my experience), many teachers today are instead handing out packets of work to be completed by the student (Fine and Fine, Teens React to Student Lectures Teacher [Jeff Bliss]).

While some students may not have difficulties with that version of self-directed learning, it will not work for every student, and some may suffer academically for it.

Howard Gardner, author of the theory of multiple intelligences, very eloquently states:

> *So long as students take only a single perspective on a concept or problem, it is virtually certain that they will understand the concept in the most limited and rigid fashion. Conversely, the adoption of a family of stances towards a phenomenon encourages students to come to know that phenomenon in more than one way, to develop multiple representations, and to seek to relate these representations to one another. (2008, p. 141)*

This is why it is imperative to adopt or adapt to new pedagogies that embrace the current technologies that students have grown up with, and use them in an interdisciplinary fashion for multiple entry points of learning.

While by no means an exhaustive master list of ideas, what follows is a guide of how an educator can integrate digital technology into the classroom at any level with which they are comfortable.

The Social Network

SOCIAL NETWORKS ARE SO UBIQUITOUS THAT SOME OF THEM, SUCH AS FACEBOOK, ARE PRE-LOADED ON SMARTPHONES SO THAT THEY ARE READY TO BE USED STRAIGHT OUT OF THE BOX. APPLE HAS INTEGRATED BOTH FACEBOOK AND TWITTER INTO THEIR MOST RECENT OPERATING SYSTEMS SO THAT ONE DOES NOT EVEN NEED TO LOAD A SOCIAL NETWORK WEBSITE IN ORDER TO TWEET OR POST A STATUS UPDATE. SCHOOLS MAY WANT TO FOLLOW SUIT.A STUDY CONDUCTED BY RICHARD LIGHT AT HARVARD GRADUATE SCHOOL OF EDUCATION REVEALED THAT, "UNDERSTANDING IS SOCIALLY CONSTRUCTED THROUGH INTERACTIONS WITH OTHERS. THIS IMPLIES THAT WE NEED TO FOCUS MORE ATTENTION ON HOW WE LEARN MOST EFFECTIVELY, AND THE SIGNS POINT TOWARD SOCIAL INTERACTION" (BARSEGHIAN, 2011).

A school built and managed social network offers the ability to teach digital literacy safely while also stressing best practice behaviors, such as knowing how much personal information to reveal online and the consequences of revealing personal information online. Some schools have already created private social networks for their students (Hill, 2011) as a digital sandbox with which to practice. This "practice" provides participants with the opportunity to:

- *Engage in friending activities as they would on outside social networks*
- *Express themselves via status updates and commenting*
- *Connect with "safe" participants, including students, teachers and faculty*
- *Make social media mistakes without real-life consequences*
- *Stay engaged in school activities outside of the classroom*

The student body government (with the guidance of a faculty advisor) is the ideal organization to manage a school-run social network. Not only are they elected by their peers to represent their interests, they assume a role of responsibility for which they are held accountable by the faculty, administration and the student body population.

Open-source software such as Elgg is designed for educational institutions to create private social network communities. Furthermore, it is licensed under the terms of the GNU General Public License which makes the software is absolutely free and can be modified with additional downloads (plugins) and customized by the social network administrator. In 2011 Mashable (Bissram, 2011) profiled the Student Life Network (SLN), a company that provides colleges and universities (60 at the time) with custom designed, private social networks for their 30,000 students in North America. Best of all the service is free!

To create a private social network, a school need only provide SLN with their branding materials, such as colors, mascot and logo, and within a week receive a fully-featured online community ready to be operated by the student body government (or whomever the school designates). The finished product is "endorsed and managed by student governments and associations to engage their students and improve communication in an active online community" (Bissram, 2011).

Once built students are able to login with their school email and create an individual profile. They can upload photos, videos, post campus events, have their own storefronts to sell and buy products[2], and earn points through a reward system that awards gift certificates or discounts to organizations meaningful to the campus. Students can receive notification emails about events and activities going on throughout the campus, a nice alternative to brightly colored fliers competing for attention on a bulletin board. And while there are advertisements present on the private social networks, they are relevant to campus activities, stores, and student life.

SLN provides those in charge of managing their school's private social network with training videos and web support at the *sponsored pricing* (free) level. More advanced support is available at various monthly price points. Student Life Network, in turn, has its own vast social media presence, and regularly maintains a blog that features students, schools, and events (scholarships, concerts, contests) that may be of interest to them.

While the Student Life Network dedicates a page on its website to testimonials from a few student organizations, they do not offer any information about how engaged students are in any particular school's network, if there are any privacy concerns, if there has ever been an attempt to hack a network designed by them, or any information beyond the selling points; it is not known if they collect such data. This is information a school will want to have so that it is prepared should similar conditions occur in their own social network.

In the Classroom

THE TYPICAL AMERICAN HIGH SCHOOL WILL OFFER A PLETHORA OF CLASSES THAT FALL INTO BASIC SUBJECTS, INCLUDING SOCIAL STUDIES, SCIENCE, ART, LANGUAGE ARTS, MATHEMATICS, AND HEALTH AND SAFETY. WHAT FOLLOWS HERE IS A LAUNDRY LIST OF WAYS MOBILE DIGITAL TECHNOLOGIES CAN BE EMBRACED IN CLASS-ROOMS, WITH THE INCLUSION OF A SOCIAL MEDIA-CENTERED CLASS SUBJECT. THESE IDEAS ARE NOT NECESSARILY MEANT TO BE CONSTRAINED TO ONE SPECIFIC SUBJECT OVER ANOTHER. IN FACT, I ENCOURAGE USING THEM FOR MULTIPLE PURPOSES OVER SEV-ERAL SUBJECTS.

Use native and third-party apps. A native app is one that comes already installed on a phone when purchased by the consumer and is usu-ally made by the manufacturer (Apple, Google, Microsoft). These typically include a calculator, calendar, camera, internet browser, photo gallery, messages (SMS/MMS), music player, task manager, voice recorder, and weather. Third-party apps are those which can be down-loaded in app stores (hereafter referred to as "the app store" to avoid confusion between operating systems) directly from the device (or from an internet browser) that sometimes replace the use for native apps that may be too basic or not specialized enough.

Most native apps have one or more complementary versions in the app store that virtually replace the need for the native app for their sheer functionality alone. In the following sections I will list the benefits of using a native app, and why the app store version makes the function of the app even more important to the classroom. Additionally, each section will offer ideas of how these apps can be utilized in- and outside of the classroom to augment learning and engagement.

Calculator. On most smartphones the calculator app is actually two or more calculators in one. In portrait orientation, or the straight up-and-down orientation most people hold their phones, the calculator is a basic calculator, capable of addition, subtraction, multiplication and division. When turned to the side in widescreen orientation the calculator capabilities are expanded to include trigonometry, pi, exponents and square root.

Interactive 4.1 Portrait verses Landscape orientation

*Tap the arrow to rotate the orientation of the calculator screen.*

Third-party calculator apps can add further functionality such as graphing for advanced algebra courses. Graphic calculators such as the TI-83 have traditionally been expensive to purchase - upwards of $80 in some cases - so having a relatively inexpensive app take the place of one can save a student and his/her family some money. Rather than having to purchase a separate calculator (a cost to the student or parent) or borrow one from the classroom supply (a cost to the school), a cell phone can replace the need for calculators.

A staple in math classrooms, calculators are also used in many science courses, such as chemistry and physics. Subject-specific third-party apps allow students to perform other calculations, such as molecular weight and balancing chemical reactions. These have the additional benefit of having high resolution images, 3D simulations, and highly engaging activities (including games and quizzes).

Instagram 4.4.2 @missaishaj
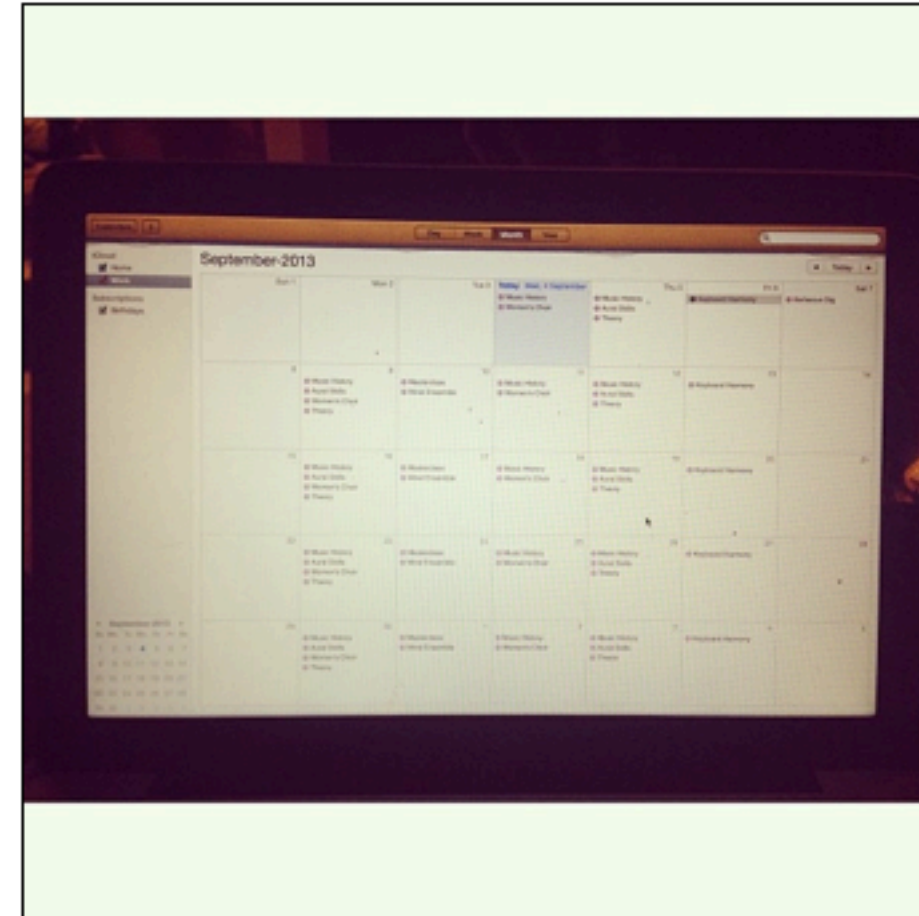
See ya bye social life. #school #schedule #studentlife #university

Calendar. With this organizational tool available on every phone students always know when assignments are due. Teachers can create calendars with syllabus information and share it with their students, such as through the Google mail system, so that there is no miscommunication between them. Additionally, students can map out timelines for when to complete portions of an assignment before they are due and collaborate with classmates on group meeting times.

Camera. Perhaps one of the more defining features that made the cell phone the smartphone, the ability to have a point-and-shoot

Instagram 4.4.3 @brooklyn_pangle7
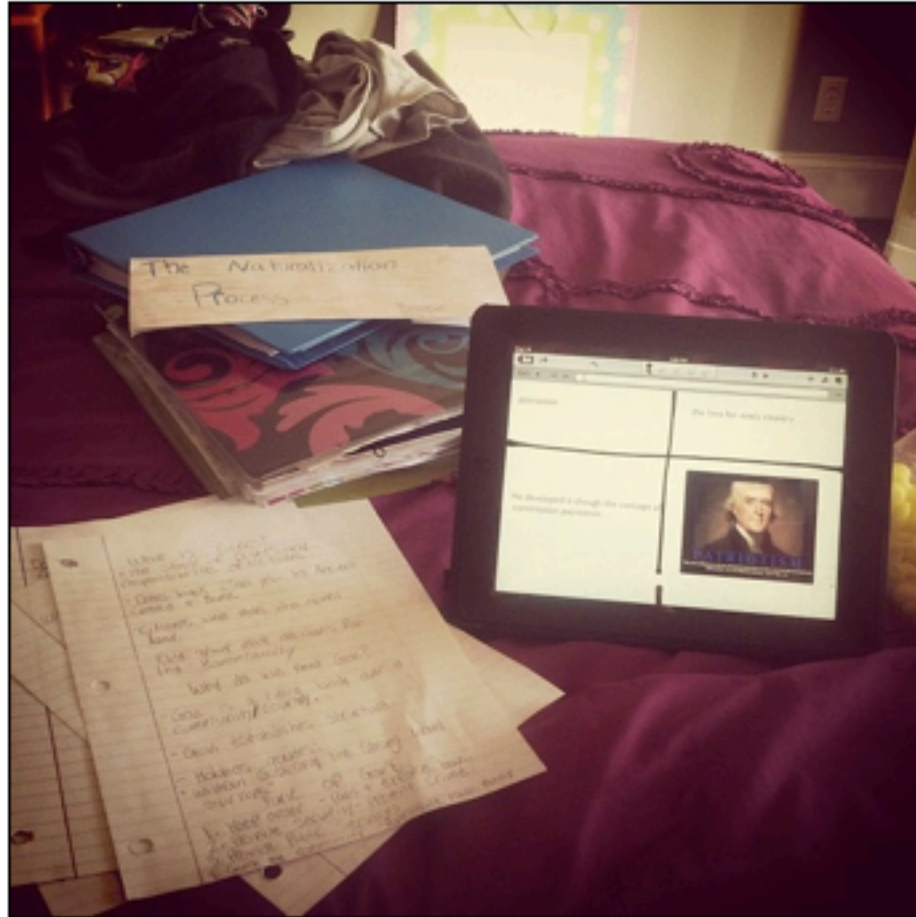
Studying for civics while eating candy... i'm going to fail this test!!! #schoollife

camera in one multi-functional device means that anyone can be a photographer at any time.

Where native camera apps truly differ from platform to platform, and even device to device, is the resolution in which photos and video are taken. On devices such as the iPhone, front- and rear-facing cameras boast different resolutions for different purposes.

Some devices will offer a quality that is almost on par with basic point-and-shoot digital cameras. Some have a much lower resolution. However, the camera is itself not wholly responsible for the quality of a picture.

Third-party apps generally augment the native camera, or provide photo editing assistance after the photo is taken. The extremely popular Instagram, which was acquired by Facebook in 2012, gives camera photos a whole new layer of dimension that harkens back to toy cameras that were popular even before the digital camera. Anyone can apply a filter to a photo to give it an artistic tone before sharing it across multiple social network platforms.

Third-party apps for augmenting and assisting in the creation of videos exist in the form of Cinemagram (a few frames of video), Vine (six second video tweets), and soon in Instagram[3] (15 seconds of video) as well.

- Digital Notecards: snaps taken from a textbook or the black/white board in the classroom can create a notecard that stays with the student at all times and is easily accessible. This reduces the amount of bulk a student has to carry, and is ensures the student always has the study aid on hand to use.

- On-the-go Photography: for an art curriculum that covers the spectrum of lessons from shape to color theory, students have the ability to capture artistic elements as they exist in nature and their every day lives. After a classroom lesson on negative space depicted in a slideshow presentation, students can find examples of negative space in their everyday surroundings to demonstrate understanding of the concept.

- Social Video Clips: apps such as Vine allow users to create six second movies with touch-to-record capability. When the finger touches the screen the app records what the camera is pointed at. The user can control for how long (or short) their finger is depressed on the screen. Short taps extend the life of the six second video, and with a bit of imagination a visual story can be told.

- Filmmaking: built-in camera/video functionalities allow image recording beyond six- or 15-second increments because they are stored on the device's internal or external memory (such as in mountable SD cards). Third-party apps such as Apple's iMovie offer powerful mobile versions of fully-featured desktop software that can turn an assignment into an artistic exploration.

Internet browser. When computers at every desk aren't possible, or when a trip to the computer lab is prohibited time-wise, having an Internet browser on a digital device can be a great service in the pursuit of information. Students are not only expected to retain vast amounts of information, but are also required, especially when the time comes to take tests that can ultimately effect the kinds and amount of funding a (public) school receives. Try as they might most students can't memorize (or better, learn) every fact, equation, notation, and term. Internet search functionality on a smartphone or tablet is an aided assistant, like a digital notecard, that serves as a reference. That being said, it should not replace memorization for the sake of being "easy," as it merely replaces memorize and regurgitate with capture and delete.

The operating system of the phone determines which Internet browser comes preloaded on it. For example, Apple devices come with he Safari browser as the native app. While all browsers essentially perform the same functions, users still have a preference, like they do with Windows or Apple computers, and any choice, native or third party, will perform the same functions.

Photo gallery. Every picture and video taken on a phone is saved to the internal photo gallery. In most cases the gallery will be divided into sub-galleries containing photos from various apps, such as Instagram and other third-party camera apps. Photos saved from the internet browser also appear in the gallery, or camera roll. When synced with a computer, they can also contain images not taken with the device.

- Study aids: snapshots taken of notes or from notebooks are easy to view and access in a collated gallery of all phone images. Swiping motions with the finger navigate through the images swiftly, and pinch-to-zoom motions bring detail into focus.

Messages. Text messaging and phones go hand-in-hand, and are often the culprit for distracting students when their attentions should be elsewhere. Still, the 160 character text is simple to compose and quick to deliver, and can be utilized in the classroom most effectively.

- Notifications: teachers can send mass texts to remind students of impending due dates or inform about what subjects will be covered the following day in class.

- Pop quizzes: A quick text asking students to "Name the four bases of DNA" can be effective for administering a quick pop quiz. It is easy to identify who has or has not responded for record keeping, and like email if the message is undeliverable to a specific recipient the sender will usually get a notification stating as much. Used whilst in class the teacher can be vigilant of cheating (is the student making many unusual swiping motions on

their screen, looking to other students for the answer, or taking an inordinately long time to respond) and unnecessary texting or browsing.

Music player and Voice Recorder. While perfectly suitable for playing music, player apps can also play many other audio types, such as podcasts, foreign language instruction tracks, and anything recorded on the device using the voice recorder. The native app versions of these two will work quite nicely for the intended functionality.

- Sharable Lectures: Extend the life of the classroom by offering audio files of lectures that can be shared via email or through a cloud device, such as Dropbox. Students can continue to learn about any number of subjects past the time the final bell rings, giving them the opportunity to learn at their own pace at home in time for the next class session. Students may wish to listen while browsing a site, reading through a textbook, or perhaps on the bus to and from school or in the car.

- Student Podcasts: Rather than just letting teachers record audio sessions, give students the opportunity to create their own podcast about a topic they are interested in. These can be shared easily with teacher and classmates and last until they are deleted.

- Music Practice: Students in the musical arts, such as band or choir, might benefit immensely from recording group or solo sessions both in and out of the music room that they can playback later for reference or to study where improvements can be made.

Task manager. Also referred to as to-do lists or reminders depending on the operating system, task managers make it easy to create itemized lists for various purposes. Third-party apps such as Wun-

derlist have synching capabilities so that lists are shared across all devices (computer, phone, tablet), and can even be shared with other users of the application (perfect for group projects).

- Digital Syllabi: Class subjects can be broken down by units into a list, which is further broken down into a hierarchy of learning units. For example: Biology > Genetics > DNA > proteins. Students and educators can keep track of the progression of a class easily and with the ability to share with one another.

Instagram 4.4.4 @victor_krucial

Et206 #studying for our first test! #electriciantraining #college #school #getthere #gonnabemakingthatballercheddar #yousnoozeyoulose

- Symbiotic Synching: When available, synching task manager and calendar apps together keeps lists and dates perfectly organized.

Weather. It might not be immediately obvious how or why a weather app can be both fun and educational in the classroom. They can be very basic and not really offer much beyond a forecast snapshot. Third party weather apps, however, can be extraordinary. Some are not only beautiful to look at, but also provide a depth of information beyond just temperature and whether the day will be sunny or rainy.

- Enhanced Global Awareness: Use forecasts and maps in class to see what the weather is like in other parts of the world and how that affects crops, livestock, climate change, and quality of life.

- Life and Earth Sciences: What is weather like in the Arctic, in different types of forests, or in deserts around the globe? Have students explain what makes monsoonal weather conditions in the San Joaquin Valley of Central California.

There is no shortage of apps that can accomplish a myriad of tasks, and many of them can be used by students and in the classroom to provide a layer of learning not previously available to educators. While the list above can serve as a jumping-off point, educators should feel encouraged to find apps that work for them in their designated field and apply them as they see fit. With a few exceptions (poor design or functionality, instability, incorrect information) there really isn't a wrong way to use these resources for positive educational gain given that they are largely affordable (most of them are free) and easily accessible.

When in doubt, look for special collections of downloadable apps that have been put together by the app store themselves. Apple, for example, almost always has a collection of recommended apps by subject and use that make the process of looking for something new very easy.

Gallery 4.1 Curated collections of apps in the Apple App Store

A dedicated EDUCATION tab makes it easy to find apps tailor made for students of all ages and disciplines

Creators and Curators

One of the most exciting aspects of social media, social networking, and digital technologies, is that the power to create is in the hands of every person. Some schools offer programming classes to kids in elementary schools, and there is an abundance of freeware (free software) available to dabble in graphic design and coding. YouTube made it possible to create original video content and share it on a global scale with a point-and-click system. Pinterest and Polyvore made it popular to bring different images together in an organized fashion to present a visual storyboard of information. Blogger and WordPress made blogging both easy and highly customizable so that blogging evolved into an employment opportunity. In this new spectrum of aggregating and sharing that didn't even exist twenty years ago, we have emerged as a global community of not only information consumers, but also creators and curators.

Imagine if the computer labs of two decades ago were replaced today with studios equipped with video cameras, light umbrellas, microphones, green screens, DSLRs, WiFi, and computers with a full range of Adobe Creative Suite (PhotoShop, Illustrator, InDesign, Premiere) programs. Some equipment, such as light umbrellas, green screens, audio booms, backdrops, and props, can be crafted by students or teachers within a classroom, lowering the school's cost to purchase equipment from a vendor.

Historical reenactments could be performed against a green screen and shown in classrooms as part of the curriculum. Chemistry labs could be executed on camera for both education and entertainment purposes. Book reports and speeches in English classes could be recorded and reviewed for improvement. Choirs could perform a concert and burn it to DVD to sell to parents and members of the community for fundraising purposes.

Such interdisciplinary endeavors can serve to give students not only confidence and opportunities to express themselves, but to also learn a set of skills that are unique to their generation and a job market adjusting to include social media in various capacities. "More Americans today work in arts, entertainment, and design than work as lawyers, accountants, and auditors" (Pink, 2006, p.55). Students should be prepared appropriately.

These activities would not only benefit the students participating in the process, but also students in future classes who can watch and improve upon existing material as technologies improve and skills are acquired.

Howard Gardner (2004) said that when multiple entry points are used the chances of understanding are enhanced and the manner in which understanding is conceptualized is broadened. If those multiple entry points include traditions learned by educators and new technologies students are already well versed in, powerful and meaningful learning can be the result and students may be the better for it.

YouTube 4.1 What Most Schools Don't Teach - featuring Mark Zuckerberg...
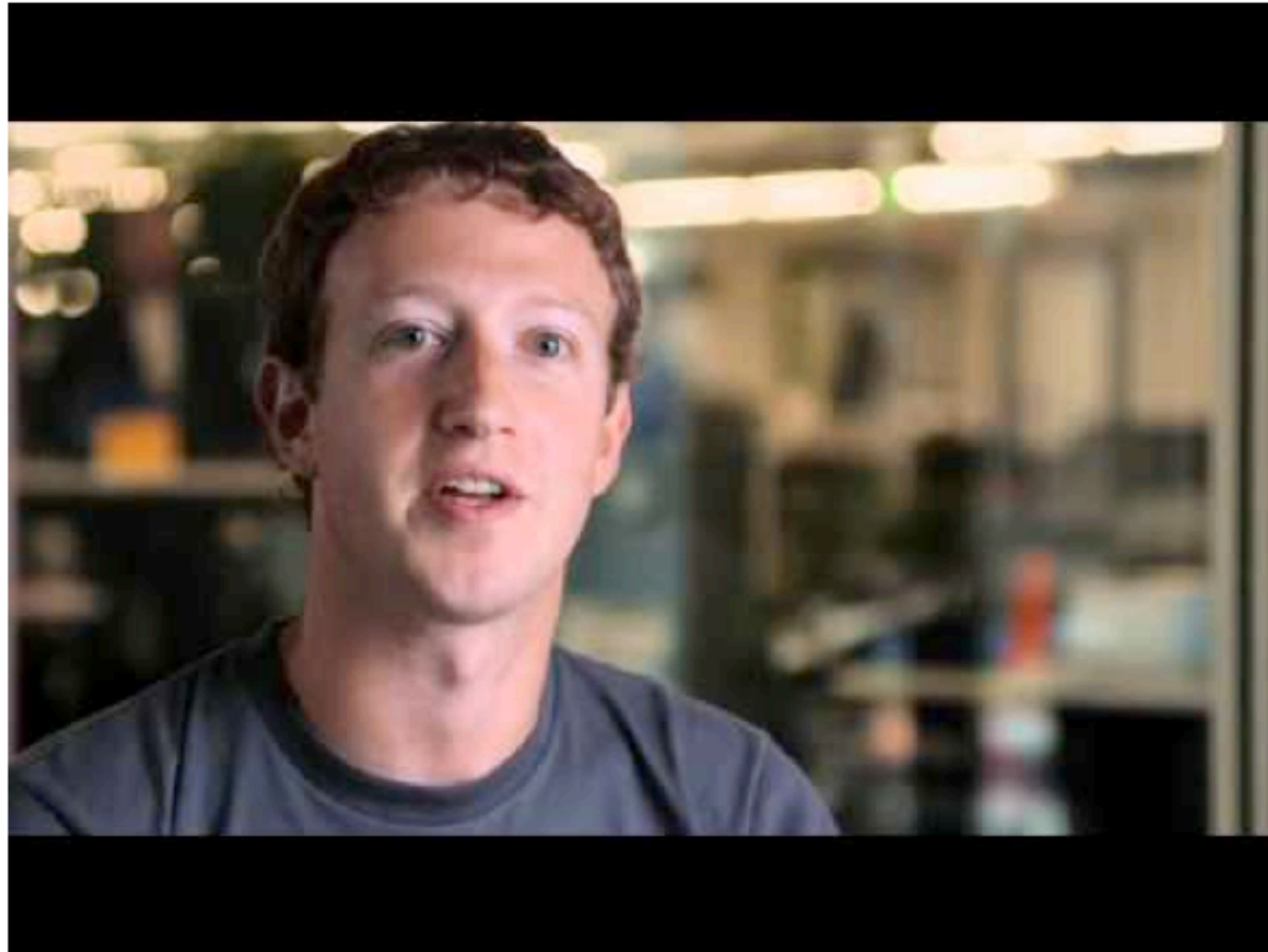
Edutainment

In a news article (Moritz, 2012) about a trio of high schools in Virginia with differing stances on the use of cellphones in school, Thelma Hinton, Vice Chair of the Suffolk Public Schools, said, "We don't want to please the children, we want to focus on the academics of the children." Of course, pleasing the children suggests that to do so might shift control or ownership of the classroom from the educators to the students, but what student goes to school each day saying, "Entertain me"? They certainly don't need to be entertained, what with the ample amounts of fun waiting for them outside of the classroom in the form of video games, hanging out with friends, and doing things they aren't required by law (and their parents) to do for seven hours a day, five days a week. But what if it was entertaining? What if a student looked forward to going to school every day because they knew that when they got there they would be doing something incredible, something they might not be able to do anywhere else? What would be wrong with that?

Digital technologies like the smartphone and tablet that have come about because of the internet haven't just made our lives more efficient or organized, they've also made them fun. Why shouldn't education receive the same benefit? Learning needn't be devoid of entertainment to still be educational, and entertainment can be smart or informative without debasing to the lowest common denominator of empty popular culture.

Take for instance popular YouTube channel VSauce, which regularly creates original content about a variety of topics such as: why we feel nostalgia, traveling through a black hole, and why things are cute or creepy. Through the attention-grabbing titles and entertaining visuals and sound effects, there is quality information being dispensed, such as how the human brain creates the sensation of nostalgia, astrophys-

ics, and the human perception of the uncanny valley. A viewer can become so immersed in the entertainment factor of the video that they might not immediately recognize they are learning something, too. That is the sweet spot of edutainment.

The point is not to trick students into being educated by entertaining them, but to foster a level of engagement to the point where it can be enjoyable, it is interesting for the students, and they want to learn.

Take for example a study (Kessler, 2010) conducted with students to analyze how they perform when tasked with contributing to class discussion via Twitter. This sounds odd. At 140 characters a tweet is shorter than a text message, and composing a meaningful tweet can be quite difficult; which is precisely the point. Whatever point a student wishes to contribute must be carefully thought out and then shaved down to the most important elements of the thought, like whittling a block of wood into a statue with a recognizable shape. The students in the study "increased their engagement over a semester more than twice as much as the control group" ("Social Networking in Schools", 2011 via Kesslery, 2010). The students were essentially forced to reevaluate how they formulated an idea or concept so that it fit within the very tight confines of a tweet.

"The rise of the Internet has challenged our minds in three fundamental and related ways: by virtue of being participatory, by forcing users to learn new interfaces, and by creating new channels for social interaction" (Johnson, 2006, Kindle Locations 962-964). Above and beyond being fun and easy vehicles for socialization, web technologies can present a user with a different way to think about something with which they are already familiar. This discovery is "critical to learning as it enables students to experience cognitive restructuring and develop new ideas (Kearne et al., 2007, via Chung, Leet & Luit, 2013).

While digital technologies do make certain tasks easier, they do not necessarily eliminate the task of discovery and how satisfying completing difficult work can be. Take the example of Twitter used above. While the use of a social networking site to complete a homework assignment might seem superficial, imagine for a moment how not easy the task actually is. One hundred and forty characters isn't a lot of space to say something, whether it is meaningful or not. You have to get to the point quick- Oops, I ran out of characters. It's not unlike turning in the final draft of a paper that went through several revisions, drafts, and swishes of red ink corrections, knowing that extraneous words are eliminated, sentences are sharpened to finite detail, and everything reads academically from opening introduction to final concluding sentence.

As an undergrad, my first non-GE course was the history of art from the Italian Renaissance to our modern epoch, and I never purchased the book. In my defense it was very expensive, even used and older editions, and while I could have pursued other means of obtaining the book (such as via library loan), I instead relied upon taking copious notes from the lectures and searching online for images and further research. When the professor, Dr. Mihalopoulos, returned our midterms she had written a note on mine saying it was one of the best in the class and if I was not already an art history major, would I consider a switch? She ended the note with an invitation to come speak to her at any time to discuss my future. I switched majors that week. Dr. Mihalopoulos -- who was born in Greece, finished her dissertation in nine months at University of Southern California, and was formerly a curator at the world famous Getty Villa -- became my mentor and took me under her wing (I was her unofficial TA) for the last two years of my undergrad career. Long after that first class with her ended I told her about never having the textbook, and to this day I can recall the look of surprise on her face. Incidentally, she ended up gifting me her own copy of it from her tenure as a student.

Dr. Mihalopoulos relied heavily on PowerPoint presentations to illustrate stories about works of art, famous architecture, and the mythologies that bound them all together like a ribbon through history. Unlike many other professors, her lectures did not come straight from the text, they came from firsthand experiences and a deep understanding of the subject matter (as opposed to memorization). She was, simply put, entertaining, and for students who--like me--benefit more from a a visual or immersive learning experience, it worked. I could argue the textbook wasn't required at all, but I won't, because this book isn't about smartphones or tablets replacing textbooks and traditional pedagogies, it's about smartphones and tablets enhancing textbooks and traditional pedagogies.

Imagine if, instead of selecting a required textbook and assigning reading from it, students were asked instead to find other methods to aid in understanding class material. What could students and teachers alike come up with to enrich the learning experience beyond the papers of a textbook?

In a high school world history class, to illustrate the reality of American soldiers sitting in trenches during WWII, we constructed our own trenches in the classroom (using backpacks and desk chairs, lights off) while watching a movie that reenacted that specific condition.

Creating a collaborative learning experience and environment where students are encouraged to apply study methods that work specifically for their style of learning, can be a powerful way to help them inherently understand the material, rather than just memorizing and regurgitating the information once the final test is concluded. That sweet spot at the junction between Education and Entertainment can be a most valuable tool in and out of the classroom.

Looking to the Future

"*The successful student is one who learns how to use research materials, libraries, notecards, and computer files as well as knowledgeable parents, teachers, older students, and classmates, in order to master those tasks of schools that are not transparently clear*" (Gardner, 2004, p. 136).

Some school districts are already embracing the move to more handheld digital technologies. The Los Angeles Unified School District has a $30 million contract with Apple to provide 31,000 students in 47 schools with iPads. By late 2014 they will have given an iPad to every student - all 640,000 of them - in Los Angeles (Paczkowski, 2013). In Clear Creek Independent School District in League City, TX, 30,000 Dell Latitude tablets will be distributed to students at the start of the school year to use every year of their academic tenure (Bosier, 2013). In college campuses across the country you will find students in classrooms taking notes on tablets in addition to their laptops and old fashion pen and paper. Computing technologies have evolved from enormous machines stored in rooms to desktops, to laptops, to tablets and phones (and a few *phablets*, or phone/tablet hybrids), and soon to everyday wearable items.

In research and development offices new technologies are being created that will likely shape a new way in which we use technology. Among these innovations is wearable technology; every day items you wear that are equal parts form and function. They vary in range from silly and whimsical, such as a dress equipped with bluetooth that lights up upon receiving a phone call (Cunningham, 2009), to hearty and powerful, such as watches and glasses.

Google Glass

Google has been developing their Google Glass headset for some time now, and demonstrations of the product have shown just how powerful wearable technology can be.

The Glass device is essentially a hands-free augmented reality device that rests on the face like a pair of glasses. A tiny screen transmits a layer of information within the user's field of vision so that they are unencumbered in their activities. The user has the benefit of not having to experience the augmented reality through a device, thus missing out on the goings-on around them.

Like a smartphone, the Glass device can take photos and video and connect to live synchronous conversations with anyone in the world via Google Hangouts. It can route out directions using GPS, send messages, make phone calls, translate foreign languages, and in some cases display answers to questions before they are even asked (depending on where the user is, such as in an airport).

Browser 5.1 Tap to launch the Google Glass website

"A man controls Google Glass using the touchpad built into the side of the device."

GLASS

In the Glassroom

Imagine taking a class field trip to The Getty in Los Angeles, the Louvre in Paris, or the National Archaeology Museum of Athens in Greece. Or perhaps to CERN in Geneva to see the Large Hadron Collider, AMGEN in Thousand Oaks to see pharmaceutical research and development, or Kennedy Space Center in central Florida. There would be no permission slips to sign, no crowds of kids to wrangle into single-file lines, and no cost to the school for travel and food, and every person has a front row seat from a first person perspective. With Glass it will be possible.

Classrooms are no longer confined to rooms within a school building as online programs have flourished over the past decade. One can be anywhere to learn, and likewise one can be anywhere to teach. An educator on his/her trip to a national landmark or museum can with Glass record a tour of what they see and play it back to his/her students in the classroom. Better yet, a tour guide from a specific location could partner with a school to perform a live virtual tour, bringing students to a place of interest in real time. Suddenly the boundaries of a classroom are diminished and a student can go anywhere at any time.

Conclusion

Digital technologies offer unprecedented opportunities for improvement in our education system so that the student of today is learning for tomorrow. We are all as connected as we choose to be, and teenagers are more connected than most. It has shaped the way they communicate, provided new ways for them to express themselves, and opened their world up to a truly global community of almost unlimited access to information. Incorporating these new instruments into education opens the classroom in ways that have the potential to revolutionize how students learn and educators teach. The relationship between the two, however, should be symbiotic. Educators today have the resources -- and students the intimate knowledge of those resources -- to pioneer new forms of learning in the classroom that can aid in improving Education as a whole and updating it to reflect current times. These digital technologies we wield in our hands are only going to evolve into faster, smarter, and more interactive devices, and soon our lives may look very similar to what science fiction movies have been depicting for ages. Education should carve a parallel path to digital technological innovation, moving in tandem and making use of the ease and effectiveness with which these technologies augment our standard of living. For educators unfamiliar or uncomfortable with adapting to digital change, allow students to serve as a guide--to be the ones educating on something they are the experts at. Students that want to succeed are just as invested in their education as schools are in teaching, so why not integrate what they are comfortable with into their learning environment?

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